

NUMBER AND NUMBER SENSE

Essential Knowledge Skills and Processes – At a Glance

K.1	FA1		FA2		FA3	
	T1	ML	T2	M2	T3	M3
a. Count orally to tell how many are in a given set containing 20 or fewer concrete objects, using one-to-one correspondence, and identify the corresponding numeral. (a)						
b. Read, write, and represent numbers from 0 – 20 to include: 1. Construct a set of objects that corresponds to a given numeral, including an empty set. 2. Read and write numerals from 0 through 20. 3. Identify written numerals from 0 through 20 represented in random order. 4. Identify the numeral that corresponds to the total number of objects in a given set of 20 or fewer concrete objects; and 5. Write a numeral that corresponds to a set of 20 or fewer concrete objects. (b)						

K.2	FA1		FA2		FA3	
	T1	ML	T2	M2	T3	M3
a. Compare and describe no more than three sets of 10 or fewer objects using the terms <i>more</i> , <i>fewer</i> , and <i>the same</i> . (a)						
b. Given a set of objects, construct a second set which has more, fewer, or the same number of objects. (a)						
c. Compare and order three or fewer sets, each containing 10 or fewer concrete objects, from least to greatest and greatest to least. (b)						

K.3	FA1		FA2		FA3	
	T1	ML	T2	M2	T3	M3
a. Count forward orally by ones from 0 to 100. (a)						
b. Count backward orally when given any number between and 10. (b)						
c. Identify the number after, without counting, when given any number between 0 and 100. (c)						
d. Identify the number before, without counting, when given any number between 1 and 10. (c)						
e. Count forward orally by tens, starting at 0, to determine the total number of objects to 100. (d)						

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NUMBER AND NUMBER SENSE

K.4	FA1		FA2		FA3	
	T1	ML	T2	M2	T3	M3
a. Recognize and describe with fluency the part-whole relationships for numbers up to 5 in a variety of configurations. (a)						
b. Investigate and describe part-whole relationships for numbers up to 10 using a variety of configurations. (b)						

K.5	FA1		FA2		FA3	
	T1	ML	T2	M2	T3	M3
a. Share a whole equally with two shares, when given a practical situation.						
b. Represent fair shares concretely or pictorially, when given a practical situation.						
c. Describe shares as equal pieces or parts of the whole (e.g., halves), when given a practical situation.						

KINDERGARTEN

COMPUTATION AND ESTIMATION

Essential Knowledge Skills and Processes- At a Glance

K.6	FA1		FA2		FA3	
	T1	ML	T2	M2	T3	M3
a. Model and solve various types of story and picture problems using 10 or fewer concrete objects. (Types of problems should include joining, separating, and part-part-whole scenarios.)						

KINDERGARTEN

MEASUREMENT AND GEOMETRY

Essential Knowledge Skills and Processes – At a Glance

K.7	FA1		FA2		FA3	
	T1	ML	T2	M2	T3	M3
a. Describe the properties/attributes (e.g., color, relative size) of a penny, nickel, dime, and quarter.						
b. Identify a penny, nickel, dime, and quarter						
c. Identify the number of pennies equivalent to a nickel, a dime, and a quarter (i.e., a nickel has the same value as five pennies).						

K.8	FA1		FA2		FA3	
	T1	ML	T2	M2	T3	M3
a. Identify the months of the year.						
c. Identify the seven days in a week.						
d. Determine the day before and after a given day (e.g., yesterday, today, tomorrow).						

K.9	FA1		FA2		FA3	
	T1	ML	T2	M2	T3	M3
a. Compare and describe lengths of two objects (as shorter or longer), using direct comparison (e.g., the bus is longer than the car).						
b. Compare and describe heights of two objects (as taller or shorter), using direct comparison.						
c. Compare and describe weights of two objects (as heavier or lighter), using direct comparison.						
d. Compare and describe temperatures of two objects or environment (as hotter or colder), using direct comparison.						
e. Compare and describe the volumes of two containers (as more or less), using direct comparison.						
f. Compare and describe the amount of time spent on two events (as longer or shorter), using direct comparison.						

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K.10	FA1		FA2		FA3	
	T1	ML	T2	M2	T3	M3
a. Identify a circle, triangle, square, and rectangle. (a)						
b. Describe the characteristics of triangles, squares, and rectangles, including number of sides and number of vertices. (a)						
c. Describe a circle using terms such as round and curved. (a)						
d. Compare and group plane figures (circle, triangle, square, and rectangle) according to their relative sizes (larger, smaller). (b)						
e. Compare and group plane figures (circle, triangle, square, and rectangle) according to their shapes. (b)						
f. Distinguish between examples and nonexamples of identified plane figures (circle, triangle, square, and rectangle). (b)						
g. Identify pictorial representations of a circle, triangle, square, and rectangle, regardless of their position and orientation in space. (c)						
h. Describe the location of one object relative to another, using the terms, <i>above</i> , <i>below</i> , and <i>next to</i> . (c)						

KINDERGARTEN

PROBABILITY AND STATISTICS

Essential Knowledge Skills and Processes – At a Glance

K.11	FA1		FA2		FA3	
	T1	ML	T2	M2	T3	M3
a. Collect data on categories identified by the teacher and/or student (e.g., number of siblings, types/numbers of pets, types of flowers in the garden). Data points, collected by students, should be limited to 16 or fewer for no more than four categories. (a)						
b. Represent data by arranging concrete objects into organized groups to form a simple object graph. (a)						
c. Represent gathered data, using pictures to form a simple picture graph (e.g., a picture graph of the weather for a month). (a)						
d. Represent gathered data in tables (vertically or horizontally). (a)						
e. Answer questions related to the gathered data displayed in object graphs, picture graphs, and tables:						
1. Read the graph to determine the categories of data and the data as a whole (e.g., the total number of responses) and its parts (e.g., five people are wearing sneakers); and						
2. Interpret the data that represents numerical relationships, including categories with the greatest, the least, or the same. (b)						

PATTERNS, FUNCTIONS, AND ALGEBRA
Essential Knowledge Skills and Processes – At a Glance

K.12	FA1		FA2		FA3	
	T1	ML	T2	M2	T3	M3
a. Identify the attributes of an object (e.g., color, size, shape, thickness).						
b. Sort objects into appropriate groups (categories) of one attribute (e.g., large bears and small bears).						
c. Classify sets of objects into groups (categories) of one attribute.						
d. Label attributes of a set of objects that have been sorted.						
e. Name multiple ways to sort a set of objects.						

K.13	FA1		FA2		FA3	
	T1	ML	T2	M2	T3	M3
a. Identify and describe the core (the part of the sequence that repeats) found in repeating patterns of common objects, sounds, movements, and pictures.						
b. Extend a repeating pattern by adding at least two complete repetitions of the core to the pattern.						
c. Create a repeating pattern.						
d. Compare similarities and differences between patterns.						
e. Transfer a repeating pattern from one representation to another.						

GRADE 1**Target for Understanding****NUMBER AND NUMBER SENSE****Essential Knowledge Skills and Processes – At a Glance**

1.1	FA1		FA2		FA3	
	T1	ML	T2	M2	T3	M3
a. Count forward orally by ones from 0 to 110 starting at any number between 0 and 110. (a)						
b. Use the oral counting sequence to tell how many objects are in a set. (a)						
c. Write numerals 0 – 110 in sequence and out of sequence. (b)						
d. Count backward orally by ones, when given a number between 1 and 30. (c)						
e. Count forward orally by ones, twos, fives, and tens to determine the total number of objects to 110. (d)						

1.2	FA1		FA2		FA3	
	T1	ML	T2	M2	T3	M3
a. Group a collection of objects into sets of tens and ones. (a)						
b. Write the numeral that corresponds to the total number of objects in a given collection of objects that have been grouped into sets of tens and ones. (a)						
c. Identify the place and value of each digit in a two-digit numeral (e.g., in the number 23, the 2 is in the tens place and the value of 2 is 20). (a)						
d. Identify the number of tens and ones that can be made from any number up to 100 (e.g., 47 is 47 ones or can also be grouped into 4 tens with 7 ones left over). (a)						
e. Compare two numbers between 0 and 110 represented pictorially or with concrete objects, using the words <i>greater than</i> , <i>less than</i> , or <i>equal to</i> . (b)						
f. Order three or fewer sets, each set containing up to 110 objects, from least to greatest and greatest to least. (c)						

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1.3	FA1		FA2		FA3	
	T1	ML	T2	M2	T3	M3
a. Identify the ordinal positions first through tenth using ordered sets of ten concrete objects and/or pictures of such sets presented from: <ol style="list-style-type: none"> 1. Left-to-right 2. Right-to-left 3. Top-to-bottom; and/or 4. Bottom-to-top. 						

1.4	FA1		FA2		FA3	
	T1	ML	T2	M2	T3	M3
a. Given a practical situation, share a whole equally with two or four sharers. (a)						
b. Given a practical situation, represent fair shares pictorially. (a)						
c. Given a practical situation, describe shares as equal pieces or parts of the whole. (e.g., halves, fourths). (a)						
d. Represent halves and fourths of a whole, using a region/area models (e.g., pie pieces, pattern blocks, paper folding, and drawings). (b)						
e. Name fractions represented by drawings or concrete materials for halves and fourths. (b)						

1.5	FA1		FA2		FA3	
	T1	ML	T2	M2	T3	M3
a. Select a reasonable order of magnitude for a given set from three given quantities: a one-digit numeral, a two-digit numeral, and a three-digit numeral (e.g., 5, 50, or 500 jelly beans in jars) in a familiar problem situation. (a)						
b. Explain why a particular estimate was chosen as the most reasonable from three given quantities (a one-digit numeral, a two-digit numeral, and a three-digit numeral), given a familiar problem situation. (b)						

GRADE 1

COMPUTATION AND ESTIMATION

Essential Knowledge Skills and Processes – At a Glance

1.6	FA1		FA2		FA3	
	T1	ML	T2	M2	T3	M3
a. Create and solve single-step oral or written story and picture problems, using addition and subtraction within 20.						
b. Identify a number sentence to solve an oral or written story and picture problem, selecting from among addition and/or subtraction equations (e.g., number sentences).						
c. Combine parts contained in larger numbers up to 20 by using related combinations (e.g., $9 + 7$ can be thought of as 9 broken up into 2 and 7; using doubles, $7 + 7 = 14$; $14 + 2 = 16$ or 7 broken up into 1 and 6; making a ten, $1 + 9 = 10$; $10 + 6 = 16$).						
d. Explain strategies used to solve addition and subtraction problems within 20 using spoken words, objects, pictorial models, and number sentences.						

1.7	FA1		FA2		FA3	
	T1	ML	T2	M2	T3	M3
a. Recognize and describe with fluency part-whole relationships for numbers up to 10 in a variety of configurations. (a)						
b. Identify + as a symbol for addition, - as a symbol for subtraction, and = as a symbol for equality. (b)						
c. Demonstrate fluency with addition and subtraction within 10. (b)						

GRADE 1

MEASUREMENT AND GEOMETRY

Essential Knowledge Skills and Processes – At a Glance

1.8	FA1		FA2		FA3	
	T1	ML	T2	M2	T3	M3
a. Count by ones to determine the value of a collection of pennies whose total value is 100 cents or less.						
b. Group a collection of pennies by fives and tens as a way to determine the value. The total value of the collection is 100 cents or less.						
c. Count by fives to determine the value of a collection of nickels whose total value is 100 cents or less.						
d. Count by tens to determine the value of a collection of dimes whose total value is 100 cents or less.						

1.9	FA1		FA2		FA3	
	T1	ML	T2	M2	T3	M3
a. Identify different types of clocks (analog and digital) as instruments to measure time. (a)						
b. Tell time shown on an analog clock to the hour and half-hour (a)						
c. Tell time shown on a digital clock to the hour and half-hour (a)						
d. Match a written time (e.g., 1:00, 3:30, 11:00) to the time shown on a digital and analog clock to the hour and half-hour (b)						
e. Read a calendar to locate a given day or date (e.g., What day of the week is the 10 th ? What date is Saturday?). (b)						
f. Determine the days/dates before and after a given day/date (e.g., today is the 30 th , so yesterday must have been the _?) (b)						
g. Given a calendar, determine the number of any day of the week (e.g., How many Fridays are in the month of October?) (b)						

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1.10	FA1		FA2		FA3	
	T1	ML	T2	M2	T3	M3
a. Measure the length of objects, using various nonstandard units (e.g., connecting cubes, paper clips, erasers)						
b. Compare the length of two objects, using the terms <i>longer/shorter, taller/shorter, same as</i> .						
c. b.Measure the weight of objects, using a balance or pan scale with various nonstandard units (e.g., paper clips, bean bags, cubes)						
d. Identify a balance scale or a pan scale as a tool for measuring weight.						
e. Compare the weight of two objects, using the terms <i>lighter, heavier, or the same</i> , using a balance scale.						
f. Measure the volume of objects, using various nonstandard units (e.g., connecting cubes, blocks, rice, water).						
g. Compare the volumes of two containers to determine if the volume of one is more, less, or equivalent to the other, using nonstandard units of measure (e.g., a spoonful or scoopful of rice, sand, jellybeans).						
h. Compare the volumes of two containers to determine if the volume of one is more, less, or equivalent to the other by pouring the contents of one container into the other.						

1.11	FA1		FA2		FA3	
	T1	ML	T2	M2	T3	M3
a. Identify the name of the plane figure when given information about the number of sides, vertices, and angles. (a)						
b. Trace triangles, squares, rectangles, and circles. (a)						
c. Describe a circle using terms such as <i>round and curved</i> . (a)						
d. Describe triangles, squares, and rectangles by the number of sides, vertices, and angles. (a)						
e. Recognize that rectangles and squares have special types of angles called right angles. (a)						
f. Sort plane figures based on their characteristics (number of sides, vertices, angles, curved, etc.). (a)						
g. Identify and describe representations of circles, squares, rectangles, and triangles, regardless of orientation in different environments and explain reasoning. (b)						

GRADE 1

PROBABILITY AND STATISTICS

Essential Knowledge Skills and Processes – At a Glance

1.12	FA1		FA2		FA3	
	T1	ML	T2	M2	T3	M3
a. Collect and organize data using various forms of data collection (e.g., counting and tallying, informal surveys, observations, voting). Data points, collected by students, should be limited to 16 or fewer for no more than four categories. (a)						
b. Represent data in tables, picture graphs, and object graphs. (a)						
c. Analyze information displayed in tables, picture graphs, and object graphs (horizontally or vertically represented). 1. Read the graph to determine the categories of data and the data as a whole (e.g., the total number of responses) and its parts (e.g., 15 people are wearing sneakers); and 2. Interpret the data that represents numerical relationships, to include using the words <i>more</i> , <i>less</i> , <i>fewer</i> , <i>greater than</i> , <i>less than</i> , and <i>equal to</i> . (b)						

GRADE 1

PATTERNS, FUNCTIONS, AND ALGEBRA

Essential Knowledge Skills and Processes – At a Glance

1.13	FA1		FA2		FA3	
	T1	ML	T2	M2	T3	M3
a. Sort and classify objects into appropriate subsets (categories) based on one or two attributes, such as size, shape, color, and/or thickness (e.g., sort a set of objects that are both red and thick).						
b. Label attributes of a set of objects that has been sorted.						
c. Name multiple ways to sort a set of objects.						

