Eagles Landing Christian Academy
Mathematics Standards of Excellence

Grade 2	Grade 1	Grade K-5
Operations and Algebraic Thinking	**Operations and Algebraic Thinking**	**Operations and Algebraic Thinking**
The student will **Represent and solve problems involving addition and subtraction.** **MGSE2.OA.1:** Use addition and subtraction within 100 to solve, one- and two-step word problems by using drawings and equations with a symbol for the unknown number to represent the problem. Problems include contexts that involve adding to, taking from, putting together/taking apart (part/part/whole) and comparing with unknowns in all positions. **Add and subtract within 20.** **MGSE2.OA.2:** Fluently add and subtract within 20 using mental strategies. By end of Grade 2, know from memory all sums of two one-digit numbers. **Work with equal groups of objects to gain foundations for multiplication.** **MGSE2.OA.3:** Determinate whether a group of objects (up to 20) has an odd or even number of members, e.g., by pairing objects or counting them by 2s; write an equation to express an even number as a sum of two equal addends. **MGSE2.OA.4:** Use addition to find the total number of objects arranged in rectangular	**The student will** **Represent and solve problems involving addition and subtraction.** **MGSE1.OA.1**: Use addition and subtraction within 20 to solve word problems involving situations of adding to, taking from, putting together, taking apart, and comparing, with unknowns in all positions, e.g., by using objects, drawings, and equations with a symbol for the unknown number to represent the problem. **MGSE1.OA.2**: Solve word problems that call for addition of three whole numbers whose sum is less than or equal to 20, e.g., by using objects, drawings, and equations with a symbol for the unknown number to represent the problem. **Understand and apply properties of operation and the relationship between addition and subtraction.** **MGSE1.OA.3**: Apply properties of operations as strategies to add and subtract. *Examples: If 8 + 3 = 11 is known, then 3 + 8 = 11 is also known. (Commutative property of addition.) To add 2 + 6 + 4, the second two numbers can be added to make a ten, so 2 + 6 + 4 = 2 + 10 = 12. (Associative property of addition.)* **MGSE1.OA.4**: Understand subtraction as an unknown-addend problem. *For example,*	**The student will** **Understand addition as putting together and adding to, and subtraction as taking apart and taking from.** **MGSEK.OA.1:** Represent addition and subtraction with objects, fingers, mental images, drawings, sounds (claps), acting out situations, verbal explanation, expression, or equations. **MGSEK.OA.2:** Solve addition and subtraction word problems, and add and subtract within 10 by using objects, or drawings to represent the problem. **MGSEK.OA.3:** Decompose number less than or equal to 10 into pairs in more than one way, e.g., by using objects, or drawings, and record each decomposition by a drawing or equation (e.g., 5 = 2 + 3 and 5 = 4 + 1)(drawings need not include an equation). **MGSEK.OA.4:** For any number from 1 to 9, find the number that makes 10 when added to the given number, e.g., by using objects, or drawings, and record the answer with a drawing or equation. **MGSEK.OA.5:** Fluently add and subtract within 5

arrays with up to 5 rows and up to 5 columns; write an equation to express the total as a sum of equal addends	*subtract 10 – 8 by finding the number that makes 10 when added to 8.* **Add and subtract within 20.** **MGSE1.OA.5**: Relate counting to addition and subtraction (e.g., by counting on 2 to add 2). **MGSE1.OA.6:** Add and subtract within 20 a. Use strategies such as counting on; making ten (e.g., 8 + 6 = 8 + 2 + 4 = 10 + 4 = 14); decomposing a number leading to a ten (e.g., 13 – 4 = 13 – 3 – 1 = 10 – 1 = 9); using the relationship between addition and subtraction (e.g., knowing that 8 + 4 = 12, one knows 12 – 8 = 4); and creating equivalent but easier or known sums (e.g., adding 6 + 7 by creating the known equivalent 6 + 6 + 1 = 12 + 1 = 13). b. Fluently add and subtract within 10. **Working with addition and subtraction equations.** **MGSE1.OA.7**: Understand the meaning of the equal sign, and determine if equations involving addition and subtraction are true or false. *For example, which of the following equations are true and which are false? 6 =6, 7 = 8-1, 5 + 2 = 2 + 5, 4 + 1 = 5 + 2.* **MGSE1.OA.8**: Determine the unknown whole number in an addition and subtraction equation relating three whole numbers. *For example, determine the unknown number that makes the equation true in each of the equations 8 + ? = 11, 5 = _ - 3, 6 + 6 = _.*	

