Knowledge of Algebra, Patterns, and Functions

Content Standard 1.0: Students will algebraically represent, model, analyze, and solve mathematical and real-world problems involving patterns and functional relationships.

By the end of the following grades, students will know and be able to do everything in the previous grade and master the following content:

Pre-Kindergarten	Kindergarten	Grade 1	Grade 2	Grade 3	Maryland State Standards Grade 3
1.PK.1 .1 recognize, duplicate, and extend simple patterns.	**1.K.1** .1 discriminate between patterns and random arrangements or designs. .2 identify, describe, copy, extend, and construct simple patterns using concrete objects. **Clarifying Examples:** Given various objects in the environment, like tiling pavers, the student identifies and describes the pattern. Given tag board patterns of color tiles, the student recreates and extends the pattern using actual color tiles.	**1.1.1** .1 recognize, describe, extend, and create repeating patterns using models. .2 copy, continue, and record patterns with actions, words, and objects; translate a pattern into another form. **Clarifying Example:** Given a pattern in one form (shapes) such as square, square, circle, square, square, circle, and so forth, the student transforms it into another form (colors) such as red, red, blue, red, red, blue.	**1.2.1** .1 recognize, describe, extend, and create repeating and increasing patterns using models and numbers. .2 use patterns to continue numerical sequences and identify the rule. **Clarifying Example:** When asked, the student counts by 2's and by 3's.	**1.3.1** .1 identify, describe, extend, and create a variety of non-numeric patterns. .2 identify, describe, extend, and create a variety of numeric patterns. **Clarifying Examples:** When asked, the student counts by 2's, 3's, 5's, and 10's beginning at any number (i.e., count by 5's starting at 12: 12, 17, 22, 27…). Given the relationship between bicycles and wheels, the student identifies and describes the pattern (1 bike to 2 wheels, 2 bikes to 4 wheels…), and translates it into different forms such as creating paper strips so that 1 blue strip = 2 red strips, 2 blue strips = 4 red strips….	**1.3.1a** identify and describe a **trend.** (MLO 1.1) 1.3.1b identify, describe, extend, and create a variety of numeric and non-numeric **patterns.** (MLO 1.2) • *create and extend number patterns of 2's, 5's, 10's and odd and even numbers.* • *create and extend patterns using* **models** *(symbols, shapes, designs, and pictures).*

By the end of the following grades, students will know and be able to do everything in the previous grade and master the following content:

Pre-Kindergarten	Kindergarten	Grade 1	Grade 2	Grade 3	Maryland State Standards Grade 3
		1.1.2 .1 write and solve number sentences derived from problem situations that express relationships involving addition and subtraction (+, -, =). .2 create, compare, and describe sets of objects as having more, less, or equal amounts. **Clarifying Example:** When told there were 7 children on the school bus and that 4 children got off, the student writes and solves the corresponding number sentence $7 - 4 =$.	**1.2.2** .1 model, represent, and interpret number relationships to solve problems involving addition and subtraction (+, -, <, >, =). .2 relate problem situations to number sentences involving addition and subtraction. .3 generate and solve problems based on various number sentences. **Clarifying Examples:** Given particular situations, such as predicting whether or not a certain number of items can be shared evenly, the student uses relationships among numbers, such as magnitude or evenness, to solve problems such as predicting whether or not 12 pieces, of candy is enough for five friends to each receive 2 pieces or whether or not 12 pieces of candy can be can be shared evenly between 2 friends. Given a number sentence, the student creates a story that matches it.	**1.3.2** .1 represent relationships of quantities in the form of mathematical expressions, equations, or inequalities (+, -, <, >, =, x, ÷). .2 solve problems involving numeric equations or inequalities. .3 select appropriate operational (+, -, x, ÷) and relational symbols (<, >, =, ≠) to express relationships and solve problems. **Clarifying Example:** Given open sentences such as 8 ⬚ 4 = 32 4 + ⬚ > 32 the student completes them.	**1.3.2** express numeric relationships using +, -, *x (multiplication)*, *(division)*, <, >, or =. (MLO 1.3) • *select appropriate operational and relational symbols to express relationships.* • *select appropriate symbols and operations to solve simple problems.*

Pre-Kindergarten	Kindergarten	Grade 1	Grade 2	Grade 3	Maryland State Standards Grade 3
			1.2.3 .1 identify the missing number in a number sentence. **Clarifying Examples**: Given sentences such as 12 - ☐ = 4 42 + ☐ = 47 the student completes them.		**1.3.3** find the missing number in a number sentence *using a variety of strategies*. (MLO 1.4)

By the end of the following grades, students will know and be able to do everything in the previous grade and master the following content:

Pre-Kindergarten	Kindergarten	Grade 1	Grade 2	Grade 3	Maryland State Standards Grade 3
		1.1.4 .1 locate whole numbers on a number line.		**1.3.4** .1 plot points to represent whole numbers and fractions with denominators of 2, 3, and 4 on a number line. .2 locate points on a simple grid.	**1.3.4a** plot points to represent **whole numbers** and fractions with denominators of 2, 3, and 4 on a number line. (MLO 1.5) **1.3.4b** locate points on a simple grid. (MLO 1.6)

Knowledge of Geometry

Content Standard 2.0: Students will apply the properties of one-, two-, and three-dimensional geometric figures to describe, reason, and solve problems about shape, size, position, and motion of objects.