1.14	FA1		FA2		FA3	
	T1	ML	T2	M2	T3	M3
a. Identify the pattern in a given rhythmic, color, geometric figure, or numerical sequence						
b. Describe the pattern in a given rhythmic, color, geometric figure, or numerical sequence in terms of the core (the part of the sequence that repeats)						
c. Extend a repeating or growing pattern, using manipulatives, geometric figures, numbers, or calculators						
d. Create a repeating or growing pattern, using manipulatives, geometric figures, or calculators (e.g., the growing patterns 2, 3, 2, 4, 2, 5, 2, 6, 2, ...)						
e. Transfer a pattern from one form to another						

1.15	FA1		FA2		FA3	
	T1	ML	T2	M2	T3	M3
a. Identify the concept of equality.						
b. Identify equivalent values and represent equalities through the use of objects, words, and the equal (=) symbol.						
c. Identify and describe expressions that are not equal (e.g., $4 + 3$ is not equal to $3 + 5$).						
d. Recognize that equations can be used to represent the relationship between two expressions of equal value (e.g., $4 + 2 = 2 + 4$ and $6 + 1 = 4 + 3$).						
e. Model an equation that represents the relationship of two expressions of equal value.						

GRADE 2

NUMBER AND NUMBER SENSE

Essential Knowledge Skills and Processes – At a Glance

2.1	FA1		FA2		FA3	
	T1	ML	T2	M2	T3	M3
a. Demonstrate the understanding of the ten-to-one relationships among ones, tens, and hundreds, using manipulatives. (a)						
b. Write numerals, using a model or pictorial representation (i.e., a picture of base-10 blocks). (a)						
c. Read three-digit numbers when shown a numeral, a model of the number, or a pictorial representation of the number. (a)						
d. Identify and write the place (ones, tens, hundreds) of each digit in a three-digit numeral. (a)						
e. Determine the value of each digit in a three-digit numeral (e.g., in 352, the 5 represents 5 tens and its value is 50)						
f. Use models to represent numbers in multiple ways, according to place-value (e.g., 256 can be 2 hundreds, 5 tens, and 6 ones or 25 tens and 6 ones). (a)						
g. Use place value understanding to identify the number that is 10 more, 10 less, 100 more, 100 less than a given number, up to 999. (b)						
h. Compare two numbers between 0 and 999 represented concrete objects, pictorially, or symbolically, using the symbols ($<$, $>$, $=$) and the words <i>greater than</i> , <i>less than</i> or <i>equal to</i> . (c)						
i. Order three whole numbers between 0 and 999 represented with concrete objects, pictorially, or symbolically from least to greatest and greatest to least. (c)						
j. Round two-digit numbers to the nearest ten. (d)						

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2.2	FA1		FA2		FA3	
	T1	ML	T2	M2	T3	M3
a. Determine patterns created by counting by twos, fives, and tens to 120 on number charts. (a)						
b. Describe patterns in skip counting and use those patterns to predict the next number in the counting sequence (a)						
c. Skip count by twos, fives, and tens to 120 from various multiples of 2, 5, or 10, using manipulatives, a hundred chart, mental mathematics, a calculator, and/or paper and pencil. (a)``						
d. Skip count by two to 120 starting from any multiple of 2. (a)						
e. Skip count by five to 120 starting from any multiple of 5. (a)						
f. Skip count by ten to 120 starting from any multiple of 10. (a)						
g. Count backward by 10 from 120 (b)						
h. Use objects to determine whether a number is even or odd (e.g., dividing collections of objects into equal groups or pairing objects). (c)						

2.3	FA1		FA2		FA3	
	T1	ML	T2	M2	T3	M3
a. Count an ordered set of objects, using the ordinal number words <i>first</i> through <i>twentieth</i> . (a)						
b. Identify the ordinal positions first through twentieth, using an ordered set of objects presented in lines or rows from <ol style="list-style-type: none"> 1. Left to right; 2. Right to left; 3. Top to bottom; and 4. Bottom to top. (a) 						
c. Write 1 st , 2 nd , 3 rd ..., through 20 th in numerals. (b)						

2.4	FA1		FA2		FA3	
	T1	ML	T2	M2	T3	M3
a. Recognize fractions as representing equal-size parts of a whole. (a)						
b. Name and write fractions represented by a set model showing halves, fourths, eighths, thirds, and sixths. (a, b)						
c. Name and write fractions represented by a region/area model showing halves, fourths, eighths, thirds, and sixths. (a, b)						
d. Name and write fractions represented by a length model showing halves, fourths, eighths, thirds, and sixths. (a, b)						
e. Represent, with models and with symbols, fractional parts of a whole for halves, fourths, eighths, thirds, and sixths, using: 1. region/area models (e.g., pie pieces, pattern blocks, geoboards); 2. sets (e.g., chips, counters, cubes); and 3. length/measurement models (e.g., fraction strips or bars, rods, connecting cube trains). (b)						
f. Compare unit fractions for halves, fourths, eighths, thirds, and sixths), using words (greater than, less than or equal to) and symbols (>, <, =), with models. (c)						
g. Using same-size fraction pieces, from region/area models or length/measurement models, count the pieces (e.g., <i>one-fourth</i> , <i>two-fourths</i> , <i>three-fourths</i> , etc.) and compare those pieces to one whole (e.g., <i>four-fourths</i> will make one whole; <i>one-fourth</i> is less than a whole). (c)						

GRADE 2

COMPUTATION AND ESTIMATION

Essential Knowledge Skills and Processes – At a Glance

2.5	FA1		FA2		FA3	
	T1	ML	T2	M2	T3	M3
1. Recognize and use the relationship between addition and subtraction to solve single-step practical problems, with whole numbers to 20. (a)						
2. Determine the missing number in an equation (number sentence) (e.g., $3 + \square = 5$ or $\square + 2 = 5$; $5 - \square = 3$ or $5 - 2 = \square$). (a)						
3. Write the related facts for a given addition or subtraction fact (e.g., given $3 + 4 = 7$, write $7 - 4 = 3$ and $7 - 3 = 4$). (a)						
4. Demonstrate fluency with addition and subtraction within 20. (b)						

2.6	FA1		FA2		FA3	
	T1	ML	T2	M2	T3	M3
a. Estimate the sum of two whole numbers whose sum is 99 or less and recognize whether the estimation is reasonable (e.g., $27 + 41$ is about 70, because 27 is about 30 and 41 is about 40, and $30 + 40$ is 70). (a)						
b. Estimate the difference between two whole numbers each 99 or less and recognize whether the estimate is reasonable. (a)						
c. Determine the sum of two whole numbers whose sum is 99 or less, using various methods. (b)						
d. Determine the difference of two whole numbers each 99 or less, using various methods. (b)						
e. Create and solve single-step practical problems involving addition or subtraction. (c)						
f. Create and solve two-step practical problems involving addition, subtraction, or both addition and subtraction. (c)						

GRADE 2

MEASUREMENT AND GEOMETRY

Essential Knowledge Skills and Processes – At a Glance

2.7	FA1		FA2		FA3	
	T1	ML	T2	M2	T3	M3
a. Determine the value of a collection of coins and one-dollar bills whose total value is \$2.00 or less. (a)						
b. Count by ones, fives, tens, and twenty-fives to determine the value of a collection of coins whose total value is \$2.00 or less. (a)						
c. Compare the values of two sets of coins and one-dollar bills (each set having a total value of \$2.00 or less), using the terms <i>greater than</i> , <i>less than</i> , or <i>equal to</i> . (a)						
d. Use the cent (¢) and dollar (\$) symbols and decimal point (.) to write a value of money which is \$2.00 or less. (b)						

2.8	FA1		FA2		Fa3	
	T1	ML	T2	M2	T3	M3
a. Identify a ruler as an instrument to measure length. (a)						
b. Estimate and then measure the length of various line segments and objects to the nearest inch using a ruler. (a)						
c. Identify different types of scales as instruments to measure weight. (b)						
d. Estimate and then measure the weight of objects to the nearest pound using a scale. (b)						

2.9	FA1		FA2		FA3	
	T1	ML	T2	M2	T3	M3
a. Show, tell, and write time to the nearest five minutes, using an analog and digital clock						
b. Match a written time (e.g., 4:20, 10:05, 1:50) to a time shown on a clock face to the nearest five minutes.						
c. Match the time (to the nearest five minutes) shown on a clock face to a written time.						

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2.10	FA1		FA2		FA3	
	T1	ML	T2	M2	T3	M3
a. Determine the day that is a specific number of days or weeks in the past or in the future from a given date, using a calendar. (a)						
b. Identify specific days and dates (e.g., the third Monday in a given month or what day of the week is May 11). (b)						

2.11	FA1		FA2		FA3	
	T1	ML	T2	M2	T3	M3
a. Identify different types of thermometers as instruments used to measure temperature.						
b. Read temperature in Fahrenheit to the nearest ten degrees on thermometers (real world, physical model, and pictorial representations).						

2.12	FA1		FA2		FA3	
	T1	ML	T2	M2	T3	M3
a. Draw a line of symmetry in a figure. (a)						
b. Identify figures with at least one line of symmetry, using various concrete materials (e.g., mirrors, paper folding, pattern blocks). (b)						
c. Determine a line of symmetry that results in two figures that have the same size and shape and explain reasoning. (a, b)						
d. Create figures with at least one line of symmetry using various concrete materials. (b)						

2.13	FA1		FA2		FA3	
	T1	ML	T2	M2	T3	M3
a. Determine similarities and differences between related plane and solid figures (circles/spheres, squares/cubes, rectangles/rectangular prisms), using models and cutouts.						
b. Trace faces of solid figures (cubes and rectangular prisms) to create the set of plane figures related to the solid figure.						
c. Identify and describe plane figures (circles, squares, and rectangles), according to their characteristics (number of sides, vertices, and angles). Squares and rectangles have four right angles.						
d. Identify and describe solid figures (spheres, cubes, and rectangular prisms), according to the shape of their faces, number of edges, and number of vertices, using models.						
e. Compare and contrast plane and solid figures (circles/spheres, squares/cubes, and rectangles/rectangular prisms) according to their characteristics (number and shape of their faces, edges, vertices, and angles).						

GRADE 2

PROBABILITY AND STATISTICS

Essential Knowledge Skills and Processes – At a Glance

2.14	FA1		FA2		FA3	
	T1	ML	T2	M2	T3	M3
a. Conduct probability experiments using multicolored spinners, colored tiles, or number cubes and use the data from the experiments to predict outcomes if the experiment is repeated.						
b. Record the results of probability experiments, using tables, charts, and tally marks.						
c. Interpret the results of probability experiments.						
d. Predict which of two events is more or less likely to occur if an experiment is repeated.						

2.15	PA1		PA2		PA3	
	T1	ML	T2	M2	T3	M3
a. Collect and organize data using various forms of data collection (e.g., lists, tables, objects, pictures, symbols, tally marks, charts). Data points, collected by students, should be limited to 16 or fewer for no more than four categories. (a)						
b. Represent data in pictographs and bar graphs (limited to 16 or fewer data points for no more than four categories). (a)						
c. Read and interpret data represented in pictographs and bar graphs with up to 25 data points for no more than six categories (represented horizontally or vertically). State orally and in writing (at least one statement) that includes one or more of the following: 1. Describes the categories of data and the data as a whole (e.g., adding together all data points will equal the total number of responses); 2. Identifies parts of the data that have special characteristics; including categories with the greatest, the least, or the same; 3. Uses the data to make comparisons; and 4. Makes predictions and generalizations. (b)						

PATTERNS, FUNCTIONS, AND ALGEBRA

Essential Knowledge Skills and Processes – At a Glance

2.16	FA1		FA2		FA3	
	T1	ML	T2	M2	T3	M3
a. Identify a pattern as growing or repeating.						
b. Describe the core (the part of the sequence that repeats) of a given repeating pattern.						
c. Describe how a given growing pattern is changing.						
d. Create a growing or repeating pattern, using objects, pictures, or numbers.						
e. Extend a given pattern, using objects, pictures, or numbers.						
f. Transfer a given growing or repeating pattern from one form to another using objects, pictures, or numbers.						

2.17	FA1		FA2		FA3	
	T1	ML	T2	M2	T3	M3
a. Identify the equal symbol (=) as the symbol used to indicate that the values on either side are equal.						
b. Identify the not equal symbol (\neq) as the symbol used to indicate that two values on either side are not equal.						
c. Identify values and expressions that are equal (e.g., $8 = 8$, $8 = 4 + 4$).						
d. Identify values and expressions that are not equal (e.g., $8 \neq 9$, $4 + 3 \neq 8$).						
e. Identify and use the appropriate symbol to distinguish between equal and not equal quantities (e.g., $9 + 24 = 10 + 23$; $45 - 9 = 46 - 10$; $15 + 16 \neq 31 + 15$).						
f. Use a model to represent the relationship of two expressions of equal value and two expressions that are not equivalent.						

