Mathematics

K-2: NUMERATION

State Mathematics Performance Standards Proficient Level Descriptors (to be assessed in 3rd grade)	**At the Kindergarten level, students know and are able to do (with teacher assistance) everything required at earlier ages and:**	**At the 1st grade level, students know and are able to do everything required at earlier ages and:**	**At the 2nd grade level, students know and are able to do everything required at earlier ages and:**
A1.1.1 Read, write, model, order, count, and demonstrate one-to-one correspondence with whole numbers up to 100.	• *identify numbers 0-20* • *use manipulatives to build sets of numbers 0-10* • *rote count numbers to 50*	• *identify numbers 0-200* • *count to 200, including "counting on"*	• *count, group, round-off numbers using the base 10 numeration system* • *identify numbers 0-1000* • *count to 1000, including "counting on"*
A1.1.2 Use, model, and identify place value positions of 1's, 10's, and 100's.		• *build numbers from 1-200 showing ones, tens, and hundreds*	• *build numbers from 1 up to 1000 on place value board*
A1.1.3 Model and explain the processes of addition and subtraction, describing the relationship between the operations.	• *solve story problems using concrete materials*	• *use manipulatives/paper and pencil to build basic addition and subtraction facts* • *solve story problems using concrete materials* • *develop skill in use of a calculator to compute answers and solve problems* • *use manipulatives to solve two-digit addition and subtraction** • *state/write addition and subtraction facts without computation* • *develop, use, and share own strategies for computation* • *observe and describe the relationship between mathematical concepts (e.g., addition and subtraction)*	• *use manipulatives to build basic addition and subtraction facts* • *solve story problems using concrete materials* • *develop skill in use of a calculator to check answers and solve problems* • *use manipulatives to solve two-digit addition and subtraction, including regrouping* • *state/write addition and subtraction fact sums through 20* • *develop, use, and share own strategies for computation* • *use a variety of strategies to solve problems* • *subtract and add to hundreds place with no regrouping* • *observe and describe the relationship between mathematical concepts (e.g., addition and subtraction)*
A1.1.4 Select and use various representations of ordinal and cardinal numbers.	• *participate in activities using cardinal and ordinal numbers*	• *demonstrate use of cardinal and ordinal numbers 1-12*	• *demonstrate use of cardinal and ordinal numbers 1-20*
A1.1.5 Identify, model, and label simple fractions, describing and defining them as equal parts of a whole, a region or a set.	• *participate in activities using fractional parts; half and whole*	• *identify and model simple fractional parts of one: half, quarter, third, and whole* • *describe and define them as equal parts of a whole, a region or a set* • *observe and describe the relationship between whole numbers and fractions*	• *identify, model, and label simple fractional parts* • *describe and define them as equal parts of a whole, a region or a set* • *observe and describe the relationship between whole numbers and fractions*
A1.1.6 Identify, describe, and extend patterns inherent in the number system. Skip count by 2's, 5's, and 10's. Add and subtract by 10. Identify even and odd numbers.	• *participate in activities counting by tens*	• *skip count by 5 and 10 up to 100* • *skip count by 2 to 50*	• *skip count by 2, 5, and 10 up to 1000* • *add and subtract by tens* • *identify even and odd numbers*

A1.1.7 Demonstrate the commutative and identity properties of addition.	• *participate in simple commutative and addition activities (e.g., 1+2=3, 2+1=3) and identity properties (2+0=2, 3+0=3)*	• *build number families: addition and subtraction* • *use the identity properties of addition and subtraction and the commutative property of addition*	• *build number families: addition and subtraction* • *use the identity properties of addition and subtraction and the commutative property of addition*

K-2: MEASUREMENT

State Mathematics Performance Standards Proficient Level Descriptors (to be assessed in 3rd grade)	**At the Kindergarten level, students know and are able to do (with teacher assistance) everything required at earlier ages and:**	**At the 1st grade level, students know and are able to do everything required at earlier ages and:**	**At the 2nd grade level, students know and are able to do everything required at earlier ages and:**
A2.1.1 Compare and order objects by various measurable attributes including calendar temperature, length, weight, capacity, area, and volume.	• *participate in activities comparing objects by various measurable attributes (e.g., size, length, weight)* • *participate in naming and ordering the days of the week* • *sort and classify objects by different attributes: color, size, and shape*	• *demonstrate attributes of length, height, and weight* • *compare and order objects by various measurable attributes (including time, length, weight, capacity, area, volume, and temperature)* • *name and order the days of the week and months of the year*	• *compare and order objects by various measurable attributes (including time, temperature, length, weight, capacity, area, and volume)* • *name and order the days of the week and months of the year*
A2.1.2 Compare objects to standard and non-standard units to identify objects that are greater than, less than, and equal to a given unit.	• *participate in activities comparing objects using non-standard units (e.g., length and weight)*	• *compare objects to standard and non-standard units to identify objects that are greater than, less than, and equal to a given unit (e.g., inch, foot)* • *use a variety of non-standard and standard measuring tools*	• *compare objects to standard and non-standard units to identify objects that are greater then, less than, and equal to a given unit* • *apply metric and English units of measurement for real-life problems: weight, length, and volume* • *use a variety of non-standard and standard measuring tools*
A2.1.4 Choose a unit of measure, estimate the length or weight of objects, and then measure to check for reasonableness.	• *participate in estimation and measurement activities*	• *estimate the length and weight of objects and then measure to check for reasonableness*	• *estimate the length and weight of objects and then measure to check for reasonableness*
A2.1.5 Tell time to the nearest half-hour, distinguishing between morning, afternoon, and evening.	• *distinguish between morning, afternoon, and night*	• *distinguish between morning, afternoon, evening, and night* • *tell time to the nearest hour and half hour*	• *tell time to the nearest quarter hour*
A2.1.6 Identify coins, their value, and the value of given sets of coins.	• *participate in activities using coins and currency*	• *identify coins and currency and their value* • *count combinations of pennies, nickels, and dimes*	• *identify coins and currency, their values, and the value of various combinations*

K-2: ESTIMATION AND COMPUTATION

State Mathematics Performance Standards Proficient Level Descriptors (to be assessed in 3rd grade)	**At the Kindergarten level, students know and are able to do (with teacher assistance) everything required at earlier ages and:**	**At the 1st grade level, students know and are able to do everything required at earlier ages and:**	**At the 2nd grade level, students know and are able to do everything required at earlier ages and:**
A3.1.1 Make reasonable estimate of "how many" and "how much"; estimate the results of simple addition and subtraction problems.	• *participate in estimation and counting activities (e.g., guessing jar, calendar, lunch count)*	• *make reasonable estimates of "how many" and "how much"; estimate the results of simple addition and subtraction* problems*	• *make reasonable estimates of "how many" and "how much"; estimate the results of simple addition and subtractions problems*
A3.1.2 Recall and use basic addition and subtraction facts orally and with paper and pencil without a calculator.	• *participate in simple addition and subtraction activities using manipulatives*	• *recall and use basic addition and subtraction facts, orally and with paper and pencil*	• *recall and use basic addition and subtraction facts with sums through 20, orally and with paper/pencil*
A3.1.3 Add and subtract whole numbers to 100 using a variety of models and algorithms.	• *participate in simple addition and subtraction activities using manipulatives connected to teacher-modeled algorithms (number sentences)*	• *add and subtract whole numbers, using a variety of models: fact families, algorithms, and mental computation*	• *add and subtract whole numbers, using a variety of models and algorithms; add and subtract two-digit numbers (regrouping in addition and subtraction); use mental computation*
A3.1.4 Model multiplication as repeated addition; model division as "sharing equally" and grouping objects.		• *model multiplication as repeated addition; model division as "sharing equally" and grouping objects*	• *model multiplication as repeated addition; model division as "sharing equally" and grouping objects*
Sitka Standard Only: A3.1.6 Describe and model how fractions represent various situations including parts of regions (e.g., ½ of the circle), parts of a whole (e.g., ½ of the cookies), and parts of a set (e.g., ½ of the people).	• *participate in activities demonstrating half and whole*	• *describe and model how fractions represent various situations, including parts of regions and wholes*	• *describe and model how fractions represent various situations, including parts of regions, wholes, and sets*

K-2: FUNCTIONS AND RELATIONSHIPS

State Mathematics Performance Standards Proficient Level Descriptors (to be assessed in 3rd grade)	**At the Kindergarten level, students know and are able to do (with teacher assistance) everything required at earlier ages and:**	**At the 1st grade level, students know and are able to do everything required at earlier ages and:**	**At the 2nd grade level, students know and are able to do everything required at earlier ages and:**
A4.1.1 Recognize, describe, create, and extend, repeating and increasing patterns with a variety of materials including symbols, objects, and manipulatives.	• *read, copy, extend, recognize, and create AB patterns using a variety of manipulatives*	• *recognize, describe, extend, and create repeating and increasing patterns with a variety of materials including symbols, objects, and manipulatives*	• *recognize, describe, extend, and create repeating and increasing patterns with a variety of materials including symbols, objects, and manipulatives*
A4.1.2 Generate and solve simple functions by identifying and applying addition and subtraction patterns.		• *solve simple functions by identifying and applying addition and subtraction patterns*	• *generate and solve simple functions by identifying and applying addition and subtraction patterns*
A4.1.3 Use a calculator to find and extend patterns in the number system.		• *use a calculator when appropriate*	• *use a calculator when appropriate*
A4.1.5 Complete open space sentences with missing numbers; use appropriate vocabulary including greater than, less than, and equal to; and use the correct symbols.	• *participate in manipulative activities that demonstrate the concepts of more than, less than, and equals*	• *use manipulatives that demonstrate the concepts of more than, less than, equals*	• *complete open space sentences with missing numbers and symbols using appropriate vocabulary*