By the end of the following grades, students will know and be able to do everything in the previous grade and master the following content:

Pre-Kindergarten	Kindergarten	Grade 1	Grade 2	Grade 3	Maryland State Standards Grade 3
2.PK.1 .1 sort by a given attribute such as color, shape, or size. .2 recognize, describe, and identify common shapes, including circle, triangle, and four-sided shapes. .3 find common shapes (circle and triangle) in the environment.	**2.K.1** .1 sort by a given attribute and describe likenesses. .2 sort a set of objects and explain the sorting rule. .3 recognize and describe basic two- and three- dimensional figures, including circle, triangle, rectangle, pyramid, cube, and cylinder. .4 identify basic two- and three-dimensional figures in the environment. **Clarifying Examples:** Given a classroom environment, the student lists things that are square, things that are rectangular, and things that are shaped like a circle**.** Given a handful of assorted buttons, the student sorts them into groups, using a simple rule, and explains the rule.	**2.1.1** .1 identify and represent two-dimensional (plane) figures including circle, square, triangle, rectangle, and hexagon and describe their attributes. .2 identify and describe the attributes of three-dimensional (solid) figures, including sphere, cube, cylinder, and cone. **Clarifying Example:** Given paper and pencil, the student draws a triangle and a rectangle and explains how they are the same and how they are different.	**2.2.1** .1 describe and classify plane and solid geometric shapes (circle, triangle, square, rectangle, sphere, pyramid, and rectangular prism) according to such attributes as the number and shape of faces, edges, and vertices. .2 put shapes together and take them apart to form other shapes. **Clarifying Examples:** Given a paper rectangle, the student cuts along its diagonal to create two congruent triangles, and then arranges them to create a parallelogram, and then recreates the original rectangle. Given models of a circle, square, rectangle, and three different triangles, the student sorts and re-sorts in a variety of ways, including: • triangles/non-triangles • having or not having only straight lines • by the number of angles	**2.3.1** .1 identify, describe, and classify polygons, including pentagons, hexagons, and octagons. .2 identify, describe, and classify common three-dimensional geometric objects (including cube, rectangular prism, pyramid, prism, sphere, cone, cylinder) and relate them to their two-dimensional counterparts (square, rectangle, triangle, circle).	**2.3.1** *describe and compare the* **attributes** *of plane and solid geometric figures and use this understanding to show relationships and solve problems.* • identify*, represent, and describe one-, two-, and three-dimensional figures.* (MLO 2.1) • combine and subdivide circles, squares, triangles, rectangles*, and other shapes.* (MLO 2.2) • *describe the following relationships: rectangle/* **prism***, circle/sphere, square/cube, and triangle/pyramid.*

By the end of the following grades, students will know and be able to do everything in the previous grade and master the following content:

Pre-Kindergarten	Kindergarten	Grade 1	Grade 2	Grade 3	Maryland State Standards Grade 3
				2.3.2 .1 identify right angles in geometric figures or in the environment. .2 determine whether angles found in geometric figures and in the environment are greater than, equal to, or less than a right angle. **Clarifying Example:** Given a classroom situation, the student lists three items in the room that have right angles, three items that have angles less than 90°, and three that have angles greater than 90°.	**2.3.2** *identify right angles and compare them to other angles.*

By the end of the following grades, students will know and be able to do everything in the previous grade and master the following content:

Pre-Kindergarten	Kindergarten	Grade 1	Grade 2	Grade 3	Maryland State Standards Grade 3
		2.1.3 .1 draw triangles, rectangles, squares and circles.	**2.2.3** .1 make solid figures including cubes, rectangular prisms, spheres, cylinders, cones, and pyramids. **Clarifying Example:** Given clay, the student makes a representation of a sphere, cone, etc.	**2.3.3** .1 draw geometric figures using tools and technology. .2 construct with blocks a solid to match a given picture or model. .3 recognize a three-dimensional object from different perspectives.	**2.3.3** ● *construct or draw geometric figures using tools and technology.* ● *sketch squares, rectangles, triangles, and circles.* (MLO 2.3*)*

By the end of the following grades, students will know and be able to do everything in the previous grade and master the following content:

Pre-Kindergarten	Kindergarten	Grade 1	Grade 2	Grade 3	Maryland State Standards Grade 3
2.PK.4 .1 use and respond to directional and positional words such as up, down, over, under, top, bottom, inside, outside, in front, and behind.	**2.K.4** .1 model and use directional and positional words to describe the position of an object. **Clarifying Example:** When asked, the student puts an object under, over, to the left, and beside his or her table.	**2.1.4** .1 compare the size of two-dimensional figures.	**2.2.4** .1 identify and model symmetry with concrete materials and drawings. .2 identify the line of symmetry in figures and objects with symmetry. **Clarifying Examples:** Given a familiar software program, the student creates symmetric figures. Given objects in nature, such as leaves from a tree, the student sorts and describes them in terms of symmetry.	**2.3.4** .1 describe and represent slides, flips, and turns using pictures and simple objects. .2 identify, describe, and represent symmetry of geometric figures and real-world objects. **Clarifying Example:** The student uses a computer-drawing program to create a variety of designs that contain a line of symmetry.	**2.3.4a** describe and demonstrate **slides**, flips, and turns using pictures *or other simple objects*. (MLO 2.4) **2.3.4b** identify, describe, and represent **symmetry** of geometric figures and real-world objects. (MLO 2.5)
		2.1.5 .1 identify shapes that appear congruent.	**2.2.5** .1 identify and model congruence with concrete materials and drawings.	**2.3.5** .1 identify, describe, and represent congruency of geometric figures and real-world objects.	**2.3.5** identify, describe, and represent **congruency** of geometric figures and real-world objects. (MLO 2.6)

Knowledge of Measurements
Content Standard 3.0: Students will identify attributes, units, and systems of measurement and apply a variety of techniques, formulas, tools, and technology for determining measurements.
By the end of the following grades, students will know and be able to do everything in the previous grade and master the following content:

Pre-Kindergarten	Kindergarten	Grade 1	Grade 2	Grade 3	Maryland State Standards Grade 3
3.PK.1 .1 describe objects according to length.	**3.K.1** .1 identify and describe measurable attributes including length and weight. **Clarifying Example:** Given the following items—candy bar, book, hallway, and shoe—the student describes how they can be measured.	**3.1.1** .1 identify and describe measurable attributes including weight, capacity, length, time. **Clarifying Example:** Given a collection of random items, the student sorts them into groups identified as light and heavy.	**3.2.1** .1 identify and describe measurable attributes including length, area, weight, volume/ capacity, and temperature. **Clarifying Example:** Given an object, the student identifies the attribute that is measured to know how heavy it is.		**3.3.1** *identify the measurable* **attributes** *(length,* **area***, weight, and* **volume***/* **capacity***).*

By the end of the following grades, students will know and be able to do everything in the previous grade and master the following content:

Pre-Kindergarten	Kindergarten	Grade 1	Grade 2	Grade 3	Maryland State Standards Grade 3
3.PK.2 .1 demonstrate an understanding of concepts of time such as day, night, morning, and afternoon.	**3.K.2** .1 use nonstandard units to measure length. .2 describe when events have happened or will happen. **Clarifying Examples:** When asked time-related questions, the student correctly uses words such as *morning, afternoon, evening, today, yesterday, tomorrow, week,* and *year.* Given a paperclip, the student determines the length of his or her pencil using the paper clip as a unit.	**3.1.2** .1 use nonstandard units to estimate and measure weight and capacity. .2 estimate and measure length in inches. .3 select an appropriate tool, including rulers, clocks (to the hour and one half and one quarter hour), calendars, and scales to measure a specific attribute. **Clarifying Examples**: Given two containers, the student tells which holds more liquid and then checks to see if the prediction is correct. Using a pencil as a nonstandard measure of length, the student determines the width of a desk.	**3.2.2** .1 use measurement tools appropriately. .2 measure in nonstandard and standard units (inches [to ½ inch increments], feet, centimeters, grams, kilograms, ounces, pounds, degrees Celsius, degrees Fahrenheit, hours, minutes, cups, and quarts). **Clarifying Example:** Given a metric and a standard ruler, the student measures the length of his or her foot in centimeters and then in inches and explains why the measurements were different.	**3.3.2** .1 choose the appropriate units and measurement tools. **Clarifying Example**: Using a string and a measuring tool, the student finds the perimeter of a leaf to the nearest one-half inch or cm.	**3.3.2a** use rulers, scales, thermometers, and clocks to measure. (MLO 2.7) **3.3.2.b** measure in standard units (inches [to ½ inch increments], feet, *yards,* centimeters, *meters,* grams, ounces, *pounds,* Celsius, Fahrenheit, hours, and minutes) and nonstandard units (i.e., paper clips). (MLO 2.8)

By the end of the following grades, students will know and be able to do everything in the previous grade and master the following content:

Pre-Kindergarten	Kindergarten	Grade 1	Grade 2	Grade 3	Maryland State Standards Grade 3
3.PK.3 .1 make comparisons between several objects based on length.	**3.K.3** .1 use direct comparison and nonstandard units to estimate and measure objects. **Clarifying Example:** Given three pencils, the student places them in order from shortest to longest, describing each and its relationship to the others.	**3.1.3** .1 compare the length, weight, and capacity of two or more objects by using direct comparison or nonstandard units. **Clarifying Example:** Given a benchmarking jar that holds five counting bears, the student estimates the number of counting bears in other, larger jars.	**3.2.3** .1 estimate and measure length, weight, temperature, time, and capacity to the nearest whole unit.	**3.3.3** .1 estimate and/or measure length (inches, feet, yards, centimeters, meters), weight (grams, kilograms, ounces, pounds), time (minutes, hours, days, weeks, months, years), and capacity (cups, pints, quarts, gallons, liters). .2 convert between inches, feet, and yards. .3 model the concepts of area and perimeter using concrete materials, nonstandard and standard units. .4 estimate and count to find perimeter, area, and volume of figures and real-world objects. .5 estimate and determine elapsed time using a clock or calendar. **Clarifying Examples:** Given posters that are 1 ft. by 2 ft. and a bulletin board 2 ft. by 6 ft, the student determines how many posters it will take to cover the entire bulletin board. Given paper and pencil, the student makes a list of items that are each about 100 inches long, and then checks the estimation by measuring.	**3.3.3a** estimate and measure length, weight, temperature, time, *and capacity.* (MLO 2.9) • *convert between inches, feet, and yards.* **3.3.3b** estimate and count to find **perimeter**, area, and volume of figures and real-world objects. (MLO 2.10)

By the end of the following grades, students will know and be able to do everything in the previous grade and master the following content:

Pre-Kindergarten	Kindergarten	Grade 1	Grade 2	Grade 3	Maryland State Standards Grade 3
		3.1.4 .1 solve problems using non-standard measurement concepts and procedures. **Clarifying Examples:** Given that Thanksgiving is November 28, the student names the day after Thanksgiving and the day before Thanksgiving. Given various items from the classroom, the student finds two different items that weigh the same amount, using a balance scale and pennies as balance.	**3.2.4** .1 solve problems using non-standard and standard measurement concepts and procedures. **Clarifying Examples:** Given that a letter was mailed on Thursday, determine when it would arrive, if it takes three days to get there. Given two items that are sold by weight, like bags of candy, the student decides whether or not each bag has the same number of items and explains how that decision was reached.	**3.3.4** .1 use length, capacity, weight, temperature, and time to solve problems. **Clarifying Example:** Given a scale and several camping items, the student decides how to divide the items into three piles that weigh about the same amount so that three friends can share the burden as evenly as possible when they go camping.	**3.3.4** use length, capacity, weight, temperature, and time to solve problems. (MLO 2.11)

Knowledge of Statistics

Content Standard 4.0: Students will collect, organize, display, analyze, and interpret data to make decisions and predictions.

By the end of the following grades, students will know and be able to do everything in the previous grade and master the following content:

Pre-Kindergarten	Kindergarten	Grade 1	Grade 2	Grade 3	Maryland State Standards Grade 3
	4.K.1 .1 ask and answer simple questions to generate data.	**4.1.1** .1 gather and organize relevant data to answer a simple question. **Clarifying Example:** Given concrete objects like post-its with the names of favorite pets (data), the student sorts them into categories.	**4.2.1** .1 gather and organize data from surveys and classroom experiments. **Clarifying Example:** Given topics such as favorite pets, number of siblings, or least-favorite TV shows, the student discusses various ways to gather and organize data about these topics and undertake the data collection and presentation of data as part of a class or individual project.	**4.3.1** .1 gather and organize data from a variety of sources.	**4.3.1** *gather relevant data and compile the results to answer a question.*

By the end of the following grades, students will know and be able to do everything in the previous grade and master the following content:

Pre-Kindergarten	Kindergarten	Grade 1	Grade 2	Grade 3	Maryland State Standards Grade 3
4.PK.2 .1 work in a group to organize and display data concretely on a graph.	**4.K.2** .1 work in a group to organize and display data, using tallies, bar graphs, and pictographs. **Clarifying Example**: Given a group setting, the student selects his or her favorite color and helps create a classroom tally of everyone's favorite colors.	**4.1.2** .1 organize and display data using tallies, bar graphs, and pictographs (using a one-one correspondence between actual data and representation, i.e., one symbol equals one unit). **Clarifying Example:** Given a numbered die, the student works with a partner and tallies the results of rolling the die ten times.	**4.2.2** .1 organize and display data in more than one way. **Clarifying Example:** Given prepared grid paper, the student tallies data randomly listed on the classroom blackboard and then creates a bar graph.	**4.3.2** .1 organize and display data using tables, pictographs, and bar graphs using appropriate scales e.g., one symbol equals 100 units.	**4.3.2** organize and display data using tables, **pictographs**, and **bar graphs.** (MLO 3.1)

By the end of the following grades, students will know and be able to do everything in the previous grade and master the following content:

Pre-Kindergarten	Kindergarten	Grade 1	Grade 2	Grade 3	Maryland State Standards Grade 3
		4.1.3 .1 interpret data taken from real/concrete graphs and pictographs in terms such as most and least. **Clarifying Example:** Given a graph of number of pets in 2 classes, student identifies which class had the most pets.	**4.2.3** .1 interpret data from tally charts, pictographs, and bar graphs in terms of more, less, and equal. **Clarifying Example:** Given three graphs, the student selects the graph that shows dogs are the most popular pets.	**4.3.3** .1 interpret and compare data from tables, pictographs, and bar graphs.	**4.3.3** interpret, compare, *and make predictions based on* tables, pictographs, and bar graphs. (MLO 3.2)

Knowledge of Probability

Content Standard 5.0: Students will use experimental methods and theoretical reasoning to determine probabilities, to make predictions, and to solve problems about events whose outcomes involve random variation.