NUMBER AND NUMBER SENSE

Essential Knowledge Skills and Processes – A Record of Understanding

3.1	FA1		FA2		FA3	
	T1	ML	T2	M2	T3	M3
a. Read six-digit numerals orally. (a)						
b. Write six-digit numerals in standard form that are stated verbally or written in words. (a)						
c. Represent numbers up to 9,999 in multiple ways, according to place value (e.g., 256 can be 1 hundred, 14 tens, and 16 ones, but also 25 tens and 6 ones), with and without models. (a)						
d. Determine the value of each digit in a six-digit whole number (e.g., in 165,724, the 7 represents 7 hundreds and its value is 700). (a)						
e. Round a given whole number, 9,999 or less, to the nearest ten, hundred, and thousand. (b)						
f. Solve problems, using rounding of numbers, 9,999 or less, to the nearest ten, hundred, and thousand. (b)						
g. Compare two whole numbers, each 9,999 or less, using symbols (>, <, =, or ≠) and/or words (<i>greater than, less than, equal to, and not equal to</i>). (c)						
h. Order up to three whole numbers, each 9,999 or less, represented with concrete objects, pictorially, or symbolically from least to greatest and greatest to least. (c)						

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3.2	FA1		FA2		FA3	
	T1	ML	T2	M2	T3	M3
a. Name and write fractions (proper and improper) and mixed numbers with denominators of 12 or less in symbols represented by concrete and/or pictorial models. (a)						
b. Represent a given fraction (proper or improper) and mixed numbers, using concrete or pictorial set, area/region, length/measurement models and symbols. (b)						
c. Identify a fraction represented by a model as the sum of unit fractions. (b)						
d. Using a model of a fraction greater than one, count the fractional parts to name and write it as an improper fraction and as a mixed number (e.g., $\frac{1}{4}, \frac{2}{4}, \frac{3}{4}, \frac{4}{4}, \frac{5}{4} = 1 \frac{1}{4}$, or $2 \frac{1}{3} = \frac{7}{3}$). (b)						
e. Compare a model of a fraction, less than or equal to one, to the benchmarks of 0, $\frac{1}{2}$, and 1. (c)						
f. Compare proper fractions using the terms <i>greater than</i> , <i>less than</i> , <i>equal to</i> , or <i>not equal to</i> and the symbols (<, >, =, and ≠). Comparisons are made between fractions with both like and unlike denominators, with concrete or pictorial models. (c)						

COMPUTATION AND ESTIMATION

Essential Knowledge Skills and Processes – At a Glance

3.3	FA1		FA2		FA3	
	T1	ML	T2	M2	T3	M3
a. Determine whether an estimate or an exact answer is an appropriate solution for practical addition and subtraction problems involving single-step and multistep problems. (a, b)						
b. Estimate the sum of two whole numbers with sums to 9,999. (a)						
c. Estimate the difference of two whole numbers, each 9,999 or less. (a)						
d. Apply strategies, including place value and the properties of addition, to add two whole numbers with sums to 9,999. (a, b)						
e. Apply strategies, including place value and the properties of addition, to subtract two whole numbers, each 9,999 or less. (a, b)						
f. Use inverse relationships between addition and subtraction facts to solve practical problems. (b)						
g. Create and solve single-step and multistep practical problems involving the sum or difference of two whole numbers, each 9,999 or less. (b)						

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3.4	FA1		FA2		FA3	
	T1	ML	T2	M2	T3	M3
a. Represent multiplication using a variety of approaches and models (e.g., repeated addition, equal-sized groups, arrays, equal jumps on a number line, skip counting). (a)						
b. Represent division using a variety of approaches and models (e.g., repeated subtraction, equal sharing, equal groups). (a)						
c. Write three related equations (fact sentences) when given one equation (fact sentence) for multiplication or division (e.g., given $6 \times 7 = 42$, write $7 \times 6 = 42$, $42 \div 7 = 6$, and $42 \div 6 = 7$). (a)						
d. Create practical problems to represent a multiplication or division fact. (b)						
e. Use multiplication and division basic facts to represent a given situation, using a number sentence. (b)						
f. Recognize and use the inverse relationship between multiplication and division to solve practical problems. (b)						
g. Solve single-step practical problems that involve multiplication and division of whole numbers through 10×10 . (b)						
h. Demonstrate fluency with multiplication facts of 0, 1, 2, 5, and 10. (c)						
i. Solve single-step practical problems involving multiplication of whole numbers, where one factor is 99 or less and the second factor is 5 or less. (d)						
j. Apply strategies, including place value and the properties of multiplication and/or addition when multiplying and dividing whole numbers. (a, b, c, d)						

3.5	FA1		FA2		FA3	
	T1	ML	T2	M2	T3	M3
a. Solve practical problems that involve addition and subtraction with proper fractions having like denominators of 12 or less, using concrete and pictorial models representing area/regions (e.g., circles, squares, and rectangles), length/measurements (e.g., fraction bars and strips), and sets (e.g., counters).						

MEASUREMENT AND GEOMETRY
Essential Knowledge Skills and Processes – At a Glance

3.6	FA1		FA2		FA3	
	T1	ML	T2	M2	T3	M3
a. Determine the value of a collection of coins and bills whose total value is \$5.00 or less. (a)						
b. Compare the values of two sets of coins or bills, up to \$5.00, using the terms <i>greater than</i> , <i>less than</i> , and <i>equal to</i> . (b)						
c. Make change from \$5.00 or less. (c)						

3.7	FA1		FA2		FA3	
	T1	ML	T2	M2	T3	M3
a. Estimate and use U.S. Customary and metric units to measure lengths of objects to the nearest $\frac{1}{2}$ of an inch, inch, foot, yard, centimeter, and meter. (a)						
b. Determine the actual measure of length using U.S. Customary and metric units to measure objects to the nearest $\frac{1}{2}$ of an inch, foot, yard, centimeter, and meter. (a)						
c. Estimate and use U.S. Customary and metric units to measure liquid volume to the nearest cup, pint, quart, gallon, and liter. (b)						
d. Determine the actual measure of liquid volume using U.S. Customary and metric units to measure to the nearest cup, pint, quart, gallon, and liter. (b)						

3.8	FA1		FA2		FA3	
	T1	ML	T2	M2	T3	M3
a. Estimate and use U.S. Customary and metric units to measure the distance around a polygon with no more than six sides to determine the perimeter. (a)						
b. Determine the area of a given surface by estimating and then counting the number of square units needed to cover the surface. (b)						

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3.9	FA1		FA2		FA3	
	T1	ML	T2	M2	T3	M3
a. a. Tell time to the nearest minute, using analog and digital clocks						
b. Match a written time (e.g., 4:38, 7:09, 12:51) to the time shown on analog and digital clocks to the nearest minute. (a)						
c. Solve practical problems related to elapsed time in one-hour increments, within a 12-hour period (within a.m. or within p.m.): 1. when given the beginning time and the ending time, determine the time that has elapsed; (b) 2. when given the beginning time and amount of elapsed time in one-hour increments, determine the ending time; or (b) 3. when given the ending time and the elapsed time in one-hour increments, determine the beginning time. (b)						
d. Identify the number of minutes in an hour and the number of hours in a day. (c)						
e. Identify equivalent relationships observed in a calendar, including the approximate number of days in a given month (about 30), the number of days in a week, the number of days in a year (about $365 \frac{1}{4}$), and the number of months in a year. (c)						
f. Solve practical problems related to equivalent periods of time to include: 1. approximate days in five or fewer months; 2. days in five or fewer weeks; 3. months in five or fewer years; 4. minutes in five or fewer hours; and 5. hours in five or fewer days. (c)						

3.10	FA1		FA2		FA3	
	T1	ML	T2	M2	T3	M3
a. Read Celsius and Fahrenheit temperatures to the nearest degree using real thermometers, physical models, or pictorial representations.						

3.11	FA1		FA2		FA3	
	T1	ML	T2	M2	T3	M3
a. Identify examples of points, lines, line segments, rays, and angles.						
b. Describe endpoints and vertices as they relate to lines, line segments, rays, and angles.						
c. Draw representations of points, line segments, rays, angles, and lines, using a ruler or straightedge.						

3.12	FA1		FA2		FA3	
	T1	ML	T2	M2	T3	M3
a. Define polygon. (a)						
b. Classify figures as polygons or not polygons. (a)						
c. Identify and name polygons with 10 or fewer sides in various orientations: 1. triangle is a three-sided polygon; 2. quadrilateral is a four-sided polygon; 3. pentagon is a five-sided polygon; 4. hexagon is a six-sided polygon; 5. heptagon is a seven-sided polygon; 6. octagon is an eight-sided polygon; 7. nonagon is a nine-sided polygon; and 8. decagon is a ten-sided polygon. (b)						
d. Combine no more than three polygons, where each has three or four sides, and name the resulting polygon. (c)						
e. Subdivide a three-sided or four-sided polygon into no more than three parts and name the resulting polygon(s). (c)						

3.13	FA1		FA2		FA3	
	T1	ML	T2	M2	T3	M3
a. Identify examples of congruent and noncongruent figures.						
b. Determine and explain why plane figures are congruent or noncongruent.						

PROBABILITY AND STATISTICS

Essential Knowledge Skills and Processes – At a Glance

3.14	FA1		FA2		FA3	
	T1	ML	T2	M2	T3	M3
a. Define probability as the measurement of chance that an event will happen.						
b. List all possible outcomes for a single event (e.g., heads and tails are the two possible outcomes of flipping a coin). Limit the number of outcomes to 12 or fewer.						
c. Describe the degree of likelihood of an outcome occurring using terms such as <i>impossible</i> , <i>unlikely</i> , <i>equally likely</i> , <i>likely</i> , and <i>certain</i> .						

3.15	FA1		FA2		FA3	
	T1	ML	T2	M2	T3	M3
a. Identify parts of the data that have special characteristics, including categories with the greatest, the least, or the same (e.g., most students prefer scrambled eggs). (b)						
b. Select a correct interpretation of a graph from a set of interpretations, where one is correct and the remaining are incorrect. (b)						

PATTERNS, FUNCTIONS, AND ALGEBRA
Essential Knowledge Skills and Processes – At a Glance

3.16	FA1		FA2		FA3	
	T1	ML	T2	M2	T3	M3
a. Identify and describe repeating and growing patterns using words, objects, pictures, numbers, and tables.						
b. Identify a missing term in a pattern (e.g., 4, 6, □, 10, 12, 14).						
c. Create repeating and growing patterns using objects, pictures, numbers, and tables.						
d. Extend or identify missing parts in repeating and growing patterns using objects, pictures, numbers, and tables.						
e. Solve problems that involve the application of input and output rules limited to addition and subtraction of whole numbers.						
f. When given the rule, determine the missing values in a list or table. (Rules will be limited to addition and subtraction of whole numbers.)						

3.17	FA1		FA2		FA3	
	T1	ML	T2	M2	T3	M3
a. Identify and use the appropriate symbol to distinguish between expressions that are equal and expressions that are not equal (e.g., $256 - 13 = 220 + 23$; $143 + 17 = 140 + 20$; $457 + 100 \neq 557 + 100$).						
b. Create equations to represent equivalent mathematical relationships (e.g., $4 \times 3 = 14 - 2$).						

NUMBER AND NUMBER SENSE

Essential Knowledge Skills and Processes – A Record of Understanding

4.1	FA1		FA2		FA3	
	T1	ML	T2	M2	T3	M3
a. Read nine-digit whole numbers, presented in standard form and represent the same number in written form. (a)						
b. Write nine-digit whole numbers in standard form when the numbers are presented orally or in written form. (a)						
c. Identify and communicate, orally and in written form, the place and value for each digit in a nine-digit whole number. (a)						
d. Compare two whole numbers expressed through millions, using the words <i>greater than</i> , <i>less than</i> , <i>equal to</i> , and <i>not equal to</i> or using the symbols $>$, $<$, $=$, or \neq . (b)						
e. Order up to four whole numbers expressed through millions. (b)						
f. Round whole numbers expressed through millions to the nearest thousand, ten thousand, and hundred thousand place. (c)						
g. Identify the range of numbers that round to a given thousand, ten thousand, and hundred thousand. (c)						

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4.2	PA1		PA2		PA3	
	T1	ML	T2	M2	T3	M3
a. Identify the range of numbers that round to a given thousand, ten thousand, and hundred thousand. (c)						
b. Use benchmarks (e.g., 0, $\frac{1}{2}$ or 1) to compare and order no more than four fractions having unlike denominators of 12 or less. (a)						
c. Compare and order fractions no more than four fractions with like denominators of 12 or less by comparing number of parts (numerators) (e.g., $\frac{1}{5} < \frac{3}{5}$). (a)						
d. Compare and order no more than four fractions with like numerators and unlike denominators of 12 or less by comparing the size of the parts (e.g., $\frac{3}{9} < \frac{3}{5}$). (a)						
e. Compare and order no more than four fractions (proper or improper), and/or mixed numbers, having denominators of 12 or less. (a)						
f. Use the symbols $>$, $<$, $=$, and \neq to compare fractions (proper or improper) and/or mixed numbers having denominators of 12 or less. (a)						
g. Represent equivalent fractions through twelfths, using region/area models, set models, and measurement/length models. (b)						
h. Identify the division statement that represents a fraction with models and in context (e.g., $\frac{3}{5}$ means the same as 3 divided by 5 or $\frac{3}{5}$ represents the amount of muffin each of five children will receive when sharing 3 muffins equally). (c)						

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4.3	FA1		FA2		FA3	
	T1	ML	T2	M2	T3	M3
a. Read and write decimals expressed through thousandths, using base-ten manipulatives, drawings, and numerical symbols. (a)						
b. Represent and identify decimals expressed through thousandths, using base-ten manipulatives, pictorial representations, and numerical symbols (e.g., relate the appropriate drawing to 0.05). (a)						
c. Investigate the ten-to-one place value relationship for decimals through thousandths, using base-ten manipulatives (e.g., place value mats/charts, decimal squares, and base-ten blocks). (a)						
d. Identify and communicate, both orally and in written form, the position and value of a decimal through thousandths (e.g., given 0.385, the 8 is in the hundredths place and has a value of 0.08). (a)						
e. Round decimals expressed through thousandths to the nearest whole number. (b)						
f. Compare two decimals expressed through thousandths, using symbols (>, <, =, and ≠) and/or words (<i>greater than</i> , <i>less than</i> , <i>equal to</i> , and <i>not equal to</i>). (c)						
g. Order a set of up to four decimals, expressed through thousandths, from least to greatest or greatest to least. (c)						
h. Represent fractions for halves, fourths, fifths, and tenths as decimals through hundredths, using concrete objects. (d)						
i. Relate fractions to decimals, using concrete objects (e.g., 10-by-10 grids, meter sticks, number lines, decimal squares, decimal circles, money). (d)						
j. Write the decimal and fraction equivalent for a given model (e.g., $\frac{1}{4} = 0.25$ or $0.25 = \frac{1}{4}$, $1.25 = \frac{5}{4}$ or $1\frac{1}{4}$). (d)						

*On the state assessment, items measuring this objective are assessed without the use of a calculator.

GRADE 4

COMPUTATION AND ESTIMATION

Essential Knowledge Skills and Processes – At a Glance

4.4	FA1		FA2		FA3	
	T1	ML	T2	M2	T3	M3
a. Demonstrate fluency with multiplication through 12×12 , and the corresponding division facts. (a)						
b. Estimate whole number sums, differences, products, and quotients, with and without context. (b, c)						
c. Apply strategies, including place value and the properties of addition to determine the sum or difference of two whole numbers, each 999,999 or less. (b)						
d. Apply strategies, including place value and the properties of multiplication and/or addition, to determine the product of two whole numbers when both factors have two digits or fewer. (b)						
e. Apply strategies, including place value and the properties of multiplication and/or addition, to determine the product of two whole numbers when both factors have two digits or fewer. (b)						
f. Refine estimates by adjusting the final amount, using terms such as <i>closer to</i> , <i>between</i> , and <i>a little more than</i> . (b, c)						
g. Create and solve single-step and multistep practical problems involving addition, subtraction, and multiplication with whole numbers. (d)						
h. Create and solve single-step practical problems involving division with whole numbers. (d)						
i. Use the context in which a practical problem is situated to interpret the quotient and remainder. (d)						

*On the state assessment, items measuring this objective are assessed without the use of a calculator.