K-2: GEOMETRY

State Mathematics Performance Standards Proficient Level Descriptors (to be assessed in 3rd grade)	**At the Kindergarten level, students know and are able to do (with teacher assistance) everything required at earlier ages and:**	**At the 1st grade level, students know and are able to do everything required at earlier ages and:**	**At the 2nd grade level, students know and are able to do everything required at earlier ages and:**
A5.1.1 Identify, sort, describe, model, and compare circles, triangles, and rectangles regardless of orientation.	• *identify four basic shapes (circle, square, rectangle, triangle)* • *sort by shape* • *recognize geometric shapes in the environment: square, circle, triangle, and rectangle*	• *identify, sort, describe, model, and compare plane geometric figures including triangles, circles, squares, and rectangles* • *recognize and relate geometric principles to everyday life*	• *identify and manipulate plane geometric figures including triangles, circles, squares, and rectangles* • *recognize and relate geometric principles to everyday life*
A5.1.2 Identify, sort, describe, model and compare solid figures including cubes, cylinders, and spheres.	• *sort solid figures by shape*	• *identify, sort, describe, and compare solid geometric figures (e.g., cones, spheres, cylinders, and cubes)*	• *identify, sort, describe, model, and compare solid geometric figures (e.g., cones, spheres, cylinders, and cubes)*
A5.1.3 Identify and create examples of line symmetry; compare and describe given circles, triangles, and rectangles as larger, smaller, or congruent.	• *compare and sort by size*	• *identify and create examples of line symmetry; compare and describe given circles, triangles, and rectangles as larger, smaller, or congruent*	• *identify and create examples of line symmetry; compare and describe given circles, triangles, and rectangles as large, smaller, or congruent*
A5.1.4 Demonstrate conservation of area using drawings or manipulatives.		• *estimate, determine, and compare perimeter and area using manipulatives* • *demonstrate conservation of area*	• *demonstrate conservation of area*
A5.1.5 Describe and identify geometric transformations including slides, flips, and turns.		• *participate in activities which describe and identify geometric transformations as slides, flips, and turns*	• *describe and identify geometric transformations as slides, flips, and turns*
A5.1.6 Use comparative directional and positional words: above, below, inside, outside, on, in, right and left, horizontal, vertical, and middle.	• *use comparative directional and positional words (e.g., above, below, inside, outside, on and in)*	• *use comparative, directional, and positional words: above, below, inside, outside, on, in right, left, and middle, etc.*	• *use comparative directional and positional words: above, below, inside, outside, on, in right, left, horizontal, vertical, and middle*
A5.1.7 Draw and build familiar shapes.	• *participate in activities building familiar shapes*	• *draw and build familiar shapes*	• *draw and build familiar shapes*

K-2: STATISTICS/PROBABILITY

State Mathematics Performance Standards Proficient Level Descriptors (to be assessed in 3rd grade)	**At the Kindergarten level, students know and are able to do (with teacher assistance) everything required at earlier ages and:**	**At the 1st grade level, students know and are able to do everything required at earlier ages and:**	**At the 2nd grade level, students know and are able to do everything required at earlier ages and:**
A6.1.1 Collect, record, organize, display, and explain the classification of data.	• *participate in activities to collect, record, organize, display, and interpret data*	• *collect, record, organize, display, and explain classification of data*	• *formulate and solve problems that involve collecting, displaying, and analyzing data (i.e., draw inferences and construct arguments based on data analysis)*
A6.1.2 Describe and interpret data from a variety of visual displays including tallies, tables, pictographs, bar graphs, and Venn diagrams.	• *participate in activities to construct and interpret data from a variety of visual displays (e.g., real graphs and picture graphs)*	• *construct and read displays of data including tallies, tables, pictographs, Venn diagrams, and concrete and bar graphs,*	• *construct and read displays of data including tallies, tables, pictographs, Venn diagrams, and concrete, line, circle, and bar graphs,*
A6.1.3 Use the terms maximum and minimum when working with a data set.	• *use the terms "more" and "less" when working with a data set*	• *use the terms "most" and "least" when working with data*	• *use the terms "minimum" and "maximum" when working with data*
A6.1.5 Find and record the possibilities of simple probability experiments; explain differences between chance and certainty, giving examples.		• *perform and record simple activities involving probability (e.g., flipping coins, rolling dice, using spinners)* • *participate in a discussion explaining the difference between chance and certainty*	• *perform and record simple activities involving probability* • *explain the differences between chance and certainty*
A6.1.6 Conduct a survey and tally the results.	• *participate in classroom surveys*	• *conduct a survey and tally the results*	• *conduct a survey and tally the results*

K-2: PROBLEM SOLVING

State Mathematics Performance Standards Proficient Level Descriptors (to be assessed in 3rd grade)	**At the Kindergarten level, students know and are able to do (with teacher assistance) everything required at earlier ages and:**	**At the 1st grade level, students know and are able to do everything required at earlier ages and:**	**At the 2nd grade level, students know and are able to do everything required at earlier ages and:**
B1.1.1 Formulate problems from practical and mathematical activities.	• *participate in real-life math situations (e.g., share snack, use recipe)*	• *participate in activities in identifying mathematical questions and/or formulate problems from real-life situations*	• *participate in activities in identifying mathematical questions and/or formulate problems from practical situations and mathematical activities*
B1.1.2 Develop and apply strategies including guess and check, modeling and acting out, drawings, extending patterns to solve a variety of problems.	• *participate in activities using problem-solving strategies (e.g., guess and check, make a drawing, find a pattern)*	• *develop problem-solving strategies including guess and check, make a drawing, find a pattern to solve a variety of problems*	• *apply problem-solving strategies including guess and check, make a drawing, find a pattern to solve a variety of problems*
B1.1.3 Predict an answer before solving a problem and compare results to check for reasonableness.	• *participate in activities to predict an answer before solving a problem and compare results (e.g., guess and check)*	• *predict an answer before solving a problem and compare results to check for reasonableness*	• *predict an answer before solving a problem and compare results to check for reasonableness*

K-2: COMMUNICATION

State Mathematics Performance Standards Proficient Level Descriptors (to be assessed in 3rd grade)	**At the Kindergarten level, students know and are able to do (with teacher assistance) everything required at earlier ages and:**	**At the 1st grade level, students know and are able to do everything required at earlier ages and:**	**At the 2nd grade level, students know and are able to do everything required at earlier ages and:**
C1.1.1 Translate problems from everyday language into mathematical language and symbols.	• *participate in problem-solving activities using simple mathematical language and symbols*	• *translate problems from everyday language into mathematical language and symbols*	• *translate problems from everyday language into mathematical language and symbols*
C1.1.2 Use manipulatives, models, pictures, and language to represent and communicate mathematical ideas	• *participate in activities using concrete objects, manipulatives, pictures, and language to represent and communicate mathematical ideas (e.g., quantity, shape, weight, size) in simple graphs*	• *use concrete objects, manipulatives, pictures, and language to represent and communicate mathematical ideas (e.g., quantity, shape, weight, size) in simple graphs*	• *use concrete objects, manipulatives, pictures, and language to represent and communicate mathematical ideas (e.g., quantity, shape, weight, size) in simple graphs*
C1.1.3 Use everyday language to explain thinking about mathematical problem strategies and solutions to problems.	• *participate in activities communicating mathematical problem-solving strategies*	• *use everyday language to explain thinking about mathematical problem-solving strategies and solutions to problems*	• *use everyday language to explain thinking about mathematical problem-solving strategies and solutions to problems*

K-2: REASONING

State Mathematics Performance Standards Proficient Level Descriptors (to be assessed in 3rd grade)	**At the Kindergarten level, students know and are able to do (with teacher assistance) everything required at earlier ages and:**	**At the 1st grade level, students know and are able to do everything required at earlier ages and:**	**At the 2nd grade level, students know and are able to do everything required at earlier ages and:**
D1.1.1 Draw logical conclusions about mathematical problems.		• *draw logical conclusions about mathematical problems*	• *draw logical conclusions about mathematical problems*
D1.1.2 Find examples that support or refute mathematical statements.		• *find examples that support or refute mathematical statements*	• *find examples that support or refute mathematical statements*
D1.1.3 Explain why a prediction, estimation, or solution is reasonable.	• *participate in activities which explain why a prediction, an estimation, or a solution is reasonable*	• *explain why a prediction, an estimation, or a solution is reasonable*	• *explain why a prediction, an estimation, or a solution is reasonable*

K-2: CONNECTIONS

State Mathematics Performance Standards Proficient Level Descriptors (to be assessed in 3rd grade)	**At the Kindergarten level, students know and are able to do (with teacher assistance) everything required at earlier ages and:**	**At the 1st grade level, students know and are able to do everything required at earlier ages and:**	**At the 2nd grade level, students know and are able to do everything required at earlier ages and:**
E1.1.1 Apply mathematical skills and processes to literature.	• *participate in activities where mathematical skills are applied to other disciplines(e.g., telling time, music patterns), especially literature*	• *apply mathematical skills and processes to other disciplines (e.g., telling time, music patterns), especially literature*	• *apply mathematical skills and processes to other disciplines(e.g., telling time, music patterns), especially literature*
E1.1.2 Apply mathematical skills and processes to self and family.	• *apply mathematical skills and processes to everyday life (e.g., directions to a friend's house, shopping), especially to self and family*	• *apply mathematical skills and processes to everyday life (e.g., directions to a friend's house, shopping)), especially to self and family*	• *apply mathematical skills and processes to everyday life (e.g., directions to a friend's house, shopping)), especially to self and family*