By the end of the following grades, students will know and be able to do everything in the previous grade and master the following content:

Pre-Kindergarten	Kindergarten	Grade 1	Grade 2	Grade 3	Maryland State Standards Grade 3
				5.3.1 .1 list the possible outcomes for a simple event. **Clarifying Example:** Given two numbered dice of different colors, the student lists all of the possible sums that could be rolled.	**5.3.1** list possible **outcomes for an event.** (MLO 3.3)

By the end of the following grades, students will know and be able to do everything in the previous grade and master the following content:

Pre-Kindergarten	Kindergarten	Grade 1	Grade 2	Grade 3	Maryland State Standards Grade 3
				5.3.2 .1 describe the likelihood of an event by using certain, impossible, more likely, less likely, and equally likely.	**5.3.2a** describe the likelihood of an event by using certain, impossible, more likely, less likely, and **equally likely.** (MLO 3.4) **5.3.2b** determine fairness by applying the concept of equally likely. (MLO 3.5)

Knowledge of Number Relationships and Computation

Content Standard 6.0: Students will describe, represent, and apply numbers and their relationships and will estimate and compute using mental strategies, paper/pencil, and technology.

By the end of the following grades, students will know and be able to do everything in the previous grade and master the following content:

Pre-Kindergarten	Kindergarten	Grade 1	Grade 2	Grade 3	Maryland State Standards Grade 3
6.PK.1 .1 model quantities to 5 using concrete objects. .2 recognize numerals to 10. .3 count to 10 using one-to-one correspondence. .4 use ordinal numbers, first and second.	**6.K.1** .1 model single-digit numbers in a variety of ways. .2 write, and count with whole numbers: using 1-to-1 correspondence to 31 or beyond. .3 use ordinal numbers first through fifth. .4 identify penny, nickel, dime, and their values. .5 determine the value of any set of coins through nineteen cents **Clarifying Examples:** Given a set of seven crayons, the student arranges them in a row with the red crayon third in line and writes the numeral that corresponds to the number of crayons in the set. Given a calendar, the student counts the number of days in January and figures out how many days are between Tuesday and Friday.	**6.1.1** .1 model one- and two-digit whole numbers using a variety of groupings. .2 read and write numerals to 100 and words that represent numbers up to ten. .3 represent one-half, one-third, and one-fourth in symbolic notation and pictures. .4 use ordinal numbers first through tenth. .5 name and determine the value of any set of coins (penny, nickel, dime, and quarter) with a value through one dollar. **Clarifying Examples:** Given paper and pencil, the student uses tallies to represent numbers to 100. Given paper and pencil, the student creates a number line with the numbers 75, 50, 20, and 5 identified. Given a set of shapes, the student follows directions to put a square first, a circle second, and a triangle fifth.	**6.2.1** .1 model multi-digit numbers. .2 read and write numerals, including those that represent common fractions. .3 model common fractions. .4 read and write words that represent numbers less than 1,000. .5 express two- and three-digit numbers in expanded notation. .6 determine the value of currency through ten dollars **Clarifying Examples:** Use rubber bands to create bundles of 10 straws and bundles of 100 straws. Use the bundles to represent numbers such as 132. Use Unifix Cubes to model how one-third can represent part of a region. From dictation, write both numerals and words that represent numbers such as 87.	**6.3.1** .1 read and write the word names for numbers to 10,000. .2 represent fractions and mixed numbers using numerals and a variety of models. .3 express three- and four-digit numbers in expanded notation.	**6.3.1** read, write, and represent **whole numbers** (**cardinal and ordinal**) and simple fractions using symbols, words*, and* **models.** (MLO 4.1) • identify number values and relationships of whole numbers and simple fractions. • *express numbers in* **expanded notation.**

By the end of the following grades, students will know and be able to do everything in the previous grade and master the following content:

Pre-Kindergarten	Kindergarten	Grade 1	Grade 2	Grade 3	Maryland State Standards Grade 3
6.PK.2 .1 identify sets with more, less, or equal numbers. .2 identify the number of items in a set with 1 to 5 items.	6.K.2 .1 create and identify sets with more, less, or an equal number of objects. .2 match the appropriate number to sets with 0-10 items. **Clarifying Example:** Given a handful of cubes, the student estimates the number in the pile and whether or not he or she has more or less than the person sitting next to him or her. The student then counts to check his or her estimate.	6.1.2 .1 compare and order equal and unequal numbers and sets. .2 count to determine the number of items in a set (1's, 2's, 5's to 30 and 10's to 100) using various methods. .3 identify a number that is one more, one less, before or after another number; identify a number or numbers located between two other numbers. .4 model 10 more/less to 100. **Clarifying Examples:** Given the number 17, the student provides the next number (18), the preceding number, and the number between 17 and 19. Given a pile of cubes, the student counts them by 2's, then counts them by 5's, adding any remaining single cubes at the end, and compares the two totals.	6.2.2 .1 identify missing numbers in a sequence to 100. .2 identify and use 10 more and 10 less. .3 compare and order whole numbers less than 1,000, applying place value concepts and using the symbols <, >, and =. .4 use, model, and label place value positions of 1's, 10's, and 100's. **Clarifying Examples:** Given the number 38, the student counts on (48, 58…) and counts back (28, 18…) by 10. Given the digits 2, 8, and 7, the student makes the largest three-digit number possible.	6.3.2 .1 identify equivalent fractions using models and pictures. .2 compare and order whole numbers through 10,000.	**6.3.2** compare, order, and describe whole numbers less than 1,000 using **place value** concepts *and the symbols* <, >, =. (MLO 4.2)

By the end of the following grades, students will know and be able to do everything in the previous grade and master the following content:

Pre-Kindergarten	Kindergarten	Grade 1	Grade 2	Grade 3	Maryland State Standards Grade 3
	6.K.3 .1 recognize sets as having an odd or even number of elements. **Clarifying Example:** Given students organized into work centers around the classroom, the student identifies each group as having an even or odd number of members.	**6.1.3** .1 identify odd and even numbers using objects. **Clarifying Example:** Given a handful of cubes or other manipulatives, the student decides if they are even or odd in number and explains how he or she knows.	**6.2.3** .1 generalize ways to determine even. Or odd. .2 describe numbers as even or odd. **Clarifying Example:** Given many opportunities to work with even and odd numbers, the student describes a rule that always works.		**6.3.3** describe numbers as even or odd. (MLO 4.3)

By the end of the following grades, students will know and be able to do everything in the previous grade and master the following content:

Pre-Kindergarten	Kindergarten	Grade 1	Grade 2	Grade 3	Maryland State Standards Grade 3
	6.K.4 .1 use concrete objects to combine and remove objects from a set and describe the results. **Clarifying Example:** If you put the 2 apples that are on the teacher's desk with the 3 apples that your friend brought to school, how many apples are there all together? What would happen if you ate 1? How many would be left? Given shape blocks, the student can represent these situations.	6.1.4 .1 demonstrate mastery of addition and subtraction fact families (sums through 10). .2 develop, use, and explain strategies to add and subtract single-digit whole numbers. **Clarifying Example**: Given nine cookies, with four cookies given away, the student writes and solves a number sentence.	6.2.4 .1 demonstrate mastery of basic addition/ subtraction fact families (sums through 18). .2 use concrete objects to model multiplication and division facts. .3 relate mathematical situations involving multiplication and division to symbolic notation and write number sentences. .4 relate mathematical situations to given mathematical expressions. **Clarifying Examples:** Given a numbered die with ten sides, the student rolls it and uses the resulting number to be the first addend in an addition problem with a sum of 10. Given concrete objects, the student models the number of tires on 3 cars by grouping the objects to model multiplication.	6.3.4 .1 develop, use, and explain strategies to multiply and divide multiplication and division fact families. .2 write a story problem that models a mathematical expression. 3. demonstrate mastery of multiplication facts for 0, 1, 2, 5, 10. 4.write a mathematical expression that models a story problem. **Clarifying Examples:** When given an expression such as 4 x 5, the student creates a situation that is described by that expression. When told that four more children join three children on a school bus, the student writes a numerical expression.	**6.3.4a** *demonstrate proficiency with addition and subtraction facts.* **6.3.4b** *use models/* **manipulatives** *and* make drawings to show multiplication and division facts.* (MLO 4.4) **6.3.4c** *write a story problem that models a mathematical* **expression.**

By the end of the following grades, students will know and be able to do everything in the previous grade and master the following content:

Pre-Kindergarten	Kindergarten	Grade 1	Grade 2	Grade 3	Maryland State Standards Grade 3
		6.1.5	**6.2.5**	**6.3.5**	**6.3.5a** add and subtract whole numbers with regrouping with sums and differences less than 1,000.
		.1 model the concept of addition.	.1 model two-digit addition and subtraction using manipulatives.	.1 select appropriate methods of computation for given situations including the use of technology.	(MLO 4.5)
		.2 model the concept of subtraction.	.2 add and subtract two- and three-digit numbers using alternative strategies.	.2 subtract two- and three-digit numbers with regrouping.	**6.3.5b** estimate sums and differences of whole numbers less than 1,000.
		.3 find sums and differences using counting strategies such as counting on and counting back.	.3 add two- and three-digit numbers with regrouping.	.3 model and explain multiplication in a variety of ways, including rectangular arrays and skip counting.	(MLO 4.6)
		.4 add and subtract one- and two-digit numbers without regrouping.	.4 model repeated addition (multiplication) and sharing equally (division) in a variety of ways, including dividing sets into two, three, or four equal parts.	.4 model and explain division in a variety of ways, including repeated subtraction, rectangular arrays, and by its inverse relationship to multiplication.	**6.3.5c** multiply and divide whole numbers using technology *or models*. (MLO 4.7)
		.5 estimate sums and differences of one- and two-digit numbers.	.5 estimate to check the reasonableness of the results of computations.	.5 estimate sums and differences of whole numbers less than 1,000.	**6.3.5d** identify, name, compare, and determine the value of a given set of currency through one hundred dollars and use this knowledge to solve problems, *including adding and subtracting money and counting change*.
		.6 solve addition and subtraction problems involving money through one dollar.	.6 solve addition and subtraction problems involving money through ten dollars.	.6 identify, name, compare, and determine the value of a given set of currency through one hundred dollars and use this knowledge to solve problems, including adding and subtracting money and counting change.	(MLO 4.8)
		Clarifying Examples: Joel thinks that his six friends will each eat two or three cookies after lunch at his house, so he asked his mom to buy ten. Is this enough?	**Clarifying Examples:** Given an answer of twenty, the student brainstorms as many different problem situations as possible that could give this answer.	.7 solve addition, subtraction, and simple multiplication and division problems using money.	
		Given a 100's chart, the student uses counting-on strategies to make change. For example, to find the change for a $0.63 purchase, the student puts a marker on 63 and uses counting strategies to find the difference between 63 and 100.	Use a 100's chart to develop strategies for adding 10 or 20 to a given number, for example: 27 + 10 34 + 10	.8 multiply and divide multi-digit numbers by one-digit numbers.	

By the end of the following grades, students will know and be able to do everything in the previous grade and master the following content:

Pre-Kindergarten	Kindergarten	Grade 1	Grade 2	Grade 3	Maryland State Standards Grade 3
		6.1.6 .1 model and use the commutative property for addition. .2 explain and apply the concept of inverse operation as it relates to addition and subtraction. **Clarifying Examples:** Explain how the number sentence 3 + 6 = 9 is related to 9 – 6 = 3. List other number sentences that are part of this family. Use tiles to show that 4+5=9 and 5+4=9.		**6.3.6** .1 model and use the identity and commutative properties for addition and multiplication to solve problems. .2 explain and apply the concept of inverse operation as it relates to multiplication and division. **Clarifying Examples**: Define the identity property. Explain why it is not zero for multiplication as well as for addition. When asked, the student explains whether or not 3 x 7 = 7 x 3 and why or why not this is true. Given 24 tiles, the student demonstrates the commutative property of multiplication by creating different pairs of rectangles. For **example**, one pair of rectangles is 1 by 24 and 24 by 1.	**6.3.6** *use mathematical properties to solve problems.* • *explain and apply number relationships using the mathematical* **properties of operations**, *including* **identity**, **commutative,** *and zero properties.* • *explain and apply the concept of* **inverse** *operation (i.e., addition and subtraction).*

By the end of the following grades, students will know and be able to do everything in the previous grade and master the following content:

Pre-Kindergarten	Kindergarten	Grade 1	Grade 2	Grade 3	Maryland State Standards Grade 3
	6.K.7 .1 estimate quantities less than 20. **Clarifying Example**: Working in partners, a student gathers a group of items, asks his or her partner to estimate the number of items in the group, and then checks for accuracy.	**6.1.7** .1 recognize when solutions to problems are reasonable.	**6.2.7** .1 use a variety of strategies to solve addition and subtraction problems. .2 estimate quantities to 100. **Clarifying Example**: Given a jar containing 80 objects, the student will use a benchmark such as 5 objects in a jar to estimate the quantity the jar contains.	**6.3.7** .1 use a variety of strategies to solve simple multiplication and division problems. .2 use estimation techniques to determine solutions to problems with whole numbers. **Clarifying Example**: Given the number of candy bars sold by each member of a dance club, the student estimates the total number of candy bars sold using estimation strategies such as compatible numbers and averaging techniques.	**6.3.7a** *apply strategies to solve problems with whole numbers.* • use **estimation** to solve problems with whole numbers. (MLO 4.9) • *estimate the number of objects in a set.* • *use estimation to evaluate reasonableness of results.*

Process of Problem Solving

Content Standard 7.0: **Students will demonstrate their ability to apply a wide variety of mathematical concepts, processes, and skills to solve a broad range of problems.**

Rationale

The process of problem solving should permeate the entire mathematics instructional program and provide the authentic context in which mathematical concepts and skills are learned. Problem solving must go beyond performing simple and complex computations. It should involve challenging, thought-provoking questions, speculations, investigations, and explorations.