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4.5	FA1		FA2		FA3	
	T1	ML	T2	M2	T3	M3
a. Determine common multiples and common factors of numbers. (a)						
b. Determine the least common multiple and greatest common factor of no more than three numbers. (a)						
c. Determine a common denominator for fractions, using common multiples. Common denominators should not exceed 60. (b)						
d. Estimate the sum or difference of two fractions. (b, c)						
e. Add and subtract fractions (proper or improper) and/or mixed numbers, having like and unlike denominators limited to 2, 3, 4, 5, 6, 8, 10, and 12, and simplify the resulting fraction. (Subtraction with fractions will be limited to problems that do not require regrouping). (b)						
f. Solve single-step practical problems that involve addition and subtraction with fractions (proper or improper) and/or mixed numbers, having like and unlike denominators limited to 2, 3, 4, 5, 6, 8, 10, and 12, and simplify the resulting fraction. (Subtraction with fractions will be limited to problems that do not require regrouping). (c)						

*On the state assessment, items measuring this objective are assessed without the use of a calculator.

4.6	FA1		FA2		FA3	
	T1	ML	T2	M2	T3	M3
a. Estimate sums and differences of decimals. (a)						
b. Add and subtract decimals through thousandths, using concrete materials, pictorial representations, and paper and pencil. (a)						
c. Solve single-step and multistep practical problems that involve adding and subtracting with decimals through thousandths. (b)						

*On the state assessment, items measuring this objective are assessed without the use of a calculator.

GRADE 4

MEASUREMENT AND GEOMETRY

Essential Knowledge Skills and Processes – At a Glance

4.7	FA1		FA2		FA3	
	T1	ML	T2	M2	T3	M3
a. Determine the perimeter of a polygon with no more than eight sides, when the lengths of the sides are given, with diagrams.						
b. Determine the perimeter and area of a rectangle when given the measure of two adjacent sides, with and without diagrams.						
c. Determine the perimeter and area of a square when the measure of one side is given, with and without diagrams.						
d. Solve practical problems that involve determining perimeter and area in U.S. Customary and metric units.						

4.8	FA1		FA2		FA3	
	T1	ML	T2	M2	T3	M3
a. Determine an appropriate unit of measure (e.g., inch, foot, yard, mile, millimeter, centimeter, and meter) to use when measuring everyday objects in both metric and U.S. Customary units. (a)						
b. Estimate and measure length of objects in both metric and U.S. Customary units, measuring to the nearest inch ($\frac{1}{2}$, $\frac{1}{4}$, $\frac{1}{8}$), and to the nearest foot, yard, millimeter, centimeter, or meter, and record the length including the unit of measure (e.g., 24 inches). (a)						
c. Compare estimates of the length with the actual measurement of the length. (a)						
d. Determine an appropriate unit of measure (ounce, pound, gram, and kilogram) to use when measuring the weight/mass of everyday objects in both U.S. Customary and metric units. (b)						
e. Estimate and measure the weight/mass of objects in both U.S. Customary and metric units (ounce, pound, gram, or kilogram) to the nearest appropriate measure, using a variety of measuring instruments. (b)						
f. Record the weight/mass of an object with the unit of measure (e.g., 24 grams). (b)						
g. Given the equivalent measure of one unit, identify equivalent measures between units within the U.S. Customary system for: <ol style="list-style-type: none"> 1. length (inches and feet, feet and yards, inches and yards); yards and miles; 2. weight/mass (ounces and pounds); and 3. liquid volume (cups, pints, quarts, and gallons). (c) 						
h. Solve practical problems that involve length, weight/mass, and liquid volume in U.S. Customary units. (d)						

4.9	FA1		FA2		FA3	
	T1	ML	T2	M2	T3	M3
<p>a. Solve practical problems related to elapsed time in hours and minutes, within a 12-hour period (within a.m., within p.m., and across a.m. and p.m.):</p> <ol style="list-style-type: none"> when given the beginning time and the ending time, determine the time that has elapsed; when given the beginning time and amount of elapsed time in hours and minutes, determine the ending time; or when given the ending time and the elapsed time in hours and minutes, determine the beginning time. 						

4.10	FA1		FA2		FA3	
	T1	ML	T2	M2	T3	M3
a. Identify and describe points, lines, line segments, rays, and angles, including endpoints and vertices. (a)						
b. Use symbolic notation to name points, lines, line segments, rays, and angles. (a)						
c. Identify parallel, perpendicular, and intersecting line segments in plane and solid figures. (b)						
d. Identify practical situations that illustrate parallel, intersecting, and perpendicular lines. (b)						
e. Use symbolic notation to describe parallel lines and perpendicular lines. (b)						

4.11	FA1		FA2		FA3	
	T1	ML	T2	M2	T3	M3
a. Identify concrete models and pictorial representations of solid figures (cube, rectangular prism, square pyramid, sphere, cone, and cylinder).						
b. Identify and describe solid figures (cube, rectangular prism, square pyramid, and sphere) according to their characteristics (number of angles, vertices, edges, and by the number and shape of faces)						
c. Compare and contrast plane and solid figures (circle/sphere, square/cube, triangle/square pyramid, and rectangle/ rectangular prism) according to their characteristics (number of sides, angles, vertices, edges, and the number and shape of faces).						

4.12	FA1		FA2		FA3	
	T1	ML	T2	M2	T3	M3
a. Develop definitions for parallelograms, rectangles, squares, rhombi, and trapezoids.						
b. Identify properties of quadrilaterals including parallel, perpendicular, and congruent sides.						
c. Classify quadrilaterals as parallelograms, rectangles, squares, rhombi, and/or trapezoids.						
d. Compare and contrast the properties of quadrilaterals.						
e. Identify parallel sides, congruent sides, and right angles using geometric markings to denote properties of quadrilaterals.						

GRADE 4

PROBABILITY AND STATISTICS

Essential Knowledge Skills and Processes – At a Glance

4.13	FA1		FA2		FA3	
	T1	ML	T2	M2	T3	M3
a. Model and determine all possible outcomes of a given simple event where there are no more than 24 possible outcomes, using a variety of manipulatives, such as coins, number cubes, and spinners. (a)						
b. Determine the outcome of an event that is least likely to occur or most likely to occur where there are no more than 24 possible outcomes. (a)						
c. Write the probability of a given simple event as a fraction, where there are no more than 24 possible outcomes. (b)						
d. Determine the likelihood of an event occurring and relate it to its whole number or fractional representation (e.g., impossible or zero; equally likely; certain or one). (a, b)						
e. Create a model or practical problem to represent a given probability. (c)						

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4.14	FA1		FA2		FA3	
	T1	ML	T2	M2	T3	M3
a. Collect data, using, for example, observations, measurement, surveys, scientific experiments, polls, or questionnaires. (a)						
b. Organize data into a chart or table. (a)						
c. Represent data in bar graphs, labeling one axis with equal whole number increments of one or more (numerical data) (e.g., 2, 5, 10, or 100) and the other axis with categories related to the title of the graph (categorical data) (e.g., swimming, fishing, boating, and water skiing as the categories of "Favorite Summer Sports"). (a)						
d. Represent data in line graphs, labeling the vertical axis with equal whole number increments of one or more and the horizontal axis with continuous data commonly related to time (e.g., hours, days, months, years. Line graphs will have no more than 10 identified points along a continuum for continuous data. (a)						
e. Title the graph or identify an appropriate title. Label the axes or identify the appropriate labels. (a) Interpret data by making observations from bar graphs and line graphs by describing the characteristics of the data and the data as a whole (e.g., the time period when the temperature increased the most, the category with the greatest/least, categories with the same number of responses, similarities and differences, the total number). One set of data will be represented on a graph. (b)						
f. Interpret data by making inferences from bar graphs and line graphs. (b)						
g. Interpret the data to answer the question posed, and compare the answer to the prediction (e.g., "The summer sport preferred by most is swimming, which is what I predicted before collecting the data."). (b)						
h. Write at least one sentence to describe the analysis and interpretation of the data, identifying parts of the data that have special characteristics, including categories with the greatest, the least, or the same. (b)						
i. Compare two different representations of the same data (e.g., a set of data displayed on a chart and a bar graph; a chart and a line graph; a pictograph and a bar graph). (c)						

PATTERNS, FUNCTIONS, AND ALGEBRA

Essential Knowledge Skills and Processes – At a Glance

4.15	FA1		FA2		FA3	
	T1	ML	T2	M2	T3	M3
a. Identify and describe patterns, using words, objects, pictures, numbers, and tables.						
b. Create patterns using objects, pictures, numbers, and tables.						
c. Extend patterns, using objects, pictures, numbers, and tables.						
d. Solve practical problems that involve identifying, describing, and extending single-operation input and output rules, limited to addition, subtraction, and multiplication of whole numbers and addition and subtraction of fractions with like denominators of 12 or less.						
e. Identify the rule in a single-operation numerical pattern found in a list or table, limited to addition, subtraction, and multiplication of whole numbers.						

4.16	FA1		FA2		FA3	
	T1	ML	T2	M2	T3	M3
a. Write an equation to represent the relationship between equivalent mathematical expressions (e.g., $4 \times 3 = 2 \times 6$; $10 + 8 = 36 \div 2$; $12 \times 4 = 60 - 12$).						
b. Identify and use the appropriate symbol to distinguish between expressions that are equal and expressions that are not equal, using addition, subtraction, multiplication, and division (e.g., $4 \times 12 = 8 \times 6$ and $64 \div 8 \neq 8 \times 8$).						

GRADE 5

NUMBER AND NUMBER SENSE

Essential Knowledge Skills and Processes – At a Glance

5.1	FA1		FA2		FA3	
	T1	ML	T2	M2	T3	M3
a. Given a decimal through thousandths, round to the nearest whole number, tenth, or hundredth.						

5.2	PA1		PA2		PA3	
	T1	ML	T2	M2	T3	M3
a. Represent fractions with denominators that are thirds, eighths, and factors of 100 in their equivalent decimal form with concrete or pictorial models. (a)						
b. Represent decimals in their equivalent fraction form (thirds, eighths, and factors of 100) with concrete or pictorial models. (a)						
c. Identify equivalent relationships between decimals and fractions with denominators that are thirds, eighths, and factors of 100 in their equivalent decimal form without models. (a)						
d. Compare and order from least to greatest and greatest to least a given set of no more than four decimals, fractions (proper or improper), and/or mixed numbers with denominators of 12 or less. (b)						
e. Use the symbols $>$, $<$, $=$, and \neq to compare decimals through thousandths, fractions (proper or improper fractions), and/or mixed numbers, having denominators of 12 or less. (b)						

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5.3	PA1		PA2		PA3	
	T1	ML	T2	M2	T3	M3
a. Identify prime numbers less than or equal to 100. (a)						
b. Identify composite numbers less than or equal to 100. (a)						
c. Demonstrate with concrete or pictorial representations and explain orally or in writing why a number is prime or composite. (a)						
d. Identify which numbers are even or odd. (b)						
e. Demonstrate with concrete or pictorial representations and explain orally or in writing why a number is even or odd. (b)						
f. Demonstrate with concrete or pictorial representations and explain orally or in writing why the sum or difference of two numbers is even or odd. (b)						

GRADE 5

COMPUTATION AND ESTIMATION

Essential Knowledge Skills and Processes – At a Glance

5.4	FA1		FA2		FA3	
	T1	ML	T2	M2	T3	M3
a. Create single-step and multistep practical problems involving addition, subtraction, multiplication, and division of whole numbers, with and without remainders.						
b. Estimate the sum, difference, product, and quotient of whole numbers.						
c. Estimate the sum, difference, product, and quotient of whole number computations.						
d. Apply strategies, including place value and application of the properties of addition and multiplication, to solve single-step and multistep practical problems involving addition, subtraction, multiplication, and division of whole numbers, with and without remainders, in which: 1. sums, differences, and products do not exceed five digits; 2. factors do not exceed two digits by three digits; 3. divisors do not exceed two digits; or 4. dividends do not exceed four digits.						
e. Use the context of a practical problem to interpret the quotient and remainder.						

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5.5	FA1		FA2		FA3	
	T1	ML	T2	M2	T3	M3
a. Estimate and determine the product of two numbers in which: 1. the factors do not exceed two digits by two digits (e.g., 2.3×4.5 , 0.08×0.9 , 0.85×2.3 , 1.8×5); and 2. the products do not exceed the thousandths place. (Leading zeroes will not be considered when counting digits.) (a)						
b. Estimate and determine the quotient of two numbers in which 1. quotients do not exceed four digits with or without a decimal point; 2. quotients may include whole numbers, tenths, hundredths, or thousandths; 3. divisors are limited to a single digit whole number or a decimal expressed as tenths; and 4. no more than one additional zero will need to be annexed. (a)						
c. Use multiple representations to model multiplication and division of decimals and whole numbers. (a)						
d. Create and solve single-step and multistep practical problems involving addition, subtraction, and multiplication of decimals. (b)						
e. Create and solve single-step practical problems involving division of decimals. (b)						

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5.6	FA1		FA2		FA3	
	T1	ML	T2	M2	T3	M3
a. Solve single-step and multistep practical problems involving addition and subtraction with fractions (proper or improper) having like and unlike denominators. Denominators in the problems should be limited to 12 or less (e.g., $\frac{1}{5} + \frac{1}{4}$, $\frac{5}{6} - \frac{2}{3}$, $3\frac{3}{4} + 2\frac{5}{12}$) and answers should be expressed in simplest form. (a)						
b. Solve single-step practical problems involving multiplication of a whole number, limited to 12 or less, and a proper fraction (e.g., $6 \times \frac{1}{3}$, $\times 8$, $9 \times \frac{2}{3}$), with models. The denominator will be a factor of the whole number and answers should be expressed in simplest form. (b)						
c. Apply the inverse property of multiplication in models. (For example, use a visual fraction model to represent 44 or 1 as the product of $\frac{4}{4} \times \frac{1}{4}$). (b)						

5.7	FA1		FA2		FA3	
	T1	ML	T2	M2	T3	M3
a. Use the order of operations to simplify whole number numerical expressions, limited to addition, subtraction, multiplication, and division. Expressions may contain parentheses.						
b. Given a whole number numerical expression involving more than one operation, describe which operation is completed first, which is second, etc.						