3rd-5th: NUMERATION

State Mathematics Performance Standards Proficient Level Descriptors (to be assessed in 6th grade)	**At the 3rd grade level, students know and are able to do everything required at earlier ages and:**	**At the 4th grade level, students know and are able to do everything required at earlier ages and:**	**At the 5th grade level, students know and are able to do everything required at earlier ages and:**
A1.2.1 Read, write, model, order, and count with positive whole numbers to 1,000,000 and negative whole numbers.	• *read, write, model, and count with positive whole numbers to 10,000*	• *read, write, model, and count with positive whole numbers to 100,000*	• *read, write, model, order, and count with positive whole numbers to 1,000,000*
A1.2.2 Use, model, and identify place value positions from 0.001 to 1,000,000.	• *use and model place value positions from 1 to 10,000*	• *use and model place value positions from 0.01 to 100,000*	• *identify place value positions from 0.001 to 1,000,000*
A1.2.3 Model and explain the processes of multiplication and division. Describe the relationships among the four operations.	• *model and explain the process of multiplication; describe the relationships between multiplication and addition*	• *model and explain the process of multiplication and division; describe the relationships among the four operations*	• *model and explain the processes of multiplication and division, describing the relationships among the four operations*
A1.2.4 Identify and describe different uses for the same numerical representation.	• *identify different representations for the same number (standard notation and expanded notation)*	• *identify and describe different uses for the same numerical representation (e.g., ¼ can represent a fraction or a decimal) and different representations for the same number*	• *identify and describe different uses for the same numerical representation and different representation for the same number*
A1.2.5 Model and explain the process of adding and subtracting fractions with common denominators and decimals that represent money.	• *model and explain the process of adding and subtracting decimals that represent money*	• *model and explain the process of adding and subtracting fractions with common denominators; model and explain the process of adding and subtracting decimals that represent money*	• *model and explain the process of adding and subtracting fractions with common denominators and decimals that represent money*
A1.2.6 Identify and describe factors and multiples including those factors and multiples common to a pair or set of numbers.	• *identify multiples of 2, 3, 4, 5, and 10*	• *identify multiples of 1 through 12 and their corresponding factors*	• *identify and describe factors and multiples including those factors and multiples common to a pair or set of numbers*
A1.2.7 Demonstrate the commutative and identity properties of multiplication.	• *demonstrate the commutative and identity properties of multiplication*	• *demonstrate the commutative and identity properties of multiplication, division, addition, and subtraction*	• *demonstrate the commutative and identity properties of multiplication*

3rd-5th: MEASUREMENT

State Mathematics Performance Standards Proficient Level Descriptors (to be assessed in 6th grade)	**At the 3rd grade level, students know and are able to do everything required at earlier ages and:**	**At the 4th grade level, students know and are able to do everything required at earlier ages and:**	**At the 5th grade level, students know and are able to do everything required at earlier ages and:**
A2.2.1 Estimate and measure weights, lengths, and temperatures to the nearest unit using the metric and standard systems.	• *estimate and measure weights, lengths, and temperatures to the nearest unit using the metric and standard systems*	• *estimate and measure weights, lengths, and temperatures to the nearest unit using the metric and standard systems*	• *estimate and measure weights, lengths, and temperatures to the nearest unit using the metric and standard systems*
A2.2.2 Identify and use equivalent measurements (e.g., 60 minutes = 1 hour, 7 days = 1 week).	• *identify and use equivalent measurements (e.g., 60 minutes = 1 hour, 7 days = 1 week)*	• *identify and use equivalent measurements (e.g., 60 minutes = 1 hour, 7 days = 1 week)*	• *identify and use equivalent measurements (e.g., 60 minutes = 1 hour, 7 days = 1 week)*
A2.2.3 Use a variety of measuring tools: describe the attribute(s) they measure.	• *use a variety of measuring tools: describe the attribute(s) they measure (e.g., rulers measure length, thermometers measure temperature)* • *use calendars to measure time*	• *use a variety of measuring tools: describe the attribute(s) they measure (e.g., rulers measure length, thermometers measure temperature)* • *use calendars to measure time*	• *use a variety of measuring tools: describe the attribute(s) they measure (e.g., rulers measure length, thermometers measure temperature)* • *use calendars to measure time*
A2.2.4 Estimate and measure the dimensions of geometric figures.	• *estimate and use direct methods to measure and model dimensions of geometric figures*	• *estimate and use direct methods to measure and model dimensions of geometric figures*	• *estimate and use direct methods to measure and model dimensions of geometric figures*
A2.2.5 Tell time using analog and digital clocks identifying AM and PM, find elapsed time.	• *tell time to 5 minutes using analog clocks identifying AM and PM*	• *tell time using analog and digital clocks identifying AM and PM, find elapsed time*	• *tell time using analog and digital clocks identifying AM and PM, find elapsed time*
A2.2.6 Read, write, and use money notation, determining possible combinations of coins and bills to equal given amounts; count back change for any given situation.	• *read, write, and use money notation, determining possible combinations of coins and bills to equal given amounts; count back change from one dollar*	• *read, write, and use money notation, determining possible combinations of coins and bills to equal given amounts; count back change from ten dollars*	• *read, write, and use money notation, determining possible combinations of coins and bills to equal given amounts; count back change for any given situation*

3rd-5th: ESTIMATION AND COMPUTATION

State Mathematics Performance Standards Proficient Level Descriptors (to be assessed in 6th grade)	**At the 3rd grade level, students know and are able to do everything required at earlier ages and:**	**At the 4th grade level, students know and are able to do everything required at earlier ages and:**	**At the 5th grade level, students know and are able to do everything required at earlier ages and:**
A3.2.1 Describe and use a variety of estimation strategies including rounding to the appropriate place value, multiply by powers of 10, and use front-end estimation to check the reasonableness of solutions.	• *estimate by rounding to the nearest ten or hundred*	• *estimate by rounding to the nearest ten, hundred, or thousand*	• *describe and use a variety of estimation strategies (e.g., round to the appropriate place value, multiply by powers of 10, use front-end estimation) to check the reasonableness of solutions*
A3.2.2 Recall and use basic multiplication and division facts orally, with paper and pencil without a calculator.	• *recall basic multiplication facts (2, 3, 4, 5, 10) with paper and pencil*	• *recall and use basic multiplication and division facts orally, on a written timed test, and as missing factors*	• *recall and use basic multiplication and division facts orally, in timed test and as missing factors*
A3.2.3 Add and subtract whole numbers and fractions with common denominators to 12 and decimals, including money amounts, using models and algorithms.	• *add and subtract money using models and algorithms* • *add and subtract three-digit whole numbers with carrying and borrowing* • *add and subtract three-digit whole numbers with trading and regrouping (carrying and borrowing)*	• *add and subtract fractions with common denominators; add and subtract decimals (including money) using models and algorithms* • *add and subtract multi-digit whole numbers* • *add and subtract three-digit whole numbers with trading and regrouping (carrying and borrowing)*	• *add and subtract fractions with common denominators to 12 and decimals (including money amounts) using models and algorithms; add and subtract any whole number with carrying and borrowing* • *add and subtract three-digit whole numbers with trading and regrouping (carrying and borrowing)*
A3.2.4 Multiply and divide multi-digit whole numbers 2-digit numbers, limiting the 2-digit divisors to those that end in 0; multiply and divide decimals that represent money by whole numbers.	• *model division as "sharing equally" and grouping objects*	• *multiply and divide decimals that represent money by whole numbers; multiply and divide multi-digit whole numbers by two-digit numbers, limiting the two-digit divisors to those that end in zero*	• *multiply and divide decimals that represent money by whole numbers; multiply and divide multi-digit whole numbers by 2-digit numbers*
A3.2.5 Find equivalent fractions. Convert between fractions and mixed numbers.	• *model fractions up to and including tenths (e.g., money)*	• *model equivalent fractions*	• *find equivalent fractions (convert between fractions and mixed numbers; recognize fractional forms of commonly used decimals*
A3.2.6 Develop and interpret scales and scale models.	• *use map scales*	• *use map scales*	• *develop and interpret scales and scale models*