Eagles Landing Christian Academy
Mathematics Standards of Excellence

Grade 5	Grade 4	Grade 3
Operations and Algebraic Thinking	**Operations and Algebraic Thinking**	**Operations and Algebraic Thinking**
The student will **Write and interpret numerical expressions.** **MGSE5.OA.1:**Use parentheses, brackets, or braces in numerical expressions, and evaluate expressions with these symbols. **MGSE5.OA.2:** Write simple expressions that record calculations with numbers, and interpret numerical expressions without evaluating them. *For example, express the calculation "add 8 and 7, then multiply by 2" as 2 × (8 + 7). Recognize that 3 × (18932 + 921) is three times as large as 18932 + 921, without having to calculate the indicated sum or product.* **Analyze patterns and relationships.** **MGSE5.OA.3:** Generate two numerical patterns using a given rules. Identify apparent relationships between corresponding terms by completing a function table or input/output table. Using the terms	**The student will** **Use the four operations with whole numbers to solve problems.** **MGSE4.OA.1:** Understand that a multiplicative comparison is a situation in which one quantity is multiplied by a specified number to get another quantity. **a.** Interpret 35 = 5 × 7 as a statement that 35 is 5 times as many as 7 and 7 times as many as 5. **b.** Represent verbal statements of multiplicative comparisons as multiplication equations. **MGSE4.OA.2:** Multiply or divide to solve word problems involving multiplicative comparison. Use drawings and equations with a symbol for the unknown number to represent the problem, distinguishing multiplicative comparison from additive comparison. **MGSE4.OA.3:** Solve multistep word problems with whole numbers and having whole-number answers using the four operations, including problems in which remainders must be interpreted. Represent these problems using equations with a symbol or letter standing for the unknown quantity. Assess the reasonableness of answers using mental computation and estimation strategies including rounding.	**The student will** **Represent and solve problems involving multiplication and division.** **MGSE3.OA.1:** Interpret products of whole numbers, e.g., interpret 5 × 7 as the total number of objects in 5 groups of 7 objects each. *For example, describe a context in which a total number of objects can be expressed as 5 × 7.* **MGSE3.OA.2:** Interpret whole-number quotients of whole numbers, e.g., interpret 56 ÷ 8 as the number of objects in each share when 56 objects are partitioned equally into 8 shares, (How many in each group?) or as a number of shares when 56 objects are partitioned into equal shares of 8 objects each. (How many groups can you make?) *For example, describe a context in which a number of shares or a number of groups can be expressed as 56 ÷ 8.* **MGSE3.OA.3:** Use multiplication and division within 100 to solve word problems in situations involving equal groups, arrays, and measurement quantities, e.g., by using drawings and equations with a symbol for the unknown number to represent the problem. **MGSE3.OA.4:** Determine the unknown whole number in a multiplication or division equation relating three whole numbers using the inverse relationship of multiplication and division. *For example, determine the unknown number that*

	Gain familiarity with factors and multiples. **MGSE4.OA.4:** Find all factor pairs for a whole number in the range 1–100. Recognize that a whole number is a multiple of each of its factors. Determine whether a given whole number in the range 1–100 is a multiple of a given one-digit number. Determine whether a given whole number in the range 1–100 is prime or composite. **Generate and analyze patterns.** **MGSE4.OA.5:** Generate a number or shape pattern that follows a given rule. Identify apparent features of the pattern that were not explicit in the rule itself. Explain informally why the pattern will continue to develop in this way. *For example, given the rule "Add 3" and the starting number 1, generate terms in the resulting sequence and observe that the terms appear to alternate between odd and even numbers.*	*makes the equation true in each of the equations 8 × ? = 48, 5 = ? ÷ 3, 6 × 6 = ?.* **Understand properties of multiplication and the relationship between multiplication and division.** **MGSE3.OA.5:** Apply properties of operations as strategies to multiply and divide. *Examples: If 6 × 4 = 24 is known, then 4 × 6 = 24 is also known. (Commutative property of multiplication.) 3 × 5 × 2 can be found by 3 × 5 = 15, then 15 × 2 = 30, or by 5 × 2 = 10, then 3 × 10 = 30. (Associative property of multiplication.) Knowing that 8 × 5 = 40 and 8 × 2 = 16, one can find 8 × 7 as 8 × (5 + 2) = (8 × 5) + (8 × 2) = 40 + 16 = 56. (Distributive property.)* **MGSE3.OA.6:** Understand division as an unknown-factor problem. *For example, find 32 ÷ 8 by finding the number that makes 32 when multiplied by 8.* **Multiply and divide within 100** **MGSE3.OA.7:** Fluently multiply and divide within 100, using strategies such as the relationship between multiplication and division (e.g., knowing that 8 × 5 = 40, one knows 40 ÷ 5 = 8) or properties of operations. By the end of Grade 3, know from memory all products of two one-digit numbers.