GRADE 5

MEASUREMENT AND GEOMETRY

Essential Knowledge Skills and Processes – At a Glance

5.8	PA1		PA2		PA3	
	T1	ML	T2	M2	T3	M3
a. Solve practical problems that involve perimeter, area, and volume in standard units of measure. (a)						
b. Determine the perimeter of a polygon, with or without diagrams, when <ol style="list-style-type: none"> 1. the lengths of all sides of a polygon that is not a rectangle or a square are given; 2. the length and width of a rectangle are given; or 3. the length of a side of a square is given. (a) 						
c. Estimate and determine the area of a square and rectangle using whole number measurements given in metric or U.S. Customary units, and record the solution with the appropriate unit of measure (e.g., 24 square inches). (a)						
d. Develop a procedure for determining the area of a right triangle using only whole number measurements given in metric or U.S. Customary units, and record the solution with the appropriate unit of measure (e.g., 12 square inches). (a)						
e. Estimate and determine the area of a right triangle, with diagrams, when the base and the height are given. (a)						
f. Develop a procedure for determining volume using manipulatives (e.g., cubes). (a)						
g. Estimate and determine the perimeter of a polygon, and area of a square, rectangle, and right triangle following the parameters listed above, using only whole number measurements given in metric or U.S. Customary units, and record the solution with the appropriate unit of measure (e.g., 24 square inches).						
h. Describe practical situations where perimeter, area, and volume are appropriate measures to use, and justify orally or in writing. (b)						
i. Identify whether the application of the concept of perimeter, area, or volume is appropriate for a given situation. (b)						

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5.9	FA1		FA2		FA3	
	T1	ML	T2	M2	T3	M3
a. Given the equivalent measure of one unit, identify equivalent measurements within the metric system for the following: 1. length (millimeters, centimeters, meters, and kilometers); 2. mass (grams and kilograms); and 3. liquid volume (milliliters and liters). (a)						
b. Estimate and measure to solve practical problems that involve metric units: 1. length (millimeters, centimeters, meters, and kilometers); 2. mass (grams and kilograms); and 3. liquid volume (milliliters, and liters). (b)						

5.10	FA1		FA2		FA3	
	T1	ML	T2	M2	T3	M3
a. Identify and describe the diameter, radius, chord, and circumference of a circle.						
b. Investigate and describe the relationship between 1. diameter and radius; 2. diameter and chord; 3. radius and circumference; and 4. diameter and circumference.						

5.11	FA1		FA2		FA3	
	T1	ML	T2	M2	T3	M3
a. Solve practical problems related to elapsed time in hours and minutes within a 24-hour period: 1. when given the beginning time and the ending time, determine the time that has elapsed; 2. when given the beginning time and amount of elapsed time in hours and minutes, determine the ending time; or 3. when given the ending time and the elapsed time in hours and minutes, determine the beginning time.						

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5.12	FA1		FA2		FA3	
	T1	ML	T2	M2	T3	M3
a. Classify angles as right, acute, obtuse, or straight.						
b. Identify the appropriate tools (e.g., protractor and straightedge or angle ruler as well as available software) used to measure and draw angles.						
c. Measure right, acute, obtuse, and straight angles, using appropriate tools, and identify their measures in degrees.						
d. Solve addition and subtraction problems to determine unknown angle measures on a diagram in practical problems.						

5.13	FA1		FA2		FA3	
	T1	ML	T2	M2	T3	M3
a. Classify angles as right, acute, obtuse, or straight.						
b. Classify triangles as equilateral, scalene, or isosceles. (a)						
c. Compare and contrast the properties of triangles. (a)						
d. Identify congruent sides and right angles using geometric markings to denote properties of triangles. (a)						
e. Use models to prove that the sum of the interior angles of a triangle is 180 degrees, and use that relationship to determine an unknown angle measure in a triangle. (b)						

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5.14	FA1		FA2		FA3	
	T1	ML	T2	M2	T3	M3
a. Apply transformations to polygons in order to determine congruence. (a)						
b. Recognize that translations, reflections, and rotations preserve congruency. (a)						
c. Identify the image of a polygon resulting from a single transformation (translation, reflection, or rotation). (a)						
d. Investigate and describe the results of combining and subdividing polygons. (b)						
e. Compare and contrast the characteristics of a given polygon that has been subdivided with the characteristics of the resulting parts. (b)						

GRADE 5

PROBABILITY AND STATISTICS

Essential Knowledge Skills and Processes – At a Glance

5.15	FA1		FA2		FA3	
	T1	ML	T2	M2	T3	M3
a. Construct a sample space, using a tree diagram to identify all possible outcomes of a single event.						
b. Construct a sample space, using a list or chart to represent all possible outcomes of a single event.						
c. Determine the probability of an outcome by constructing a sample space. The sample space will have a total of 24 or fewer equally likely possible outcomes.						
d. Determine the number of possible outcomes by using the Fundamental (Basic) Counting Principle.						

5.16	FA1		FA2		FA3	
	T1	ML	T2	M2	T3	M3
a. Collect data, using observations (e.g., weather), measurement (e.g., shoe sizes), surveys (e.g., hours watching television), or experiments (e.g., plant growth). (a)						
b. Organize the data into a chart, table, line plot, and stem-and-leaf plot. (a)						
c. Represent data in a line plot. Line plots will have no more than 30 data points. (a)						
d. Represent data in a stem-and-leaf plot where the stem is listed in ascending order and the leaves are in ascending order, with or without commas between leaves. Stem-and-leaf plots will be limited to no more than 30 data points. (a)						
e. Title the given graph or identify an appropriate title. (a)						
f. Interpret data by making observations from line plots and stem-and-leaf plots, describing the characteristics of the data and describing the data as a whole. One set of data will be represented on a graph. (b)						
g. Interpret data by making inferences from line plots and stem-and-leaf plots. (b)						
h. Compare data represented in a line plot with the same data represented in a stem-and-leaf plot. (b)						

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5.17	FA1		FA2		FA3	
	T1	ML	T2	M2	T3	M3
a. Describe and determine the mean of a group of numbers representing data from a given context as a measure of center. (a, d)						
b. Describe and determine the median of a group of numbers representing data from a given context as a measure of center. (a, d)						
c. Describe and determine the mode of a group of numbers representing data from a given context as a measure of center. (a, d)						
d. Describe mean as fair share. (b)						
e. Describe and determine the range of a group of numbers representing data from a given context as a measure of spread. (c, d)						

GRADE 5

PATTERNS, FUNCTIONS, AND ALGEBRA

Essential Knowledge Skills and Processes – At a Glance

5.18	FA1		FA2		FA3	
	T1	ML	T2	M2	T3	M3
a. Identify, create, describe, and extend patterns using concrete materials, numbers, number lines, tables, or pictures.						
b. Describe and express the relationship found in patterns, using words, tables, and symbols.						
c. Solve practical problems that involve identifying, describing, and extending single-operation input and output rules (limited to addition, subtraction and multiplication of whole numbers; addition and subtraction of fractions, with denominators of 12 or less; and addition and subtraction of decimals expressed in tenths or hundredths).						
d. Identify the rule in a single-operation numerical pattern found in a list or table (limited to addition, subtraction and multiplication of whole numbers; addition and subtraction of fractions, with denominators of 12 or less; and addition and subtraction of decimals expressed in tenths or hundredths).						

5.19	FA1		FA2		FA3	
	T1	ML	T2	M2	T3	M3
a. Describe the concept of a variable (presented as boxes, letters, or other symbols) as a representation of an unknown quantity. (a)						
b. Write an open sentence with addition, subtraction, multiplication, or division, using a variable to represent a missing number. (b)						
c. Use an expression with a variable to represent a given verbal expression involving one operation (e.g., “5 more than a number” can be represented by $y + 5$). (c)						
d. Create and write a word problem to match a given equation with a single variable and one operation. (d)						

GRADE 6

NUMBER AND NUMBER SENSE

Essential Knowledge Skills and Processes – At a Glance

6.1	FA1		FA2		FA3	
	T1	ML	T2	M2	T3	M3
a. Represent a relationship between two quantities using ratios.						
b. Represent a relationship in words that makes a comparison by using the notations $\frac{a}{b}$, $a:b$, and a to b .						
c. Create a relationship in words for a given ratio expressed symbolically.						

6.2	FA1		FA2		FA3	
	T1	ML	T2	M2	T3	M3
a. Represent ratios as fractions (proper or improper), mixed numbers, decimals, and/or percents. (a)						
b. Determine the decimal and percent equivalents for numbers written in fraction form (proper or improper) or as a mixed number, including repeating decimals. (a)						
c. Represent and determine equivalencies among decimals, percents, fractions (proper or improper), and mixed numbers that have denominators that are 12 or less or factors of 100. (a)						
d. Compare two percents using pictorial representations and symbols ($<$, \leq , \geq , $>$, $=$). (b)						
e. Order no more than four positive rational numbers expressed as fractions (proper or improper), mixed numbers, decimals, and percents (decimals through thousandths, fractions with denominators of 12 or less or factors of 100). Ordering may be in ascending or descending order. (b)						

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6.3	FA1		FA2		FA3	
	T1	ML	T2	M2	T3	M3
a. Model integers, including models derived from practical situations. (a)						
b. Identify an integer represented by a point on a number line. (a)						
c. Compare and order integers using a number line. (b)						
d. Compare integers, using mathematical symbols ($<$, \leq , $>$, \geq , $=$). (b)						
e. Identify and describe the absolute value of an integer. (c)						

6.4	FA1		FA2		FA3	
	T1	ML	T2	M2	T3	M3
a. Recognize and represent patterns with bases and exponents that are whole numbers.						
b. Recognize and represent patterns of perfect squares not to exceed 20^2 , by using grid paper, square tiles, tables, and calculators.						
c. Recognize powers of 10 with whole number exponents by examining patterns in place value.						
d. Compare integers, using mathematical symbols ($<$, \leq , $>$, \geq , $=$). (b)						
e. Identify and describe the absolute value of an integer. (c)						

GRADE 5

COMPUTATION AND ESTIMATION

Essential Knowledge Skills and Processes – At a Glance

6.5	FA1		FA2		FA3	
	T1	ML	T2	M2	T3	M3
a. Demonstrate/model multiplication and division of fractions (proper or improper) and mixed numbers using multiple representations. (a)						
b. Multiply and divide fractions (proper or improper) and mixed numbers. Answers are expressed in simplest form. (a)						
c. Solve single-step and multistep practical problems that involve addition and subtraction with fractions (proper or improper) and mixed numbers, with and without regrouping, that include like and unlike denominators of 12 or less. Answers are expressed in simplest form. (b)						
d. Solve single-step and multistep practical problems that involve multiplication and division with fractions (proper or improper) and mixed numbers that include denominators of 12 or less. Answers are expressed in simplest form. (b)						
e. Solve multistep practical problems involving addition, subtraction, multiplication and division with decimals. Divisors are limited to a three-digit number, with decimal divisors limited to hundredths. (c)						

6.6	FA1		FA2		FA3	
	T1	ML	T2	M2	T3	M3
a. Model addition, subtraction, multiplication and division of integers using pictorial representations or concrete manipulatives. (a)						
b. Add, subtract, multiply, and divide two integers. (a)						
c. Solve practical problems involving addition, subtraction, multiplication, and division with integers. (b)						
d. Use the order of operations and apply the properties of real numbers to simplify numerical expressions involving more than two integers. Expressions should not include braces { } or brackets [], but may contain absolute value bars . Simplification will be limited to three operations, which may include simplifying a whole number raised to an exponent of 1, 2 or 3. (c)						

GRADE 6

MEASUREMENT AND GEOMETRY

Essential Knowledge Skills and Processes – At a Glance

6.7	FA1		FA2		FA3	
	T1	ML	T2	M2	T3	M3
a. Derive an approximation for pi (3.14 or $\frac{22}{7}$) by gathering data and comparing the circumference to the diameter of various circles, using concrete materials or computer models. (a)						
b. Solve problems, including practical problems, involving circumference and area of a circle when given the length of the diameter or radius. (b)						
c. Solve problems, including practical problems, involving area and perimeter of triangles and rectangles. (c)						

6.8	FA1		FA2		FA3	
	T1	ML	T2	M2	T3	M3
a. Identify and label the axes, origin, and quadrants of a coordinate plane. (a)						
b. Identify the quadrant or the axis on which a point is positioned by examining the coordinates (ordered pair) of the point. Ordered pairs will be limited to coordinates expressed as integers. (a)						
c. Graph ordered pairs in the four quadrants and on the axes of a coordinate plane. Ordered pairs will be limited to coordinates expressed as integers. (b)						
d. Identify ordered pairs represented by points in the four quadrants and on the axes of the coordinate plane. Ordered pairs will be limited to coordinates expressed as integers. (b)						
e. Relate the coordinates of a point to the distance from each axis and relate the coordinates of a single point to another point on the same horizontal or vertical line. Ordered pairs will be limited to coordinates expressed as integers. (b)						
f. Draw polygons in the coordinate plane given coordinates for the vertices; use coordinates to determine the length of a side joining points with the same first coordinate or the same second coordinate. Ordered pairs will be limited to coordinates expressed as integers. Apply these techniques in the context of solving practical and mathematical problems. (b)						

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6.9	FA1		FA2		FA3	
	T1	ML	T2	M2	T3	M3
a. Identify regular polygons.						
b. Draw lines of symmetry to divide regular polygons into two congruent parts.						
c. Determine the congruence of segments, angles, and polygons given their properties.						
d. Determine whether polygons are congruent or noncongruent according to the measures of their sides and angles.						

GRADE 6

PROBABILITY AND STATISTICS

Essential Knowledge Skills and Processes – At a Glance

6.10	FA1		FA2		FA3	
	T1	ML	T2	M2	T3	M3
a. Collect, organize and represent data in a circle graph. The number of data values should be limited to allow for comparisons that have denominators of 12 or less or those that are factors of 100 (e.g., in a class of 20 students, 7 choose apples as a favorite fruit, so the comparison is 7 out of 20, $\frac{7}{20}$, or 35%). (a)						
b. Make observations and inferences about data represented in a circle graph. (b)						
c. Compare data represented in a circle graph with the same data represented in bar graphs, pictographs, and line plots. (c)						

6.11	FA1		FA2		FA3	
	T1	ML	T2	M2	T3	M3
a. Represent the mean of a set of data graphically as the balance point represented in a line plot. (a)						
b. Determine the effect on measures of center when a single value of a data set is added, removed, or changed. (b)						

GRADE 6

PATTERNS, FUNCTIONS, AND ALGEBRA

Essential Knowledge Skills and Processes – At a Glance

6.12	FA1		FA2		FA3	
	T1	ML	T2	M2	T3	M3
a. Make a table of equivalent ratios to represent a proportional relationship between two quantities, when given a ratio. (a)						
b. Make a table of equivalent ratios to represent a proportional relationship between two quantities, when given a practical situation. (a)						
c. Identify the unit rate of a proportional relationship represented by a table of values or a verbal description, including those represented in a practical situation. Unit rates are limited to positive values. (b)						
d. Determine a missing value in a ratio table that represents a proportional relationship between two quantities using a unit rate. Unit rates are limited to positive values. (b)						
e. Determine whether a proportional relationship exists between two quantities, when given a table of values or a verbal description, including those represented in a practical situation. Unit rates are limited to positive values. (c)						
f. Determine whether a proportional relationship exists between two quantities given a graph of ordered pairs. Unit rates are limited to positive values. (c)						

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6.13	FA1		FA2		FA3	
	T1	ML	T2	M2	T3	M3
a. Identify examples of the following algebraic vocabulary: equation, variable, expression, term, and coefficient.						
b. Represent and solve one-step linear equations in one variable, using a variety of concrete materials such as colored chips, algebra tiles, or weights on a balance scale.						
c. Apply properties of real numbers and properties of equality to solve a one-step equation in one variable. Coefficients are limited to integers and unit fractions. Numeric terms are limited to integers.						
d. Confirm solutions to one-step linear equations in one variable.						
e. Write verbal expressions and sentences as algebraic expressions and equations.						
f. Write algebraic expressions and equations as verbal expressions and sentences.						
g. Represent and solve a practical problem with a one-step linear equation in one variable.						