3rd-5th: FUNCTIONS AND RELATIONSHIPS

State Mathematics Performance Standards Proficient Level Descriptors (to be assessed in 6th grade)	**At the 3rd grade level, students know and are able to do everything required at earlier ages and:**	**At the 4th grade level, students know and are able to do everything required at earlier ages and:**	**At the 5th grade level, students know and are able to do everything required at earlier ages and:**
A4.2.1 Use patterns and their extensions to make predictions and solve problems; describe patterns found in the number system including those formed by multiples, factors, perfect squares, and powers of 10.	• *recognize, describe, extend, and create repeating patterns with a variety of materials including manipulatives and symbols*	• *use number patterns and their extensions to make predictions and solve problems*	• *use patterns and their extensions to make predictions and solve problems; describe patterns found in the number system including those formed by multiples, factors, and powers of 10*
A4.2.2 Generate and solve simple functions by identifying and applying multiplication and division patterns.	• *generate and solve simple functions by identifying and applying addition and subtraction patterns*	• *generate and solve simple functions by identifying and applying multiplication and division patterns*	• *generate and solve simple functions by identifying and applying multiplication and division patterns*
A4.2.3 Use a calculator to find a missing item in a number sequence.	• *use a calculator when appropriate*	• *use a calculator when appropriate*	• *use a calculator when appropriate*
A4.2.4 Use words, lists, and tables to represent and analyze patterns.	• *use words, lists, and tables to represent patterns*	• *use words, lists, and tables to represent and analyze patterns*	• *use words, lists, and tables to represent and analyze patterns*
A4.2.5 Explain the purpose of variables and use them in open sentences to express relationships and describe simple functions.	• *complete open space sentences with missing numbers using appropriate vocabulary (e.g., >, <, =)*	• *explain the purpose of variables and use them in open sentences to express relationships and describe simple functions*	• *write and solve one-step equations with variables; begin to construct number sentences*

3rd-5th: GEOMETRY

State Mathematics Performance Standards Proficient Level Descriptors (to be assessed in 6th grade)	**At the 3rd grade level, students know and are able to do everything required at earlier ages and:**	**At the 4th grade level, students know and are able to do everything required at earlier ages and:**	**At the 5th grade level, students know and are able to do everything required at earlier ages and:**
A5.2.1 Identify, and compare various triangles and quadrilaterals according to their sides and/or angles.	• *identify, classify, and compare various triangles and quadrilaterals (polygons) according to their sides and/or angles*	• *identify, classify, and compare various triangles and quadrilaterals (polygons) according to their sides and/or angles*	• *identify, classify, and compare various triangles and quadrilaterals (polygons) according to their sides and/or angles*
A5.2.2 Compare and contrast plane and solid figures (e.g., circle/sphere, square/cube, triangle/pyramid) using relevant attributes, including the number of vertices, edges, and the number and shape of faces.	• *compare and contrast plane and solid figures (e.g., circle/sphere, square/cube, triangle/pyramid)*	• *compare and contrast plane and solid figures (e.g., circle/sphere, square/cube, triangle/pyramid) using relevant attributes, including the number of vertices, edges, and the number and shape of faces*	• *compare and contrast plane and solid figures (e.g., circle/sphere, square/cube, triangle/pyramid) using relevant attributes, including the number of vertices, edges, and the number and shape of faces*
A5.2.3 Identify and model geometric figures that are congruent, similar, and/or symmetrical.	• *identify and model geometric figures that are congruent, similar, and/or symmetrical*	• *identify and model geometric figures that are congruent, similar, and/or symmetrical*	• *identify and model geometric figures that are congruent, similar, and/or symmetrical*
A5.2.4 Distinguish between area and perimeter, finding both using a variety of methods including rules, grid paper, and tiles.	• *estimate and determine the perimeter and area of rectangles using manipulatives*	• *distinguish between area and perimeter, finding both using a variety of methods including rules, grid paper, and tiles*	• *distinguish between area and perimeter, finding both using a variety of methods including rules, grid paper, tiles, and formulas*
A5.2.5 Identify and model transformations of geometric figures describing the motions as slides, flips, or rotations.	• *identify and model transformations of geometric figures*	• *identify and model transformations of geometric figures and rotations of line segments, describing the motions as slides, flips, or rotations*	• *identify and model transformations of geometric figures and rotations of line segments, describing the motions as slides, flips, or rotations*
A5.2.6 Locate and describe objects in terms of their position with & without compass directions; identify coordinates for a given point or locate points of given coordinates on a grid.	• *locate points on a grid* • *use directional words*	• *identify coordinates for a given point or locate points of given coordinates on a grid*	• *locate and describe objects in terms of their position with and without compass directions; identify coordinates for a given point or locate points of given coordinates on a grid*
A5.2.7 Sketch and identify line segments, midpoint, intersections, parallel, and perpendicular lines.	• *sketch and identify line segments and parallel lines*	• *sketch and identify line segments, parallel, and perpendicular lines*	• *sketch and identify line segments, midpoint, intersections, parallel, and perpendicular lines*

3rd-5th: STATISTICS/PROBABILITY

State Mathematics Performance Standards Proficient Level Descriptors (to be assessed in 6th grade)	**At the 3rd grade level, students know and are able to do everything required at earlier ages and:**	**At the 4th grade level, students know and are able to do everything required at earlier ages and:**	**At the 5th grade level, students know and are able to do everything required at earlier ages and:**
A6.2.1 Collect, organize, and display data creating a variety of visual displays including tables, charts, line graphs.	• *collect, organize, and display data creating a variety of visual displays (e.g., tables, charts, line graphs)*	• *collect, organize, and display data creating a variety of visual displays (e.g., tables, charts, line graphs)*	• *create tables from data* • *use circle, line, bar, and pictographs to display data*
A6.2.2 Present the data using a variety of appropriate representations and explain the meaning of the data.	• *interpret and analyze data from displays, using the information to solve problems*	• *interpret and analyze data from displays, using the information to solve problems*	• *interpret and analyze data from displays, using the information to solve problems*
A6.2.3 Describe and interpret a data set using mean median, mode, and range.	• *use the terms "minimum" and "maximum" when working with data*	• *describe and interpret a data set using averaging*	• *describe and interpret a data set using mean by modeling, median, mode, and range*
A6.2.5 Estimate whether a game is mathematically fair or unfair; analyze and present probability data using simple fractions.	• *estimate whether a game is mathematically fair or unfair*	• *estimate whether a game is mathematically fair or unfair; analyze and present probability data using simple fractions*	• *estimate whether a game is mathematically fair or unfair; analyze and present probability data using simple fractions*
A6.2.6 Conduct simple probability experiments using concrete materials and represent the results using fractions and probability.	• *conduct simple probability experiments using concrete materials*	• *conduct simple probability experiments using concrete materials and represent the results using fractions and probability*	• *conduct simple probability experiments using concrete materials and represent the results using fractions and probability*

3rd-5th: PROBLEM SOLVING

State Mathematics Performance Standards Proficient Level Descriptors (to be assessed in 6th grade)	**At the 3rd grade level, students know and are able to do everything required at earlier ages and:**	**At the 4th grade level, students know and are able to do everything required at earlier ages and:**	**At the 5th grade level, students know and are able to do everything required at earlier ages and:**
B1.2.1 Read and summarize a problem, using mathematical terms and symbols.	• *read and summarize a problem, using mathematical terms and symbols*	• *read and summarize a problem, using mathematical terms and symbols*	• *read and summarize a problem, using mathematical terms and symbols*
B1.2.2 Select and apply a variety of strategies including making a table, chart or list, drawing pictures, making a model, and comparing with previous experience to solve problems.	• *select and apply a variety of strategies to solve a problem guess and check, making a table, chart or list, drawing pictures, making a model, comparing with previous experience*	• *select and apply a variety of strategies guess and check, making a table, chart or list, drawing pictures, making a model, comparing with previous experience*	• *select and apply a variety of strategies guess and check, making a table, chart or list, drawing pictures, making a model, comparing with previous experience*
B1.2.3 Explain and verify results with respect to the original problem, applying what was learned to new situations.	• *explain and verify results with respect to the original problem*	• *explain and verify results with respect to the original problem, applying what was learned to new situations*	• *explain and verify results with respect to the original problem, applying what was learned to new situations*

3rd-5th: COMMUNICATION

State Mathematics Performance Standards Proficient Level Descriptors (to be assessed in 6th grade)	**At the 3rd grade level, students know and are able to do everything required at earlier ages and:**	**At the 4th grade level, students know and are able to do everything required at earlier ages and:**	**At the 5th grade level, students know and are able to do everything required at earlier ages and:**
C1.2.1 Use the mathematical vocabulary appropriate to the content being studied.	• *use the mathematical vocabulary appropriate to the content being studied* • *listen and observe to obtain mathematical information from the real world*	• *use the mathematical vocabulary appropriate to the content being studied* • *listen and observe to obtain mathematical information from the real world*	• *use the mathematical vocabulary appropriate to the content being studied* • *listen and observe to obtain mathematical information from the real world*
C1.2.2 Represent mathematical and practical situations using concrete, pictorial, and symbolic representation.	• *represent mathematical and practical situations using concrete, pictorial, and symbolic representation (e.g., write a number sentence from a word problem)*	• *represent mathematical and practical situations using concrete, pictorial, and symbolic representation (e.g., write a number sentence from a word problem)*	• *represent mathematical and practical situations using concrete, pictorial, and symbolic representation (e.g., write a number sentence from a word problem)*
C1.2.3 Organize and communicate effectively mathematical problem strategies and solutions to problems.	• *organize and communicate effectively mathematical problem strategies and solutions to problems*	• *organize and communicate effectively mathematical problem strategies and solutions to problems*	• *organize and communicate effectively mathematical problem strategies and solutions to problems*