In order to solve problems, students will be able to:

- use information to identify and define the question(s) within a problem (MLO 5.1, SFS 2.2, SFS 2.4)
- make a plan and decide what information *is needed or missing* and steps needed to solve the problem (MLO 5.2, SFS 2.4)
- choose the appropriate operation(s) for a given problem situation (MLO 5.3)
- *create or* select and then apply appropriate problem-solving strategies to solve a problem from **visual** (draw a picture, create a **graph**), **numerical** (guess and check, look for a pattern), and **symbolic** (write an **equation**) **perspectives** (MLO 5.4, SFS 2.4)
- *analyze multi-step problem-solving situations* (SFS 2.4)
- organize, interpret, and use relevant information (MLO5.5, SFS 2.2, SFS 2.4)
- select and use appropriate tools and technology (MLO 5.6, SFS 2.4)
- *persevere through to a solution*
- *verify the conclusion based on the data and the processes used* (SFS 2.4)
- *communicate the conclusion with appropriate mathematical justification* (SFS 3.2)
- show that no solution or multiple solutions may exist (MLO 5.7, SFS 3.2)
- *ascribe a meaning to the solution in the context of the problem*
- identify alternate ways to find a solution (MLO 5.8, SFS 2.4)
- apply what was learned to a new *and/or more complex* problem (MLO 5.9, SFS 2.4)

Process of Communication

Content Standard 8.0: **Students will demonstrate their ability to organize and consolidate their mathematical thinking in order to analyze and use information, and will present ideas with words, symbols, visual displays, and technology.**

Rationale

Communication plays an important role in helping students make the connections between previously learned and newly acquired knowledge. Explaining, justifying, predicting, and defending ideas orally and in writing can clarify understanding of concepts and principles and can provide opportunities to assess understanding and thinking.

In order to communicate mathematically, students will be able to:

- *discuss, read, listen, and observe to obtain mathematical information from a variety of sources* (SFS 3.2)
- use multiple representations to express mathematical concepts and solutions (MLO 5.10, SFS 2.4)
- represent problem situations and express their solutions using **concrete**, pictorial, tabular, graphical, and algebraic methods (MLO 5.11, SFS 3.1)
- *clarify meaning by asking questions, supporting solutions with evidence, and explaining mathematical ideas in oral and written forms* (SFS 3.1)
- use mathematical language and symbolism appropriately (MLO 5.12, SFS 3.2)
- *organize, interpret, and* describe situations mathematically by providing mathematical ideas and evidence in *oral and* written form (MLO 5.13, SFS 3.1, SFS 3.2)
- *give and use feedback to revise mathematical thinking/presentations/solutions* (SFS 3.1, SFS 3.3)
- present results in written*, oral, and visual* forms (MLO 5.14, SFS 3.1, SFS 3.2)
- *describe the reasoning and processes used in order to reach the solution to a problem*

Process of Reasoning

Content Standard 9.0: **Students will demonstrate their ability to reason mathematically, using inductive and deductive reasoning, and to evaluate mathematical situations. Students will justify and draw conclusions.**

Rationale

Reasoning, analyzing, and thinking logically are essential to knowing and doing mathematics. Constructing **valid arguments** in problem settings and evaluating the arguments of others are important skills to be developed over time through a variety of experiences.

- justify why an answer or approach to a problem is reasonable (MLO 5.15, SFS 2.2)
- make and test generalizations based upon investigation or observation (MLO 5.16, SFS 2.2)
- make predictions or draw conclusions from available information (MLO 5.17, SFS 2.2)
- analyze statements and provide examples which support or refute them (MLO 5.18, SFS 2.2)
- *follow and* judge the validity of arguments by applying inductive and deductive thinking (MLO 5.19, SFS 2.2)
- *use methods of proof, including direct, indirect, paragraph, and/or contradiction*
- use supporting data to explain why a chosen method and a solution are mathematically correct (MLO 5.20, SFS 2.2)
- *analyze mathematical situations using* **manipulatives**, *technology, patterns, relationships,* **spatial** *and* **proportional reasoning** (SFS 2.2)
- *use if…then statements to formulate* **valid arguments** *or proofs*
- *use manipulatives to model and justify solutions*

Process of Connections

Content Standard 10.0: **Students will demonstrate their ability to relate and apply mathematics within the discipline, to other content areas, and to daily life.**

Rationale

Connections help students view mathematics as an integrated whole rather than an isolated set of topics. Connections also help students acknowledge the relevance and usefulness of mathematics, both in and out of school, because it is important for students to be able to link current and future knowledge to their understanding of mathematics.

- identify and use the relationships among mathematical concepts as a basis for learning additional concepts (MLO 5.21, SFS 1.3)
- identify the relationships among graphical, numerical, physical, and algebraic mathematical models and concepts (MLO 5.22, SFS 1.32)
- identify mathematical concepts and processes as they apply to other content areas (MLO 5.23, SFS 1.3)
- *move beyond a particular problem by making general conclusions and summary statements and by posing new, related questions and comments* (SFS 1.3)
- use mathematical concepts and processes to translate personal experiences into mathematical language (MLO 5.24)
- *identify the contributions of men and women of diverse cultures to the development, understanding, and application of mathematical concepts and processes*