6.14	FA1		FA2		FA3	
	T1	ML	T2	M2	T3	M3
a. Given a verbal description, represent a practical situation with a one-variable linear inequality. (a)						
b. Apply properties of real numbers and the addition or subtraction property of inequality to solve a one-step linear inequality in one variable, and graph the solution on a number line. Numeric terms being added or subtracted from the variable are limited to integers. (b)						
c. Given the graph of a linear inequality with integers, represent the inequality two different ways (e.g., $x < -5$ or $-5 > x$) using symbols. (b)						
d. Identify a numerical value(s) that is part of the solution set of a given inequality. (a, b)						

GRADE 7

NUMBER AND NUMBER SENSE

Essential Knowledge Skills and Processes – At a Glance

7.1	FA1		FA2		FA3	
	T1	ML	T2	M2	T3	M3
a. Recognize powers of 10 with negative exponents by examining patterns. (a)						
b. Represent a power of 10 with a negative exponent in fraction and decimal form. (a)						
c. Convert between numbers greater than 0 written in scientific notation and decimals. (b)						
d. Compare and order no more than four numbers greater than 0 written in scientific notation. Ordering may be in ascending or descending order. (b)						
e. Compare and order no more than four rational numbers expressed as integers, fractions (proper or improper), mixed numbers, decimals, and percents. Fractions and mixed numbers may be positive or negative. Decimals may be positive or negative and are limited to the thousandths place. Ordering may be in ascending or descending order. (c)						
f. Identify the perfect squares from 0 to 400. (d)						
g. Determine the positive square root of a perfect square from 0 to 400. (d)						
h. Demonstrate absolute value using a number line. (e)						
i. Determine the absolute value of a rational number. (e)						
j. Show that the distance between two rational numbers on the number line is the absolute value of their difference, and apply this principle to solve practical problems. (e)						

COMPUTATION AND ESTIMATION

Essential Knowledge Skills and Processes- At a Glance

7.2	FA1		FA2		FA3	
	T1	ML	T2	M2	T3	M3
a. Solve practical problems involving addition, subtraction, multiplication, and division with rational numbers expressed as integers, fractions (proper or improper), mixed numbers, decimals, and percents. Fractions may be positive or negative. Decimals may be positive or negative and are limited to the thousandths place.						

7.3	FA1		FA2		FA3	
	T1	ML	T2	M2	T3	M3
a. Given a proportional relationship between two quantities, create and use a ratio table to determine missing values.						
b. Write and solve a proportion that represents a proportional relationship between two quantities to find a missing value.						
c. Apply proportional reasoning to convert units of measurement within and between the U.S. Customary System and the metric system when given the conversion factor.						
d. Apply proportional reasoning to solve practical problems, including scale drawings. Scale factors shall have denominators no greater than 12 and decimals no less than tenths.						
e. Using 10% as a benchmark, compute 5%, 10%, 15%, or 20% of a given whole number.						
f. Using 10% as a benchmark, compute 5%, 10%, 15%, or 20% in a practical situation such as tips, tax, and discounts.						
g. Solve problems involving tips, tax, and discounts. Limit problems to only one percent computation per problem.						

MEASUREMENT AND GEOMETRY

Essential Knowledge Skills and Processes – At a Glance

7.4	FA1		FA2		FA3	
	T1	ML	T2	M2	T3	M3
a. Determine the surface area of rectangular prisms and cylinders using concrete objects, nets, diagrams, and formulas. (a)						
b. Determine the volume of rectangular prisms and cylinders using concrete objects, diagrams, and formulas. (a)						
c. Determine if a practical problem involving a rectangular prism or cylinder represents the application of volume or surface area. (b)						
d. Solve practical problems that require determining the surface area of rectangular prisms and cylinders. (b)						
e. Solve practical problems that require determining the volume of rectangular prisms and cylinders. (b).						

7.5	FA1		FA2		FA3	
	T1	ML	T2	M2	T3	M3
a. Identify corresponding sides and corresponding congruent angles of similar quadrilaterals and triangles.						
b. Given two similar quadrilaterals or triangles, write similarity statements using symbols.						
c. Write proportions to express the relationships between the lengths of corresponding sides of similar quadrilaterals and triangles.						
d. Solve a proportion to determine a missing side length of similar quadrilaterals or triangles.						
e. Given angle measures in a quadrilateral or triangle, determine unknown angle measures in a similar quadrilateral or triangle.						

7.6	FA1		FA2		FA3	
	T1	ML	T2	M2	T3	M3
a. Compare and contrast properties of the following quadrilaterals: parallelogram, rectangle, square, rhombus, and trapezoid. (a)						
b. Sort and classify quadrilaterals, as parallelograms, rectangles, trapezoids, rhombi, and/or squares based on their properties. (a)						
c. Given a diagram, determine an unknown angle measure in a quadrilateral, using properties of quadrilaterals. (b)						
d. Given a diagram determine an unknown side length in a quadrilateral using properties of quadrilaterals. (b)						

7.7	FA1		FA2		FA3	
	T1	ML	T2	M2	T3	M3
a. Given a preimage in the coordinate plane, identify the coordinates of the image of a right triangle or rectangle that has been translated either vertically, horizontally, or a combination of a vertical and horizontal translation.						
b. Given a preimage in the coordinate plane, identify the coordinates of the image of a right triangle or a rectangle that has been reflected over the x - or y -axis.						
c. Given a preimage in the coordinate plane, identify the coordinates of the image of a right triangle or rectangle that has been translated and reflected over the x - or y -axis or reflected over the x - or y -axis and then translated.						
d. Sketch the image of a right triangle or rectangle that has been translated vertically, horizontally, or a combination of both.						
e. Sketch the image of a right triangle or rectangle that has been reflected over the x - or y -axis.						
f. Sketch the image of a right triangle or rectangle that has been translated and reflected over the x - or y -axis or reflected over the x - or y -axis and then translated.						

GRADE 7

PROBABILITY AND STATISTICS

Essential Knowledge Skills and Processes – At a Glance

7.8	FA1		FA2		FA3	
	T1	ML	T2	M2	T3	M3
a. Determine the theoretical probability of an event. (a)						
b. Determine the experimental probability of an event. (a)						
c. Describe changes in the experimental probability as the number of trials increases. (b)						
d. Investigate and describe the difference between the probability of an event found through experiment or simulation versus the theoretical probability of that same event. (b)						

7.9	FA1		FA2		FA3	
	T1	ML	T2	M2	T3	M3
a. Collect, organize, and represent data in a histogram. (a)						
b. Make observations and inferences about data represented in a histogram. (b)						
c. Compare data represented in histograms with the same data represented in line plots, circle graphs, and stem-and-leaf plots. (c)						

GRADE 7

PATTERNS, FUNCTIONS, AND ALGEBRA

Essential Knowledge Skills and Processes – At a Glance

7.10	FA1		FA2		FA3	
	T1	ML	T2	M2	T3	M3
a. Determine the slope, m , as rate of change in a proportional relationship between two quantities given a table of values or a verbal description, including those represented in a practical situation, and write an equation in the form $y = mx$ to represent the relationship. Slope will be limited to positive values. (a)						
b. Graph a line representing a proportional relationship, between two quantities given an ordered pair on the line and the slope, m , as rate of change. Slope will be limited to positive values. (b)						
c. Graph a line representing a proportional relationship between two quantities given the equation of the line in the form $y = mx$, where m represents the slope as rate of change. Slope will be limited to positive values. (b)						
d. Determine the y -intercept, b , in an additive relationship between two quantities given a table of values or a verbal description, including those represented in a practical situation, and write an equation in the form $y = x + b$, $b \neq 0$, to represent the relationship. (c)						
e. Make connections between and among representations of a proportional or additive relationship between two quantities using verbal descriptions, tables, equations, and graphs. (e)						
f. Make connections between and among representations of a proportional or additive relationship between two quantities using verbal descriptions, tables, equations, and graphs. (e)						
g. Make connections between and among representations of a proportional or additive relationship between two quantities using verbal descriptions, tables, equations, and graphs. (e)						

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7.11	FA1		FA2		FA3	
	T1	ML	T2	M2	T3	M3
a. Represent algebraic expressions using concrete materials and pictorial representations. Concrete materials may include colored chips or algebra tiles.						
b. Use the order of operations and apply the properties of real numbers to evaluate expressions for given replacement values of the variables. Exponents are limited to 1, 2, 3, or 4 and bases are limited to positive integers. Expressions should not include braces { } but may include brackets [] and absolute value . Square roots are limited to perfect squares. Limit the number of replacements to no more than three per expression.						

7.12	FA1		FA2		FA3	
	T1	ML	T2	M2	T3	M3
a. Represent and solve two-step linear equations in one variable using a variety of concrete materials and pictorial representations.						
b. Apply properties of real numbers and properties of equality to solve two-step linear equations in one variable. Coefficients and numeric terms will be rational.						
c. Confirm algebraic solutions to linear equations in one variable.						
d. Write verbal expressions and sentences as algebraic expressions and equations.						
e. Write algebraic expressions and equations as verbal expressions and sentences.						
f. Solve practical problems that require the solution of a two-step linear equation.						

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7.13	FA1		FA2		FA3	
	T1	ML	T2	M2	T3	M3
a. Apply properties of real numbers and the multiplication and division properties of inequality to solve one-step inequalities in one variable, and the addition, subtraction, multiplication, and division properties of inequality to solve two-step inequalities in one variable. Coefficients and numeric terms will be rational.						
b. Represent solutions to inequalities algebraically and graphically using a number line.						
c. Write verbal expressions and sentences as algebraic expressions and inequalities.						
d. Write algebraic expressions and inequalities as verbal expressions and sentences.						
e. Solve practical problems that require the solution of a one- or two-step inequality.						
f. Identify a numerical value(s) that is part of the solution set of a given inequality.						

GRADE 8

NUMBER AND NUMBER SENSE

Essential Knowledge Skills and Processes – At a Glance

8.1	FA1		FA2		FA3	
	T1	ML	T2	M2	T3	M3
a. Compare and order no more than five real numbers expressed as integers, fractions (proper or improper), decimals, mixed numbers, percents, numbers written in scientific notation, radicals, and π . Radicals may include both positive and negative square roots of values from 0 to 400. Ordering may be in ascending or descending order.						
b. Use rational approximations (to the nearest hundredth) of irrational numbers to compare and order, locating values on a number line. Radicals may include both positive and negative square roots of values from 0 to 400 yielding an irrational number.						

8.2	PA1		PA2		PA3	
	T1	ML	T2	M2	T3	M3
a. Describe and illustrate the relationships among the subsets of the real number system by using representations (graphic organizers, number lines, etc.). Subsets include rational numbers, irrational numbers, integers, whole numbers, and natural numbers.						
b. Classify a given number as a member of a particular subset or subsets of the real number system, and explain why.						
c. Describe each subset of the set of real numbers and include examples and non-examples.						
d. Recognize that the sum or product of two rational numbers is rational; that the sum of a rational number and an irrational number is irrational; and that the product of a nonzero rational number and an irrational number is irrational.						

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8.3	FA1		FA2		FA3	
	T1	ML	T2	M2	T3	M3
a. Estimate and identify the two consecutive integers between which the positive or negative square root of a given number lies. Numbers are limited to natural numbers from 1 to 400. (a)						
b. Determine the positive or negative square root of a given perfect square from 1 to 400. (b)						

COMPUTATION AND ESTIMATION

Essential Knowledge Skills and Processes- At a Glance

8.4	FA1		FA2		FA3	
	T1	ML	T2	M2	T3	M3
a. Solve practical problems involving consumer applications by using proportional reasoning and computation procedures for rational numbers.						
b. Reconcile an account balance given a statement with five or fewer transactions.						
c. Compute a discount or markup and the resulting sale price for one discount or markup.						
d. Compute the sales tax or tip and resulting total.						
e. Compute the simple interest and new balance earned in an investment or on a loan given the principal amount, interest rate, and time period in years.						
f. Compute the percent increase or decrease found in a practical situation.						

MEASUREMENT AND GEOMETRY

Essential Knowledge Skills and Processes – At a Glance

8.5	FA1		FA2		FA3	
	T1	ML	T2	M2	T3	M3
a. Identify and describe the relationship between pairs of angles that are vertical, adjacent, supplementary, and complementary.						
b. Use the relationships among supplementary, complementary, vertical, and adjacent angles to solve problems, including practical problems, involving the measure of unknown angles.						

8.6	FA1		FA2		FA3	
	T1	ML	T2	M2	T3	M3
a. Distinguish between situations that are applications of surface area and those that are applications of volume. (a)						
b. Determine the surface area of cones and square-based pyramids by using concrete objects, nets, diagrams and formulas. (a)						
c. Determine the volume of cones and square-based pyramids, using concrete objects, diagrams, and formulas. (a)						
d. Solve practical problems involving volume and surface area of cones and square-based pyramids. (a)						
e. Describe how the volume of a rectangular prism is affected when one measured attribute is multiplied by a factor of $\frac{1}{4}$, $\frac{1}{3}$, $\frac{1}{2}$, 2, 3, or 4. (b)						
f. Describe how the surface area of a rectangular prism is affected when one measured attribute is multiplied by a factor of $\frac{1}{2}$ or 2. (b)						

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8.7	FA1		FA2		FA3	
	T1	ML	T2	M2	T3	M3
a. Given a preimage in the coordinate plane, identify the coordinate of the image of a polygon that has been translated vertically, horizontally, or a combination of both. (a)						
b. Given a preimage in the coordinate plane, identify the coordinates of the image of a polygon that has been reflected over the x- or y-axis. (a)						
c. Given a preimage in the coordinate plane, identify the coordinates of the image of a right triangle or a rectangle that has been dilated. Scale factors are limited to $\frac{1}{4}$, 12, 2, 3, or 4. The center of the dilation will be the origin. (a)						
d. Given a preimage in the coordinate plane, identify the coordinates of the image of a polygon that has been translated and reflected over the x-or y-axis, or reflected over the x- or y-axis and then translated. (a)						
e. Sketch the image of a polygon that has been translated vertically, horizontally, or a combination of both. (a)						
f. Sketch the image of a polygon that has been reflected over the x- or y-axis. (a)						
g. Sketch the image of a dilation of a right triangle or a rectangle limited to a scale factor of 14, 12, 2, 3, or 4. The center of the dilation will be the origin. (a)						
h. Sketch the image of a dilation of a right triangle or a rectangle limited to a scale factor of 14, 12, 2, 3, or 4. The center of the dilation will be the origin. (a)						
i. Identify the type of translation in a given example. (a, b)						
j. Identify practical applications of transformations including, but not limited to, tiling, fabric, wallpaper designs, art, and scale drawings. (b)						

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8.8	FA1		FA2		FA3	
	T1	ML	T2	M2	T3	M3
a. Construct three-dimensional models, given the top or bottom, side, and front views.						
b. Identify three-dimensional models given a two-dimensional perspective.						
c. Identify the two-dimensional perspective from the top or bottom, side, and front view, given a three-dimensional model.						