3rd-5th: REASONING

State Mathematics Performance Standards Proficient Level Descriptors (to be assessed in 6th grade)	At the 3rd grade level, students know and are able to do everything required at earlier ages and:	At the 4th grade level, students know and are able to do everything required at earlier ages and:	At the 5th grade level, students know and are able to do everything required at earlier ages and:
D1.2.1 Draw logical conclusions about mathematical situations.	• *draw logical conclusions about mathematical situations*	• *draw logical conclusions about mathematical situations*	• *draw logical conclusions about mathematical situations*
D1.2.2 Give a rule or generalization, determine whether the example fits.	• *give a rule or generalization, determine whether the example fits*	• *give a rule or generalization, determine whether the example fits*	• *give a rule or generalization, determine whether the example fits*
D1.2.3 Justify answers and mathematical strategies as reasonable.	• *justify answers and mathematical strategies as reasonable*	• *justify answers and mathematical strategies as reasonable*	• *justify answers and mathematical strategies as reasonable*

3rd-5th: CONNECTIONS

State Mathematics Performance Standards Proficient Level Descriptors (to be assessed in 6th grade)	At the 3rd grade level, students know and are able to do everything required at earlier ages and:	At the 4th grade level, students know and are able to do everything required at earlier ages and:	At the 5th grade level, students know and are able to do everything required at earlier ages and:
E1.2.1 Apply mathematical processes to social studies.	• *apply mathematical processes to other discipline, especially social studies (e.g., timing events in physical education, graphs in social studies)*	• *apply mathematical processes to other discipline, especially social studies (e.g., timing events in physical education, graphs in social studies)*	• *apply mathematical processes to other discipline, especially social studies (e.g., timing events in physical education, graphs in social studies)*
E1.2.2 Apply mathematical skills and processes to situations with friends and school.	• *apply mathematical skills and processes to everyday life, especially to situations with friends and school (e.g., read and locate points on a city map)*	• *apply mathematical skills and processes to everyday life, especially to situations with friends and school (e.g., read and locate points on a city map)*	• *apply mathematical skills and processes to everyday life, especially to situations with friends and school (e.g., read and locate points on a city map)*

6th-8th: NUMERATION

State Mathematics Performance Standards Proficient Level Descriptors (to be assessed in 8th grade)	**At the 6th grade level, students know and are able to do everything required at earlier ages and:**	**At the 7th grade level, students know and are able to do everything required at earlier ages and:**	**At the 8th grade level, students know and are able to do everything required at earlier ages and:**
A1.3.1 Read, write, model, and order real numbers, explaining scientific notation, exponents, and percents.	• *read/write place values to billions* • *begin to use exponential notation* • *begin to use rational, irrational, and real numbers* • *begin to use square roots* • *begin to use positive and negative numbers* • *use set of real numbers and inequalities*	• *read/write place values to trillions* • *use exponential notation* • *use rational, irrational, and real numbers* • *use square roots* • *use positive and negative numbers* • *use set of real numbers and inequalities*	• *read/write standard and decimal notations from the written name* • *apply square roots* • *write numbers and expanded notations using powers of 10 and using exponential notation* • *use rational, irrational, and real numbers* • *translate positive and negative numbers* • *apply the set of real numbers and inequalities*
A1.3.2 Model counting in a different base system.	• *recognize reading/writing in bases other than 10*	• *recognize reading/writing in bases other than 10*	• *add, subtract, multiply, and divide like base using exponents*
A1.3.4 Translate between equivalent representations of the same number. Select a representation that is appropriate for the situation.	• *read/write fractions, percentages, and decimals* • *begin conversion between fractions, percentages, and decimals* • *identify rational and real numbers*	• *read/write fractions, percentages, and decimals* • *convert among fractions, percentages, and decimals* • *use rational, irrational, and real numbers* • *begin to use exponential notations*	• *read/write fractions, percentages, decimals, and scientific notations* • *convert among fractions, percentages, and decimals* • *translate rational, irrational, and real numbers*
A1.3.5 Describe and model the relationship of fractions to decimals, percents, ratios, and proportions.	• *review the relationship between fractions, decimals, and percentages* • *understand ratios* • *begin to use proportions*	• *show the relationship between fractions, decimals, and percentages* • *understand and use ratios and proportions*	• *apply the relationship between fractions, decimals, percentages, ratios and proportions to various mathematical problems*
A1.3.6 Use, explain, and define concepts of number theory (e.g., divisibility, prime and composite numbers, multiples, and order of operations).	• *reinforce factors and multiples* • *use the order of operations* • *distinguish between prime and composite numbers* • *use absolute value* • *use rules for divisibility* • *use prime and composite numbers* • *use prime factorization, order of operations, rules of divisibility*	• *reinforce factors and multiples* • *apply the order of operations* • *apply prime and composite numbers* • *apply absolute value* • *apply rules for divisibility* • *apply the rules of divisibility, square numbers, prime factorization, and property of zero using order of operations*	• *reinforce factors and multiples* • *expand the order of operations* • *apply properties of prime and composite numbers to mathematical problems* • *expand absolute value* • *use rules for divisibility* • *apply the rules of divisibility, square numbers, prime factorization, and property of zero using order of operations*
A1.3.7 Use commutative, associative, and distributive properties with variables.	• *use commutative, associative, and distributive properties with addition and multiplication*	• *apply commutative, associative, and distributive properties with addition and multiplication*	• *use, apply, and expand commutative, associative, and distributive properties with addition and multiplication*

6th-8th: MEASUREMENT

State Mathematics Performance Standards Proficient Level Descriptors (to be assessed in 8th grade)	**At the 6th grade level, students know and are able to do everything required at earlier ages and:**	**At the 7th grade level, students know and are able to do everything required at earlier ages and:**	**At the 8th grade level, students know and are able to do everything required at earlier ages and:**
A2.3.1 Estimate and measure various dimensions to a specified degree of accuracy.	• *predict outcomes of measurement to a specified degree of accuracy (recipes, distances)*	• *predict outcomes of measurement to a specified degree of accuracy (angle rotation)*	• *predict outcomes of measurement to a specified degree of accuracy (angle rotations up to 360 degrees, volume)*
A2.3.2 Estimate and convert measurements within the same system.	• *solve measurement conversions within a system (customary and metric)*	• *solve measurement conversions within a system (customary and metric)*	• *solve measurement conversions within a system (customary and metric)* • *begin to compare Celsius and Fahrenheit relationships*
A2.3.3 Use a variety of methods and tools to construct and compare plane figures.	• *utilize measurement instruments (rulers, yardsticks, scales, compasses, protractors)*	• *utilize measurement instruments (rulers, yardsticks, scales, compasses, protractors, paper folding, technology)*	• *utilize measurement instruments (rulers, yardsticks, scales, compasses, protractors) in specified situations*
A2.3.4 Describe and apply the relationships between dimensions of geometric figures to solve problems using indirect measurement; describe and apply the concepts of rate and scale.	• *use formulas to calculate area/perimeter, volume, and circumference* • *begin to use the concept of geometric scale to solve problems* • *begin to use the concept of indirect measurement to solve problems*	• *use formulas to calculate area/perimeter, volume, and circumference* • *use the concept of geometric scale to solve problems* • *use the concept of indirect measurement to solve problems*	• *use and develop formulas to calculate area/perimeter, volume, and circumference* • *use the concept of geometric scale to solve problems* • *use the concept of indirect measurement to solve problems*
A2.3.5 Apply information about time zones and elapsed time to solve problems.	• *begin to use time conversion, units, and zones*	• *use time conversion, units, and zones*	• *solve problems using time zones*

6th-8th: ESTIMATION AND COMPUTATION

State Mathematics Performance Standards Proficient Level Descriptors (to be assessed in 8th grade)	**At the 6th grade level, students know and are able to do everything required at earlier ages and:**	**At the 7th grade level, students know and are able to do everything required at earlier ages and:**	**At the 8th grade level, students know and are able to do everything required at earlier ages and:**
A3.3.1 Apply, explain, and assess the appropriateness of a variety of estimation strategies including truncating and rounding to a compatible numbers.	• *practice rounding, estimation, and computation of all numbers*	• *apply rounding, estimation, and computation of all numbers* • *practice simple interest problems*	• *apply rounding, estimation, computation, and truncation of all numbers in solving problems* • *choose the most appropriate unit and compute the percentage* • *practice compound interest problems*
A3.3.2 Apply basic operations efficiently and accurately, using estimation to check the reasonableness of results.	• *begin to predict outcomes and check reasonableness of results* • *understand the four mathematical operations and terms (e.g., sum, difference, quotient, product)*	• *predict outcomes and check reasonableness of results* • *understand the four mathematical operations and terms (e.g., sum, difference, quotient, product)*	• *predict outcomes and check reasonableness of results* • *understand the four mathematical operations and terms (e.g., sum, difference, quotient, product)*
A3.3.3 Add and subtract fractions, decimals, and percents.	• *add and subtract fractions, decimals, and percentages*	• *add and subtract fractions, decimals, and percentages*	• *add and subtract fractions, decimals, and percentages in solving problems*
A3.3.4 Multiply and divide rational numbers including fractions, decimals, and percents.	• *multiply and divide three-digit numbers* • *multiply and divide fractions* • *begin to multiply and divide decimals* • *begin to use percentages (sales tax, interest, and discounts)* • *begin to use positive and negative numbers*	• *apply addition, subtraction, multiplication, and division of fractions, decimals, and percentages to mathematical problems* • *apply positive and negative numbers to mathematical problems*	• *apply addition, subtraction, multiplication, and division of fractions, decimals, and percentages to mathematical problems* • *apply positive and negative numbers to mathematical problems*
A3.3.5 Convert between equivalent fractions, decimals, percents, and proportions. Convert from exact to decimal representations of irrational numbers.	• *begin to translate between equivalent fractions, decimals, and percents*	• *translate between equivalent fractions, decimals, and percents with rational and irrational numbers*	• *translate between equivalent fractions, decimals, percents, proportions, and exponential forms*
A3.3.6 Solve problems using ratios and proportions.	• *solve simple problems using ratios and proportions*	• *solve problems using ratios and proportions*	• *apply relationships between numbers and solve selected problems using ratios and proportions*

6th-8th: FUNCTIONS AND RELATIONSHIPS

State Mathematics Performance Standards Proficient Level Descriptors (to be assessed in 8th grade)	**At the 6th grade level, students know and are able to do everything required at earlier ages and:**	**At the 7th grade level, students know and are able to do everything required at earlier ages and:**	**At the 8th grade level, students know and are able to do everything required at earlier ages and:**
A4.3.1 Identify numeric and geometric patterns and sequences to find the next term and predict the nth term.	• *look for simple patterns and sequences to find the next term and the next few terms (nth term)*	• *look for patterns and sequences to find the next term and nth term* • *use a calculator to find a missing item in an arithmetic and geometric sequence*	• *look for patterns and sequences to find the next term and nth term* • *use a graphing calculator to find a missing item in an arithmetic and geometric sequence* • *use the Sieve of Erasthostenes to find prime numbers*
A4.3.2 Identify and describe how a change in one variable in a function effects the remaining variables (e.g., how changing the length effects the area and volume of a rectangular prism).	• *evaluate a simple pattern using a table and graph*	• *evaluate an ordinary function using a table and graph*	• *evaluate linear and complex functions using a table and graph*
A4.3.3 Use a calculator to find a missing item in an arithmetic and a geometric sequence; predict the graph of each function.	• *use a calculator when appropriate*	• *use a calculator and begin to use a graphing calculator*	• *use a graphing calculator to find a missing item in an arithmetic and a geometric sequence; predict the graph of each function*
A4.3.4 Translate among and use tables of ordered pairs, graphs on coordinate planes, and linear equations as tools to represent and analyze patterns.	• *practice graphing ordered pairs on grids* • *begin to plot integers on a number line* • *begin to use ordered pairs grouping*	• *begin to use XY coordinate/tables and ordered pairs grouping*	• *begin to calculate slope, recognize correlations in data, and apply best fit lines to data* • *begin to use mathematical patterns (discrete mathematics)*
A4.3.5 Find the value of a variable by evaluating formulas and algebraic expressions for given value.	• *write and solve one-step equations; begin to construct number sentences* • *begin to use inverse operations*	• *from a given problem, write and solve two-step equations; construct number sentences*	• *solve two-step equations* • *practice inverse operations* • *begin to use quadratic equations and exponential functions*

6th-8th: GEOMETRY

State Mathematics Performance Standards Proficient Level Descriptors (to be assessed in 8th grade)	**At the 6th grade level, students know and are able to do everything required at earlier ages and:**	**At the 7th grade level, students know and are able to do everything required at earlier ages and:**	**At the 8th grade level, students know and are able to do everything required at earlier ages and:**
A5.3.1 Identify, classify, compare, and sketch regular and irregular polygons.	• *define geometric terms and figures; review geometric symbols*	• *use geometric terms, figures, and symbols; begin to sketch geometric constructions (e.g., quadrilaterals, pentagons, hexagons, and octagons).*	• *use geometric terms, figures, and symbols; sketch geometric constructions*
A5.3.2 Model, identify, draw, and describe a variety of 3-dimensional figures including tetrahedrons, dodecahedrons, triangular prisms, and rectangular prisms.	• *review prisms, cones, and spheres*	• *identify and describe a variety of three-dimensional figures*	• *model, identify, and describe a variety of three-dimensional figures*
A5.3.3 Apply the properties of equality and proportionality to solve problems involving congruent or similar shapes.	• *begin to use results of combining, subdividing, and changing of geometric shapes*	• *use results of combining, subdividing, and changing of geometric shapes*	• *apply results of combining, subdividing, and changing of geometric shapes*
A5.3.4 Estimate and determine volume and surface areas of solid using manipulatives and formulas; estimate and find the circumference**s** and areas of circles.	• *begin to use volume and circumference formulas* • *begin to calculate surface area* • *begin to use temperature scales*	• *develop/discover geometric formulas (e.g., rectangular prisms, cylinders, and pyramids)* • *use temperature scales*	• *develop/discover geometric formulas (e.g., rectangular prisms, cylinders, and pyramids)* • *use temperature scales*
A5.3.5 Draw and describe the results of transformations including translations (slides), rotations (turns), reflections (flips), and dilations (shrinking or enlarging).	• *begin to use geometric scale ratios* • *identify transformations, rotations, reflections, and scaling of plane figures*	• *use geometric scale ratios* • *identify and construct transformations, rotations, reflections, and scaling of plane figures*	• *apply transformational geometry to mathematical problems*
A5.3.6 Use coordinate geometry to represent and interpret relationships defined by equations and formulas including distance and midpoint.	• *graph ordered pairs*	• *identify several points on a two-dimensional graph, and map using all four quadrants of a coordinate system*	• *apply identifying several points on a two-dimensional graph, and map using all four quadrants of a coordinate system*
A5.3.7 Draw, measure, and construct geometric figures using perpendicular bisectors, polygons with given dimensions and angles, circles with given dimensions, perpendicular and parallel lines.	• *use the compass and protractor to construct figures with points, lines, curves, parallel constructions, and perpendicular constructions* • *draw, measure, and identify right, obtuse, and acute angles and their parts including rays, points, and vertices*	• *begin to investigate/predict results of combining, subdividing, and changing geometric shapes* • *draw, measure, and identify right, obtuse, and acute angles and their parts including rays, points, and vertices* • *use ratios to find missing sides in similar geometric figures*	• *investigate/predict results of combining, subdividing, and changing geometric shapes* • *draw, measure, and identify right, obtuse, and acute angles and their parts including rays, points, and vertices* • *derive and apply the Pythagorean Theorem*

6th-8th: STATISTICS/PROBABILITY

State Mathematics Performance Standards Proficient Level Descriptors (to be assessed in 8th grade)	**At the 6th grade level, students know and are able to do everything required at earlier ages and:**	**At the 7th grade level, students know and are able to do everything required at earlier ages and:**	**At the 8th grade level, students know and are able to do everything required at earlier ages and:**
A6.3.1 Collect, analyze and display data creating a variety of visual displays including frequency distributions, circle graphs, box and whisker plots, stem and leaf plots, histograms, and scatter plots with and without technology.	• *create tables from data* • *use circle, line, bar, stem and leaf graphs to display data*	• *create tables from data* • *read and construct data* • *plan circle, line, bar, stem and leaf graphs to display data*	• *create tables from data* • *begin to use a graphing calculator to construct and analyze statistical problems* • *use circle, line, bar, stem and leaf graphs, box/whisker/scatter plots, and histograms to display data*
A6.3.2 Interpret and analyze information found in printed material newspapers, magazines and graphical displays.	• *interpret/analyze data found in printed material and graphical displays*	• *interpret/analyze data found in printed material and graphical displays* • *use appropriate technology to create graphical displays*	• *interpret/analyze and evaluate data found in printed material and graphical displays* • *use appropriate technology to create graphical displays*
A6.3.3 Determine and justify a choice of mean, median, mode, or range as the best representation of data for a practical situation.	• *identify and compute mean, median, and mode* • *begin to use range*	• *identify and compute mean, median, mode, and range*	• *apply mean, median, mode, and range to solve mathematical problems* • *determine when a specific mean, median, mode, or range is the best representation*
A6.3.4 Make projections based on available data and evaluate whether or not inferences can be made given the parameters of the data.	• *begin to predict outcomes*	• *predict outcomes based on projections of manipulated data*	• *predict outcomes based on projections of manipulated data* • *determine when data has been misrepresented*
A6.3.5 Use tree diagrams and sample spaces to make predictions about independent events.	• *use inferences, samplings, probabilities, chance, and predictions to estimate outcomes*	• *use inferences, samplings, probabilities, chance, and predictions to estimate outcomes* • *describe events as likely or unlikely*	• *use inferences, samplings, probabilities, chance, and predictions to estimate outcomes* • *continue to use computer programs for statistics and probability* • *analyze student-generated data*
A6.3.6 Design and conduct a simulation to study a problem and communicate the results.	• *perform simulations to solve problems*	• *begin to solve real life probability problems*	• *solve real life probability problems* • *use random digit tables for simulations*