8.9	FA1		FA2		FA3	
	T1	ML	T2	M2	T3	M3
a. Verify the Pythagorean Theorem, using diagrams, concrete materials, and measurement. (a)						
b. Determine whether a triangle is a right triangle given the measures of its three sides. (b)						
c. Determine the measure of a side of a right triangle, given the measures of the other two sides. (b)						
d. Solve practical problems involving right triangles by using the Pythagorean Theorem. (b)						

8.10	FA1		FA2		FA3	
	T1	ML	T2	M2	T3	M3
a. Subdivide a plane figure into triangles, rectangles, squares, trapezoids, parallelograms, and semicircles. Determine the area of subdivisions and combine to determine the area of the composite plane figure.						
b. Subdivide a plane figure into triangles, rectangles, squares, trapezoids, parallelograms, and semicircles. Use the attributes of the subdivisions to determine the perimeter of the composite plane figure.						
c. Apply perimeter, circumference, and area formulas to solve practical problems involving composite plane figures.						

GRADE 8

PROBABILITY AND STATISTICS

Essential Knowledge Skills and Processes – At a Glance

8.11	FA1		FA2		FA3	
	T1	ML	T2	M2	T3	M3
a. Determine whether two events are independent or dependent. (a)						
b. Compare and contrast the probability of independent and dependent events. (a)						
c. Determine the probability of two independent events. (b)						
d. Determine the probability of two dependent events. (b)						

8.12	FA1		FA2		FA3	
	T1	ML	T2	M2	T3	M3
a. Collect and display a numeric data set of no more than 20 items, using boxplots. (a)						
b. Make observations and inferences about data represented in a boxplot. (b)						
c. Given a data set represented in a boxplot, identify and describe the lower extreme (minimum), upper extreme (maximum), median, upper quartile, lower quartile, range, and interquartile range. (b)						
d. Compare and analyze two data sets represented in boxplots. (c)						

8.13	FA1		FA2		FA3	
	T1	ML	T2	M2	T3	M3
a. Collect, organize, and represent a data set of no more than 20 items using scatterplots. (a)						
b. Make observations about a set of data points in a scatterplot as having a positive linear relationship, a negative linear relationship, or no relationship. (b)						
c. Estimate the line of best fit with a drawing for data represented in a scatterplot. (c)						

GRADE 8

PATTERNS, FUNCTIONS, AND ALGEBRA

Essential Knowledge Skills and Processes – At a Glance

8.14	FA1		FA2		FA3	
	T1	ML	T2	M2	T3	M3
a. Use the order of operations and apply the properties of real numbers to evaluate algebraic expressions for the given replacement values of the variables. Exponents are limited to whole numbers and bases are limited to integers. Square roots are limited to perfect squares. Limit the number of replacements to no more than three per expression. (a)						
b. Represent algebraic expressions using concrete materials and pictorial representations. Concrete materials may include colored chips or algebra tiles. (a)						
c. Simplify algebraic expressions in one variable. Expressions may need to be expanded (using the distributive property) or require combining like terms to simplify. Expressions will include only linear and numeric terms. Coefficients and numeric terms may be rational. (b)						

8.15	FA1		FA2		FA3	
	T1	ML	T2	M2	T3	M3
a. Determine whether a relation, represented by a set of ordered pairs, a table, or a graph of discrete points is a function. Sets are limited to no more than 10 ordered pairs. (a)						
b. Identify the domain and range of a function represented as a set of ordered pairs, a table, or a graph of discrete points. (b)						

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8.16	FA1		FA2		FA3	
	T1	ML	T2	M2	T3	M3
a. Recognize and describe a line with a slope that is positive, negative, or zero (0). (a)						
b. Given a table of values for a linear function, identify the slope and y -intercept. The table will include the coordinate of the y -intercept. (b)						
c. Given a linear function in the form $y = mx + b$, identify the slope and y -intercept. (b)						
d. Given the graph of a linear function, identify the slope and y -intercept. The value of the y -intercept will be limited to integers. The coordinates of the ordered pairs shown in the graph will be limited to integers. (b)						
e. Identify the dependent and independent variable, given a practical situation modeled by a linear function. (c)						
f. Given the equation of a linear function in the form $y = mx + b$, graph the function. The value of the y -intercept will be limited to integers. (d)						
g. Write the equation of a linear function in the form $y = mx + b$ given values for the slope, m , and the y -intercept or given a practical situation in which the slope, m , and y -intercept are described verbally. (e)						
h. Make connections between and among representations of a linear function using verbal descriptions, tables, equations, and graphs. (e).						

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8.17	FA1		FA2		FA3	
	T1	ML	T2	M2	T3	M3
a. Represent and solve multistep linear equations in one variable with the variable on one or both sides of the equation (up to four steps) using a variety of concrete materials and pictorial representations. Apply properties of real numbers and properties of equality to solve multistep linear equations in one variable (up to four steps). Coefficients and numeric terms will be rational. Equations may contain expressions that need to be expanded (using the distributive property) or require collecting like terms to solve.						
b. Write verbal expressions and sentences as algebraic expressions and equations.						
c. Write algebraic expressions and equations as verbal expressions and sentences.						
d. Solve practical problems that require the solution of a multistep linear equation.						
e. Confirm algebraic solutions to linear equations in one variable.						

8.18	FA1		FA2		FA3	
	T1	ML	T2	M2	T3	M3
a. Apply properties of real numbers and properties of inequality to solve multistep linear inequalities (up to four steps) in one variable with the variable on one or both sides of the inequality. Coefficients and numeric terms will be rational. Inequalities may contain expressions that need to be expanded (using the distributive property) or require collecting like terms to solve.						
b. Graph solutions to multistep linear inequalities on a number line.						
c. Write verbal expressions and sentences as algebraic expressions and inequalities.						
d. Write algebraic expressions and inequalities as verbal expressions and sentences.						
e. Solve practical problems that require the solution of a multistep linear inequality in one variable.						
f. Identify a numerical value(s) that is part of the solution set of a given inequality.						

EXPRESSIONS AND OPERATIONS*Essential Knowledge Skills and Processes – At a Glance*

A.1	FA1		FA2		FA3	
	T1	ML	T2	M2	T3	M3
a. Translate between verbal quantitative situations and algebraic expressions and equations. (a)						
b. Represent practical situations with algebraic expressions in a variety of representations (e.g., concrete, pictorial, symbolic, verbal). (a)						
c. Evaluate algebraic expressions, using the order of operations, which include absolute value, square roots, and cube roots for given replacement values to include rational numbers, without rationalizing the denominator. (b)						

A.2	FA1		FA2		FA3	
	T1	ML	T2	M2	T3	M3
a. Simplify monomial expressions and ratios of monomial expressions in which the exponents are integers, using the laws of exponents. (a)						
b. Model sums, differences, products, and quotients of polynomials with concrete objects and their related pictorial and symbolic representations.						
c. Determine sums and differences of polynomials. (b)						
d. Determine products of polynomials. The factors should be limited to five or fewer terms (i.e., $(4x + 2)(3x + 5)$ represents four terms and $(x + 1)(2x^2 + x + 3)$ represents five terms). (b)						
e. Determine the quotient of polynomials, using a monomial or binomial divisor, or a completely factored divisor. (b)						
f. Factor completely first- and second-degree polynomials in one variable with integral coefficients. After factoring out the greatest common factor (GCF), leading coefficients should have no more than four factors. (c)						

A.3	FA1		FA2		FA3	
	T1	ML	T2	M2	T3	M3
a. Express the square root of a whole number in simplest form. (a)						
b. Express the principal square root of a monomial algebraic expression in simplest form where variables are assumed to have positive values. (a)						
c. Express the cube root of an integer in simplest form. (b)						
d. Simplify a numerical expression containing square or cube roots. (c)						
e. Add, subtract, and multiply two monomial radical expressions limited to a numerical radicand. (c)						

EQUATIONS AND INEQUALITIES*Essential Knowledge Skills and Processes – At a Glance*

A.4	FA1		FA2		FA3	
	T1	ML	T2	M2	T3	M3
a. Determine whether a linear equation in one variable has one, an infinite number, or no solutions. (a)						
b. Apply the properties of real numbers and properties of equality to simplify expressions and solve equations. (a, b)						
c. Solve multistep linear equations in one variable algebraically. (a)						
d. Solve quadratic equations in one variable algebraically. Solutions may be rational or irrational. (b)						
e. Solve a literal equation for a specified variable. (c)						
f. Given a system of two linear equations in two variables that has a unique solution, solve the system by substitution or elimination to identify the ordered pair which satisfies both equations. (d)						
g. Given a system of two linear equations in two variables that has a unique solution, solve the system graphically by identifying the point of intersection. (d)						
h. Solve and confirm algebraic solutions to a system of two linear equations using a graphing utility. (d)						
i. Determine whether a system of two linear equations has one, an infinite number, or no solutions. (d)						
j. Write a system of two linear equations that models a practical situation. (e)						
k. Interpret and determine the reasonableness of the algebraic or graphical solution of a system of two linear equations that models a practical situation. (e)						
l. Solve practical problems involving equations and systems of equations. (e)						

A.5	FA1		FA2		FA3	
	T1	ML	T2	M2	T3	M3
a. Solve multistep linear inequalities in one variable algebraically and represent the solution graphically. (a)						
b. Apply the properties of real numbers and properties of inequality to solve multistep linear inequalities in one variable algebraically. (a)						
c. Represent the solution of a linear inequality in two variables graphically. (b)						
d. Solve practical problems involving linear inequalities. (c)						
e. Determine whether a coordinate pair is a solution of a linear inequality or a system of linear inequalities. (c)						
f. Represent the solution of a system of two linear inequalities graphically. (d)						
g. Determine and verify algebraic solutions using a graphing utility. (a, b, c, d)						

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A.6	FA1		FA2		FA3	
	T1	ML	T2	M2	T3	M3
a. Determine the slope of the line, given the equation of a linear function. (a)						
b. Determine the slope of a line, given the coordinates of two points on the line. (a)						
c. Determine the slope of a line, given the graph of a line. (a)						
d. Recognize and describe a line with a slope or rate of change that is positive, negative, zero, or undefined. (a)						
e. Write the equation of a line when given the graph of a line. (b)						
f. Write the equation of a line when given two points on the line whose coordinates are integers. (b)						
g. Write the equation of a line when given the slope and a point on the line whose coordinates are integers. (b)						
h. Write the equation of a vertical line as $x = a$. (b)						
i. Write the equation of a horizontal line as $y = c$. (b)						
j. Write the equation of a line parallel or perpendicular to a given line through a given point. (b)						
k. Graph a linear equation in two variables, including those that arise from a variety of practical situations. (c)						
l. Use the parent function $y = x$ and describe transformations defined by changes in the slope or y -intercept. (c)						

FUNCTIONS*Essential Knowledge Skills and Processes – At a Glance*

A.7	FA1		FA2		FA3	
	T1	ML	T2	M2	T3	M3
a. Determine whether a relation, represented by a set of ordered pairs, a table, a mapping, or a graph is a function. (a)						
b. Identify the domain, range, zeros, and intercepts of a function presented algebraically or graphically. (b, c, d)						
c. Use the x -intercepts from the graphical representation of a quadratic function to determine and confirm its factors. (c, d)						
d. For any value, x , in the domain of f , determine $f(x)$. (e)						
e. Represent relations and functions using verbal descriptions, tables, equations, and graph. Given one representation, represent the relation in another form. (f)						
f. Investigate and analyze characteristics and multiple representations of functions with a graphing utility. (a, b, c, d, e, f)						

STATISTICS

Essential Knowledge Skills and Processes – At a Glance

ALGEBRA I

Name: _____

A.8	FA1		FA2		FA3	
	T1	ML	T2	M2	T3	M3
a. Given a data set or practical situation, determine whether a direct variation exists.						
b. Given a data set or practical situation, determine whether an inverse variation exists.						
c. Given a data set or practical situation, write an equation for a direct variation.						
d. Given a data set or practical situation, write an equation for an inverse variation.						
e. Given a data set or practical situation, graph an equation representing a direct variation.						

A.9	FA1		FA2		FA3	
	T1	ML	T2	M2	T3	M3
a. Determine an equation of a curve of best fit, using a graphing utility, given a set of no more than twenty data points in a table, a graph, or a practical situation.						
b. Make predictions, using data, scatterplots, or the equation of the curve of best fit.						
c. Solve practical problems involving an equation of the curve of best fit.						
d. Evaluate the reasonableness of a mathematical model of a practical situation.						