6th-8th: PROBLEM SOLVING

State Mathematics Performance Standards Proficient Level Descriptors (to be assessed in 8th grade)	**At the 6th grade level, students know and are able to do everything required at earlier ages and:**	**At the 7th grade level, students know and are able to do everything required at earlier ages and:**	**At the 8th grade level, students know and are able to do everything required at earlier ages and:**
B1.3.1 Analyze and summarize a problem using the relationships between the known facts and unknown information.	• *begin to use problems to determine the relationships between known and unknown facts*	• *begin to use problems to determine the relationships between known and unknown facts*	• *begin to use problems to determine the relationships between known and unknown facts* • *begin to formulate a plan to solve a problem*
B1.3.2 Select, modify, and apply a variety of problem-solving strategies including graphing, inductive and deductive reasoning, Venn diagrams, and spreadsheets.	• *use a variety of problem-solving techniques including making a list, looking for a patterns, making table, drawing a diagram, working backwards, and using concrete objects*	• *use a variety of problem-solving techniques including making a list, looking for a patterns, making table, drawing a diagram, working backwards, using concrete objects, extending patterns, and logical reasoning*	• *use a variety of problem-solving techniques including making a list, looking for a patterns, making table, drawing a diagram, working backwards, using concrete objects, extending patterns, logical reasoning, Venn diagrams, and computer spreadsheets*
B1.3.3 Evaluate, interpret, and justify solutions to problems.	• *estimate or predict the reasonableness of an answer using mental math, calculators, or drawings*	• *estimate or predict the reasonableness of an answer using mental math, calculators, or drawings* • *plan and explain in writing and orally the process for solving a problem*	• *estimate or predict the reasonableness of an answer using mental math, calculators, or drawings* • *plan and explain the process for solving a problem* • *begin to predict the reasonableness of an answer by using an alternative strategy*

6th-8th: COMMUNICATION

State Mathematics Performance Standards Proficient Level Descriptors (to be assessed in 8th grade)	**At the 6th grade level, students know and are able to do everything required at earlier ages and:**	**At the 7th grade level, students know and are able to do everything required at earlier ages and:**	**At the 8th grade level, students know and are able to do everything required at earlier ages and:**
C1.3.1 Use math vocabulary, symbols, and notation to represent information in the problem.	• *begin to explain math methods of problem solving, orally and in writing*	• *begin to develop and defend, in small groups, convincing oral and written arguments to problems*	• *develop and defend, in small groups, convincing oral and written arguments to problems*
C1.3.2 Represent a problem numerically, graphically, symbolically, and translate among these alternative presentations.	• *draw, compute, and explain solutions to problems*	• *begin to represent a problem numerically, graphically, symbolically, and translate between these alternative representations*	• *represent a problem numerically, graphically, symbolically, and translate between these alternative representations*
C1.3.3 Use math vocabulary, symbols, and notations to explain, justify, and defend mathematical solutions.	• *begin to use math vocabulary, symbols, and notations to communicate the method(s) used for solving a math problem*	• *begin to use math vocabulary, symbols, and notations to communicate the method(s) used for solving a math problem*	• *begin to use appropriate technology to present information, ideas, and solutions*

6th-8th: REASONING

State Mathematics Performance Standards Proficient Level Descriptors (to be assessed in 8th grade)	At the 6th grade level, students know and are able to do everything required at earlier ages and:	At the 7th grade level, students know and are able to do everything required at earlier ages and:	At the 8th grade level, students know and are able to do everything required at earlier ages and:
D1.3.1 Use informal deductive and inductive reasoning in both concrete and abstract contexts.	• *begin to draw and justify conclusions*	• *recognize and begin to utilize deductive reasoning in concrete and abstract situations*	• *recognize and apply deductive and inductive reasoning in concrete and abstract situations*
D1.3.2 State counterexamples to disprove statements	• *begin to prove or disprove statements by using logic and reason*	• *give examples to explain why a statement is true or false*	• *extract, compare, contrast, and interpret information*
D1.3.3 Justify and defend the validity of mathematical strategies and solutions using examples and counterexamples.	• *begin to understand the use of mathematical strategies to test the validity of solutions*	• *understand the use of mathematical strategies to test the validity (by using examples) of solutions*	• *justify and defend the validity of mathematical strategies and solutions using examples and counterexamples*

6th-8th: CONNECTIONS

State Mathematics Performance Standards Proficient Level Descriptors (to be assessed in 8th grade)	At the 6th grade level, students know and are able to do everything required at earlier ages and:	At the 7th grade level, students know and are able to do everything required at earlier ages and:	At the 8th grade level, students know and are able to do everything required at earlier ages and:
E1.3.1 Apply mathematical skills and processes to science and humanities.	• *integrate basic math concepts into other subjects, especially science and humanities (e.g., timelines, population studies, tessellations, data collection and interpretation in science)* • *integrate mathematical concepts in a variety of situations on a basic level*	• *integrate intermediate math concepts into other subjects, especially science and humanities (e.g., timelines, population studies, tessellations)* • *integrate mathematical concepts in a variety of situations on a intermediate level*	• *integrate complex math concepts into other subjects, especially science and humanities (e.g., timelines, population studies, tessellations)* • *integrate mathematical concepts in a variety of situations on a complex level by showing and discussing relationships*
E1.3.2 Apply mathematical skills and processes to situations with peers and community.	• *apply mathematical skills/processes in daily living, especially to situations with peers and community (e.g., cooking, navigation, banking)*	• *apply mathematical skills/processes in daily living, especially to situations with peers and community (e.g., cooking, navigation, banking)*	• *apply mathematical skills/processes in daily living, especially to situations with peers and community (e.g., cooking, navigation, banking)*

9th-10th: NUMERATION

State Mathematics Performance Standards Proficient Level Descriptors (High School Graduation Qualifying Examination)	**At the 9th grade level, students know and are able to do everything required at earlier ages and:**	**At the 10th grade level, students know and are able to do everything required at earlier ages and:**
A1.4.1 Read, write, model, order, and define real numbers and subsets.	• *read, write, model, order, and count with the real number system; define the real number system and its subsets, selecting the appropriate one as possible set for given situations*	• *read, write, model, order, and count with the real number system; define the real number system and its subsets, selecting the appropriate one as possible set for given situations*
A1.4.2 Add in a different base system.		
A1.4.3 Compare and contrast the relationship between various applications of the same operation.	• *use the same operation in various applications (e.g., linear models, now-next equations, exponential models)*	• *use the same operation in various applications (e.g., linear, exponential, power, and inverse power models and periodic change)*
A1.4.4 Translate between equivalent representations of the same exponential expression.	• *use graphs, tables, and equations to represent exponential expressions*	• *use graphs, tables, and equations to represent exponential expressions*
A1.4.7 Recognize, describe, and use properties of the real number system.	• *identify properties of real numbers and apply to situations involving variables*	• *identify properties of real numbers and apply to situations involving variables*

9th-10th: MEASUREMENT

State Mathematics Performance Standards Proficient Level Descriptors (High School Graduation Qualifying Examination)	**At the 9th grade level, students know and are able to do everything required at earlier ages and:**	**At the 10th grade level, students know and are able to do everything required at earlier ages and:**
A2.4.1 Evaluate measurements for accuracy, precision, and error with respect to the measuring tools, methods, and the computational process.	• *discuss accuracy, precision, and error when measuring, computing, and interpreting results (e.g., simulations, measuring for linear models and exponential models)*	• *discuss accuracy, precision, and error when measuring, computing, and interpreting results (e.g., patterns of association, similar figures)*
A2.4.2 Estimate and convert measurements between different systems.	• *convert measurements between different systems*	• *convert measurements between different systems (e.g., degrees to radians)*
A2.4.3 Apply various measurement systems to describe situations and solve problems.	• *use various measurement systems in real world applications*	• *use various measurement systems in real world applications*
A2.4.4 Use indirect methods, including the Pythagorean Theorem and right triangle trigonometry, to find missing dimensions.	• *use Pythagorean Theorem to find a missing leg or hypotenuse on a right triangle*	• *use Pythagorean Theorem and trigonometry functions to find a missing angles or sides of a right triangle*

9th-10th: ESTIMATION AND COMPUTATION

State Mathematics Performance Standards Proficient Level Descriptors (High School Graduation Qualifying Examination)	**At the 9th grade level, students know and are able to do everything required at earlier ages and:**	**At the 10th grade level, students know and are able to do everything required at earlier ages and:**
A3.4.1 Use estimation to solve problems and to check the accuracy of solutions; state whether the estimation is greater or less than the exact answer.	• *use estimations to check the reasonableness of solutions*	• *use estimations to check the reasonableness of solutions*
A3.4.3 Add and subtract real numbers in various forms including scientific notation, powers, and roots.	• *apply the addition of real numbers including scientific notation, powers, and roots to various situations (e.g., power models, exponential models, exponential growth and decay)*	• *apply the addition of real numbers including scientific notation, powers, and roots to various situations (e.g., power models, exponential models, exponential growth and decay)*
A3.4.4 Multiply and divide real numbers in various forms including scientific notation, powers, and roots.	• *apply multiplication and division including scientific notation, powers, and roots to various situations*	• *apply multiplication and division including scientific notation, powers, and roots to various situations*
A3.4.5 Select, convert, and apply an equivalent representation of a number for a specified situation.		
A3.4.6 Use ratios and proportions to model and solve fraction and percent problems with variables.	• *use ratios and proportions to model and solve problems* • *solve fractions and percent problems using variables (e.g., linear models, now-next, exponential growth and decay, and compound growth)*	• *use ratios and proportions to model and solve problems (e.g., transformations, similarity, trigonometry, transmission factor)* • *solve fractions and percent problems using variables (e.g., similar figures, transformations, systems of linear equations)*

9th-10th: FUNCTIONS AND RELATIONSHIPS

State Mathematics Performance Standards Proficient Level Descriptors (High School Graduation Qualifying Examination)	**At the 9th grade level, students know and are able to do everything required at earlier ages and:**	**At the 10th grade level, students know and are able to do everything required at earlier ages and:**
A4.4.1 Identify, graph, and describe the graphs of basic families of functions including linear, absolute value, quadratic, and exponential using a graphing calculator.	• *describe relationships between graphs, tables, and equations of linear and exponential functions*	• *describe relationships between graphs, tables, and equations of linear, quadratic, exponential, power, inverse power, and periodic functions*
A4.4.2 Create and solve linear and quadratic equations and inequalities.	• *create and solve linear equations and inequalities*	• *create and solve linear equations and inequalities*
A4.4.3 Create and solve simple systems of equations, algebraically and graphically, using a graphing calculator.	• *solve systems of two equations graphically*	• *solve systems of two or three equations using matrices, substitution and linear combinations*
A4.4.4 Use discrete structures, such as finite graphs, matrices, sequences, and iterations as tools to analyze patterns, expressions, and equations.	• *use finite graphs, sequences, and iterations to analyze patterns*	• *use finite graphs, sequences, matrices, and iterations to analyze patterns (e.g., network optimization, matrix models, power models)*
A4.4.5 Add, subtract, multiply, divide, and simplify rational expressions; add, subtract, and multiply polynomials.	• *write rational expressions to model situations and then add, subtract, multiply, divide, and simplify the expression*	• *write rational expressions and polynomials to model situations and then add, subtract, multiply, divide, and simplify the expression*

9th-10th: GEOMETRY

State Mathematics Performance Standards Proficient Level Descriptors (High School Graduation Qualifying Examination)	**At the 9th grade level, students know and are able to do everything required at earlier ages and:**	**At the 10th grade level, students know and are able to do everything required at earlier ages and:**
A5.4.1 Identify and use the properties of polygons including interior and exterior angles and circles (including angles, arc, chord, secants, and tangents) to solve practical problems.	• *visualize and understand properties of space shapes including symmetry, area, volume, and angles* • *investigate and use the properties of polygons to solve problems* • *use the Pythagorean Theorem to find the leg or hypotenuse of a right triangle in a given situation*	• *model and analyze physical phenomena with triangles, quadrilaterals, and circles* • *use these shapes to investigate trigonometric functions, angular velocity, and periodic change* • *investigate and use the properties of polygons and circle to solve problems* • *use the Pythagorean Theorem and trigonometric ratios to find missing information in given situations*
A5.4.2 Create 2-dimensional representations of 3-dimensional objects.	• *use isometric drawing to represent 3-D shapes based on given descriptions or nets* • *draw front, side, and top views of 3-D shapes*	• *represent real world triangular and circular objects in two-dimensional drawings for calculating missing information*
A5.4.3 Identify congruent and similar figures using Euclidean and coordinate geometries; apply this information to solve problems.	• *identify shapes that are congruent and similar and use information to solve problems*	• *use Euclidean and coordinate geometries to determine congruence and similarities of figures and use information to solve problems*
A5.4.5 Use transformations to demonstrate geometric principles.	• *identify and apply one-dimensional strip patterns, tilings of the plane, and the isometric transformations (e.g., reflections, rotations, translations, and glide reflections)*	• *apply coordinate geometry to model and analyze geometric figures* • *perform size and isometric transformations (reflections, rotations, translations, and glide reflections)*
A5.4.6 Use coordinate geometry to graph linear equations, determine slopes of lines, identify parallel and perpendicular lines, and to find possible solutions to sets of equations.	• *identify linear functions, slope of a line, rate of change, and intercepts in graphs, tables, and equations*	• *determine distance in the coordinate plane, midpoint of a segment, slope, and intercepts in graphs, tables, and equations*
A5.4.7 Construct geometric models, transformations, and scale drawings using a variety of methods (e.g., paper folding, compass, straight edge, protractor, technology).	• *build space shapes and describe rigidity of prisms, pyramids, and real world structures*	• *use pantographs to understand and describe similarity, scale drawings, and transformations* • *use protractor and straight edge to understand relationship of similar triangles and develop understanding of trigonometric functions*

9th-10th: STATISTICS/PROBABILITY

State Mathematics Performance Standards Proficient Level Descriptors (High School Graduation Qualifying Examination)	**At the 9th grade level, students know and are able to do everything required at earlier ages and:**	**At the 10th grade level, students know and are able to do everything required at earlier ages and:**
A6.4.1 Analyze and draw inferences from a wide variety of printed materials that summarize data from real-world situations; constructing graphical displays with and without technology.	• *create graphical displays with and without technology to summarize real world situations*	• *create graphical displays with and without technology to summarize real world situations*
A6.4.2 Describe the line of best fit and use it to predict unknown data values.	• *apply the line of best fit to make predictions about data and with technology find linear regression and exponential regression equations*	• *understand the strength of association between two variables, measure the degree of the relation, and interpret prediction lines for paired data*
A6.4.3 Describe data, selecting measures of central tendencies and distribution, to convey accurately and honestly information in the data.	• *make sense out of real world data using graphical displays and summary statistics (e.g., shape of distribution, number line plots, histograms, stem and leaf plots, scatter plots, and association, plots over time and trends, transformations of data)*	• *make sense out of real world data using patterns of association (e.g., Pearson's correlation coefficient, cause and effect, impact of outwires, least squares linear models, variability of prediction)*
A6.4.4 Analyze the validity of statistical conclusions and the use, misuse, and abuse of data caused by a wide variety of factors including choices of scale, inappropriate choices of measures of center, incorrect curve fitting, and inappropriate uses of controls or sample groups.	• *investigate data and describe possible factors that would influence the results including setup of a simulation, amount of information gathered, and probability vs. odds*	• *determine the validity of data in situations involving correlation and probability*
A6.4.5 Analyze data from multiple events and predict theoretical probability; find and compare experimental and theoretical probability for a simple situation, discussing possible differences between two results.	• *compare theoretical and experimental*	• *probability in a variety of situations and analyze similarities and differences in results*
A6.4.6 Design, conduct, analyze, and communicate the results of multi-stage probability experiments.	• *design simulations using coins and random number generator to determine the probability of events*	• *design simulations to understand situations involving chance*

9th-10th: PROBLEM SOLVING

State Mathematics Performance Standards Proficient Level Descriptors (High School Graduation Qualifying Examination)	**At the 9th grade level, students know and are able to do everything required at earlier ages and:**	**At the 10th grade level, students know and are able to do everything required at earlier ages and:**
B1.4.1 Recognize and formulate mathematical problems from within and outside the field of mathematics.	• *use all mathematical topics in real world situations*	• *use all mathematical topics in real world situations*
B1.4.2 Apply multi-step, integrated mathematical problem-solving strategies, persisting until a solution is found or it is clear no solutions exists.	• *apply a variety of problem solving strategies*	• *apply a variety of problem solving strategies*
B1.4.3 Verify the reasonableness of an answer by using an alternative strategy.	• *determine the reasonableness of a solution by estimating or using different strategies*	• *determine the reasonableness of a solution by estimating or using different strategies*

9th-10th: COMMUNICATION

State Mathematics Performance Standards Proficient Level Descriptors (High School Graduation Qualifying Examination)	**At the 9th grade level, students know and are able to do everything required at earlier ages and:**	**At the 10th grade level, students know and are able to do everything required at earlier ages and:**
C1.4.1 Use appropriate technology to present information and ideas.	• *use graphing calculator or computer programs when appropriate to illustrate problem solving process*	• *use graphing calculator or computer programs when appropriate to illustrate problem solving process*
C1.4.2 Use numerical, graphic, and symbolic representations to support oral and written communication about mathematical ideas.	• *show steps when solving problems to illustrate strategy used* • *use graphs to illustrate mathematical ideas*	• *show steps when solving problems to illustrate strategy used* • *use graphs to illustrate mathematical ideas*
C1.4.3 Explain, justify, and defend mathematical ideas, solutions, and methods to various audiences.	• *present solutions to small groups and whole classes, justifying and explaining strategy used*	• *present solutions to small groups and whole classes, justifying and explaining strategy used*

9th-10th: REASONING

State Mathematics Performance Standards Proficient Level Descriptors (High School Graduation Qualifying Examination)	**At the 9th grade level, students know and are able to do everything required at earlier ages and:**	**At the 10th grade level, students know and are able to do everything required at earlier ages and:**
D1.4.1 Follow and evaluate an argument, judging its validity using reasoning and logic.	• *examine a problem solving approach and determine where a flaw in reasoning may have occurred*	• *examine a problem solving approach and determine where a flaw in reasoning may have occurred*
D1.4.2 Make and test conjectures.	• *investigate situations, develop and discuss conjectures, and develop situations to test the conjectures*	• *investigate situations, develop and discuss conjectures, and develop situations to test the conjectures*
D1.4.3 Use methods of proofs (e.g., direct, indirect, counterexamples, paragraph) to validate conjectures.	• *write paragraphs proving conjectures to be true or false*	• *write paragraphs proving conjectures to be true or false*

9th-10th: CONNECTIONS

State Mathematics Performance Standards Proficient Level Descriptors (High School Graduation Qualifying Examination)	**At the 9th grade level, students know and are able to do everything required at earlier ages and:**	**At the 10th grade level, students know and are able to do everything required at earlier ages and:**
E1.4.1 Apply mathematical skills and processes to global issues.	• *apply math skills in a variety of subject areas and situations*	• *apply math skills in a variety of subject areas and situations*
E1.4.2 Describe how mathematics can be used in knowing how to prepare for careers.	• *recognize the application of math concepts in careers*	• *recognize the application of math concepts in careers*