REASONING, LINES, AND TRANSFORMATIONS

Essential Knowledge Skills and Processes – At a Glance

G.1	FA1		FA@		FA3	
	T1	ML	T2	M2	T3	M3
a. Identify the converse, inverse, and contrapositive of a conditional statement. (a)						
b. Translate verbal arguments into symbolic form using the symbols of formal logic. (b)						
c. Determine the validity of a logical argument using valid forms of deductive reasoning. (c)						
d. Determine that an argument is false using a counterexample. (c)						

G.2	FA1		FA2		FA3	
	T1	ML	T2	M2	T3	M3
a. Prove two or more lines are parallel given angle measurements expressed numerically or algebraically. (a)						
b. Prove two lines are parallel using deductive proofs given relationships between and among angles. (a)						
c. Solve problems by using the relationships between pairs of angles formed by the intersection of two parallel lines and a transversal including corresponding angles, alternate interior angles, alternate exterior angles, same-side (consecutive) interior angles, and same-side (consecutive) exterior angles. (b)						
d. Solve problems, including practical problems, involving intersecting and parallel lines. (b)						

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G.3	FA1		FA2		FA3	
	T1	ML	T2	M2	T3	M3
a. Determine the coordinates of the midpoint or endpoint of a segment, using the midpoint formula. (a)						
b. Use a formula to find the slope of a line. (a)						
c. Apply the distance formula to determine the length of a line segment when given the coordinates of the endpoints. (a)						
d. Compare the slopes to determine whether two lines are parallel, perpendicular, or neither. (b)						
e. Determine whether a figure has point symmetry, line symmetry, both, or neither. (c)						
f. Given an image and preimage, identify the transformation or combination of transformations that has/have occurred. Transformations include: <ol style="list-style-type: none"> 1. a translation; 2. a reflection over any horizontal or vertical line or the lines $y = x$ or $y = -x$; 3. a clockwise or counter clockwise rotation of 90°, 180°, 270°, or 360° on a coordinate grid where the center of rotation is limited to the origin; and 4. a dilation from a fixed point on a coordinate grid. (d)						

G.4	FA1		FA2		FA3	
	T1	ML	T2	M2	T3	M3
a. Construct and justify the constructions of <ol style="list-style-type: none"> 1. a line segment congruent to a given line segment; (a) 2. the perpendicular bisector of a line segment; (b) 3. a perpendicular to a given line from a point not on the line; (c) 4. a perpendicular to a given line at a given point on the line; (d) 5. the bisector of a given angle; (e) 6. an angle congruent to a given angle; (f) 7. a line parallel to a given line through a point not on the given line; (g) and 8. an equilateral triangle, a square, and a regular hexagon inscribed in a circle. (h) 						

GEOMETRY

Name: _____

TRIANGLES

Essential Knowledge Skills and Processes – At a Glance

G.5	FA1		FA2		FA3	
	T1	ML	T2	M2	T3	M3
a. Given information about the lengths of sides and/or measures of angles in triangles, solve problems, including practical problems. (a, b, c, d)						
b. Order the sides of a triangle by their lengths when given information about the measures of the angles. (a)						
c. Order the angles of a triangle by their measures when given information about the lengths of the sides. (b)						
d. Given the lengths of three segments, determine whether a triangle could be formed. (c)						
e. Given the lengths of two sides of a triangle, determine the range in which the length of the third side must lie. (d)						

G.6	PA1		PA2		PA3	
	T1	ML	T2	M2	T3	M3
a. Prove two triangles congruent given relationships among angles and sides of triangles expressed numerically or algebraically.						
b. Prove two triangles congruent given representations in the coordinate plane and using coordinate methods (distance formula and slope formula).						
c. Use direct proofs to prove two triangles congruent.						

G.7	FA1		FA2		FA3	
	T1	ML	T2	M2	T3	M3
a. Prove two triangles similar given relationships among angles and sides of triangles expressed numerically or algebraically.						
b. Prove two triangles similar given representations in the coordinate plane and using coordinate methods (distance formula and slope formula).						
c. Use direct proofs to prove triangles similar.						

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G.8	FA1		FA2		FA3	
	T1	ML	T2	M2	T3	M3
a. Solve problems, including practical problems, using right triangle trigonometry and properties of special right triangles. (a, b, c)						
b. Determine whether a triangle formed with three given lengths is a right triangle. (a)						
c. Solve for missing lengths in geometric figures, using properties of 45° - 45° - 90° triangles where rationalizing denominators may be necessary. (b)						
d. Solve for missing lengths in geometric figures, using properties of 30° - 60° - 90° triangles where rationalizing denominators may be necessary. (b).						
e. Solve problems, including practical problems, involving right triangles with missing side lengths or angle measurements, using sine, cosine, and tangent ratios. (c)						

POLYGONS AND CIRCLES

Essential Knowledge Skills and Processes – At a Glance

G.9	FA1		FA2		FA3	
	T1	ML	T2	M2	T3	M3
a. Solve problems, including real-world problems, using the properties specific to parallelograms, rectangles, rhombi, squares, isosceles trapezoids, and trapezoids.						
b. Prove that quadrilaterals have specific properties, using coordinate and algebraic methods, such as the distance formula, slope, and midpoint formula.						
c. Prove the properties of quadrilaterals, using direct proofs.						

G.10	FA1		FA2		FA3	
	T1	ML	T2	M2	T3	M3
a. Solve problems, including practical problems, involving angles of convex polygons. (a, b, c)						
b. Determine the sum of the measures of the interior and exterior angles of a convex polygon. (a)						
c. Determine the measure of each interior and exterior angle of a regular polygon. (b)						
d. Determine angle measures of a regular polygon in a tessellation. (b)						
e. Determine the number of sides of a regular polygon, given the measures of interior or exterior angles of the polygon. (c)						

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G.11	FA1		FA2		FA3	
	T1	ML	T2	M2	T3	M3
a. Solve problems, including practical problems, by applying properties of circles. (a, b, c, d)						
b. Determine angle measures and arc measures associated with <ol style="list-style-type: none"> 1. two intersecting chords; 2. two intersecting secants; 3. an intersecting secant and tangent; 4. two intersecting tangents; and 5. central and inscribed angles. 						
c. Determine segment lengths associated with: <ol style="list-style-type: none"> 1. two intersecting chords; 2. two intersecting secants; 3. an intersecting secant and tangent; and 4. two intersecting tangents. (b) 						
d. Calculate the length of an arc of a circle. (c)						
e. Calculate the area of a sector. (d)						

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G.12	FA1		FA2		FA3	
	T1	ML	T2	M2	T3	M3
a. Given a graph or the equation of a circle in standard form, identify the coordinates of the center of the circle.						
b. Given the coordinates of the endpoints of a diameter of a circle, determine the coordinates of the center of the circle.						
c. Given a graph or the equation of a circle in standard form, identify the length of the radius or diameter of the circle.						
d. Given the coordinates of the endpoints of the diameter of a circle, determine the length of the radius or diameter of the circle.						
e. Given the coordinates of the center and the coordinates of a point on the circle, determine the length of the radius or diameter of the circle.						
f. Given the coordinates of the center and length of the radius of a circle, identify the coordinates of a point(s) on the circle.						
g. Determine the equation of a circle given: <ol style="list-style-type: none"> 1. a graph of a circle with a center with coordinates that are integers; 2. coordinates of the center and a point on the circle; 3. coordinates of the center and the length of the radius or diameter; or 4. coordinates of the endpoints of a diameter. 						

THREE-DIMENSIONAL FIGURES

Essential Knowledge Skills and Processes – At a Glance

G.13	FA1		FA2		FA3	
	T1	ML	T2	M2	T3	M3
a. Determine the surface area of cylinders, prisms, pyramids, cones, hemispheres, and spheres, using the appropriate formulas.						
b. Determine the volume of cylinders, prisms, pyramids, cones, hemispheres, and spheres, using the appropriate formulas.						
c. Solve problems including practical problems, involving surface area and volume of cylinders, prisms, pyramids, cones, hemispheres, and spheres, as well as composite three-dimensional figures.						
d. Solve problems, including practical problems, involving the lateral area of circular cylinders, prisms, and regular pyramids.						
e. Given information about a three-dimensional figure such as length of a side, area of a face, or volume, determine missing information.						

G.14`	FA1		FA2		FA3	
	T1	ML	T2	M2	T3	M3
a. Compare ratios between side lengths, perimeters, areas, and volumes, given two similar figures. (a)						
b. Describe how changes in one or more dimensions affect other derived measures (perimeter, area, surface area, and volume) of an figure. (b)						
c. Describe how changes in one or more measures (perimeter, area, surface area, and volume) affect other measures of a figure. ©						
d. Solve real-world problems involving measured attributes of similar figures. (d)						

EXPRESSIONS AND OPERATIONS*Essential Knowledge Skills and Processes – At a Glance*

AII.1	FA1		FA2		FA3	
	T1	ML	T2	M2	T3	M3
a. Add, subtract, multiply, and divide rational algebraic expressions. (a)						
b. Simplify a rational algebraic expression with monomial or binomial factors. Algebraic expressions should be limited to linear and quadratic expressions. (a)						
c. Recognize a complex algebraic fraction, and simplify it as a quotient or product of simple algebraic fractions. (a)						
d. Simplify radical expressions containing positive rational numbers and variables. (b)						
e. Convert between radical expressions and expressions containing rational exponents. (b)						
f. Add and subtract radical expressions. (b)						
g. Multiply and divide radical expressions. Simplification may include rationalizing denominators. (b)						
h. Factor polynomials in one or two variables with no more than four terms completely over the set of integers. Factors of the polynomial should be constant, linear, or quadratic.						
i. Verify polynomial identities including the difference of squares, sum and difference of cubes, and perfect square trinomials. (c)						

AII.2	FA1		FA2		FA3	
	T1	ML	T2	M2	T3	M3
a. Recognize that the square root of -1 is represented as i .						
b. Simplify radical expressions containing negative rational numbers and express in $a+bi$ form.						
c. Simplify powers of i .						
d. Add, subtract, and multiply complex numbers.						

EQUATIONS AND INEQUALITIES*Essential Knowledge Skills and Processes – At a Glance*

AII.3	FA1		FA2		FA3	
	T1	ML	T2	M2	T3	M3
a. Solve absolute value linear equations or inequalities in one variable algebraically. (a)						
b. Represent solutions to absolute value linear inequalities in one variable graphically. (a)						
c. Solve a quadratic equation over the set of complex numbers algebraically. (b)						
d. Calculate the discriminant of a quadratic equation to determine the number and type of solutions. (b)						
e. Solve rational equations with real solutions containing factorable algebraic expressions algebraically and graphically. Algebraic expressions should be limited to linear and quadratic expressions. (c)						
f. Solve an equation containing no more than one radical expression algebraically and graphically. (d)						
g. Solve equations and verify algebraic solutions using a graphing utility. (a, b, c, d)						

AII.4	FA1		FA2		FA3	
	T1	ML	T2	M2	T3	M3
a. Determine the number of solutions to a linear-quadratic and quadratic-quadratic system of equations in two variables.						
b. Solve a linear-quadratic system of two equations in two variables algebraically and graphically.						
c. Solve a quadratic-quadratic system of two equations in two variables algebraically and graphically.						
d. Solve systems of equations and verify solutions of systems of equations with a graphing utility.						

FUNCTIONS*Essential Knowledge Skills and Processes – At a Glance*

AII.5	FA1		FA2		FA3	
	T1	ML	T2	M2	T3	M3
a. Distinguish between a sequence and a series.						
b. Generalize patterns in a sequence using explicit and recursive formulas.						
c. Use and interpret the notations Σ , n , n^{TH} term, and an .						
d. e. Given the formula, determine an (the n th term) for an arithmetic or a geometric sequence.						
f. Given formulas, write the first n terms and determine the sum, S_n , of the first n terms of an arithmetic or geometric series.						
g. Given the formula, determine the sum of a convergent infinite series.						
h. Model practical situations using sequences and series.						

AII.6	FA1		FA2		FA3	
	T1	ML	T2	M2	T3	M3
a. Recognize the general shape of function families. (a)						
b. Recognize graphs of parent functions. (a)						
c. Identify the graph of a function from the equation. (b)						
d. Write the equation of a function given the graph. (b)						
e. Graph a transformation of a parent function, given the equation. (b)						
f. Identify the transformation(s) of a function. Transformations of exponential and logarithmic functions, given a graph, should be limited to a single transformation. (b)						
g. Investigate and verify transformations of functions using a graphing utility. (a, b)						

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AII.7	FA1		FA2		FA3	
	T1	ML	T2	M2	T3	M3
a. Identify the domain, range, zeros, and intercepts of a function presented algebraically or graphically, including graphs with discontinuities. (a, d, e)						
b. Describe a function as continuous or discontinuous. (a)						
c. Given the graph of a function, identify intervals on which the function (linear, quadratic, absolute value, square root, cube root, polynomial, exponential, and logarithmic) is increasing or decreasing. (b)						
d. Identify the location and value of absolute maxima and absolute minima of a function over the domain of the function graphically or by using a graphing utility. (c)						
e. Identify the location and value of relative maxima or relative minima of a function over some interval of the domain graphically or by using a graphing utility. (c)						
f. Represent relations and functions using verbal descriptions, tables, equations, and graphs. Given one representation, represent the relation in another form. (g)						
g. Describe the end behavior of a function. (h)						
h. Determine the equations of vertical and horizontal asymptotes of functions (rational, exponential, and logarithmic). (i)						
i. Determine the inverse of a function (linear, quadratic, cubic, square root, and cube root). (j)						
j. Graph the inverse of a function as a reflection over the line $y = x$. (j)						
k. Determine the composition of two functions algebraically and graphically. (k)						
l. Investigate and analyze characteristics and multiple representations of functions with a graphing utility. (a, b, c, d, e, f, g, h, i, j, k)						

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AII.8	FA1		FA2		FA3	
	T1	ML	T2	M2	T3	M3
a. Define a polynomial function in factored form, given its zeros.						
b. Determine a factored form of a polynomial expression from the x -intercepts of the graph of its corresponding function.						
c. For a function, identify zeros of multiplicity greater than 1 and describe the effect of those zeros on the graph of the function.						
d. Given a polynomial equation, determine the number and type of solutions.						

STATISTICS

Essential Knowledge Skills and Processes – At a Glance

AII.9	FA1		FA2		FA3	
	T1	ML	T2	M2	T3	M3
a. Determine an equation of the curve of best fit, using a graphing utility, given a set of no more than 20 data points in a table, graph, or practical situation.						
b. Make predictions, using data, scatterplots, or the equation of the curve of best fit.						
c. Solve practical problems involving an equation of the curve of best fit.						
d. Evaluate the reasonableness of a mathematical model of a practical situation.						

AII.10	FA1		FA2		FA3	
	T1	ML	T2	M2	T3	M3
a. Given a data set or practical situation, write the equation for an inverse variation.						
b. Given a data set or practical situation, write the equation for a joint variation.						
c. Solve problems, including practical problems, involving inverse variation, joint variation, and a combination of direct and inverse variations.						

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AII.11	FA1		FA2		FA3	
	T1	ML	T2	M2	T3	M3
a. Identify the properties of a normal distribution. (a)						
b. Describe how the standard deviation and the mean affect the graph of the normal distribution. (a)						
c. Solve problems involving the relationship of the mean, standard deviation, and z-score of a normally distributed data set. (b)						
d. Compare two sets of normally distributed data using a standard normal distribution and z-scores, given the mean and standard deviation. (b)						
e. Represent probability as area under the curve of a standard normal distribution. (c)						
f. Use the graphing utility or a table of Standard Normal Probabilities to determine probabilities associated with areas under the standard normal curve. (c)						
g. Use a graphing utility to investigate, represent, and determine relationships between a normally distributed data set and its descriptive statistics. (a, b, c)						

AII.12	FA1		FA2		FA3	
	T1	ML	T2	M2	T3	M3
a. Compare and contrast permutations and combinations.						
b. Calculate the number of permutations of n objects taken r at a time.						
c. Calculate the number of combinations of n objects taken r at a time.						
d. Use permutations and combinations as counting techniques to solve practical problems.						
e. Calculate and verify permutations and combinations using a graphing utility.						