		Solve problems involving the four operations, and identify and explain patterns in arithmetic. **MGSE3.OA.8:** Solve two-step word problems using the four operations. Represent these problems using equations with a letter standing for the unknown quantity. Assess the reasonableness of answers using mental computation and estimation strategies including rounding. **MGSE3.OA.9:** Identify arithmetic patterns (including patterns in the addition table or multiplication table), and explain them using properties of operations. *For example, observe that 4 times a number is always even, and explain why 4 times a number can be decomposed into two equal addends.*

Eagles Landing Christian Academy
Mathematics Standards of Excellence

Grade 2	Grade 1	Grade K-5
Geometry	**Geometry**	**Geometry**
The student will **Reason with shapes and their attributes.** **MGSE2.G.1:** Recognize and draw shapes having specified attributes, such as a given number of angles, or a given number of equal faces. Identify triangles, quadrilaterals, pentagons, hexagons, and cubes. **MGSE2.G.2:** Partition a rectangle into rows and columns of same size squares and count to find the total number of them. **MGSE2.G.3:** Master partition circles and rectangles into two, three, or four equal shares, describe the shares using the words *halves, thirds, half of, a third of, etc.,* and describe the whole as two halves, three thirds, four fourths. Recognize that equal shares of identical wholes need not have the same shape. Master comparing ½, 1/3, ¼; order least to greatest, and compare using symbols <, >.	**The student will** **Reason with shapes and their attributes.** **MGSE1.G.1:** Distinguish between defining attributes (e.g., triangles are closed and three-sided) versus non-defining attributes (e.g., color, orientation, overall size); build and draw shapes to possess defining attributes. **MGSE1.G.2:** Compose two-dimensional shapes (rectangles, squares, trapezoids, triangles, half-circles, and quarter-circles) or three-dimensional shapes (cubes, right rectangular prisms, right circular cones, and right circular cylinders) to create a composite shape, and compose new shapes from the composite shape. *This is important for the future development of spatial relations which later connects to developing understanding of area, volume, and fractions.* **MGSE1.G.3: P**artition circles and rectangles into two, three, and four equal shares, describe the shares using the words *halves, thirds, fourths, and quarters,* and use the phrases *half of, third of, fourth of,* and *quarter of.* Describe the whole as two of, three of, or four of the shares. Understand for these examples that decomposing into more equal shares creates smaller shares. Introduce comparing ½, 1/3, ¼; order least to greatest, and compare using symbols <, >.	**The student will** **Identify and describe shapes (squares, circles, triangles, rectangles, hexagons, cubes, cones, cylinders, and spheres).** **MGSEK.G.1:** Describe objects in the environment using names of shapes, and describe the relative positions of these objects using terms such as *above, below, beside, in front of, behind,* and *next to.* **MGSEK.G.2:** Correctly name shapes regardless of their orientations or overall size. **MGSEK.G.3:** Identify shapes as two-dimensional (lying in a plane, "flat") or three- dimensional (solid). **Analyze, compare, create, and compose shapes.** **MGSEK.G.4:** Analyze, and compare two- and three- dimensional shapes, in different sizes and orientations, using informal language to describe their similarities, differences, parts (e.g., number of sides and vertices/ "corners") and other attributes (e.g., having sides of equal length). **MGSEK.G.5:** Model shapes in the world by building shapes from components (e.g., sticks and clay balls) and drawing shapes. **MGSEK.G.6:** Compose simple shapes to form larger shapes. *For example, "Can you join these two triangles with full sides touching to make a*

		rectangle?" Recognize one-half of an object when marked in two equal parts.

Eagles Landing Christian Academy
Mathematics Standards of Excellence

Grade 5	Grade 4	Grade 3
Geometry	**Geometry**	**Geometry**
The student will **Graph points on the coordinate plane to solve real-world and mathematical problems.** **MGSE5.G.1:** Use a pair of perpendicular number lines, called axes, to define a coordinate system, with the intersection of the lines (the origin) arranged to coincide with the 0 on each line and a given point in the plane located by using an ordered pair of numbers, called its coordinates. Understand that the first number indicates how far to travel from the origin in the direction of one axis, and the second number indicates how far to travel in the direction of the second axis, with the convention that the names of the two axes and the coordinates correspond (e.g., *x*-axis and *x*-coordinate, *y*-axis and *y*-coordinate). **MGSE5.G.2:** Represent real world and mathematical problems by graphing points in the first quadrant of the coordinate plane, and interpret coordinate values of points in the context of the situation.	**The student will** **Draw and identify lines and angles, and classify shapes by properties of their lines and angles.** **MGSE4.G.1:** Draw points, lines, line segments, rays, angles (right, acute, obtuse), and perpendicular and parallel lines. Identify these in two-dimensional figures. **MGSE4.G.2:** Classify two-dimensional figures based on the presence or absence of parallel or perpendicular lines, or the presence or absence of angles of a specified size. Recognize right triangles as a category, and identify right triangles. **MGSE4.G.3:** Recognize a line of symmetry for a two-dimensional figure as a line across the figure such that the figure can be folded along the line into matching parts. Identify line-symmetric figures and draw lines of symmetry.	**The student will** **Reason with shapes and their attributes.** **MGSE3.G.1:** Understand that shapes in different categories (e.g., rhombuses, rectangles, and others) may share attributes (e.g., having four sides), and that the shared attributes can define a larger category (e.g., quadrilaterals). Recognize rhombuses, rectangles, and squares as examples of quadrilaterals, and draw examples of quadrilaterals that do not belong to any of these subcategories**.** **MGSE3.G.2:** Partition shapes into parts with equal areas. Express the area of each part as a unit fraction of the whole. *For example, partition a shape into 4 parts with equal area, and describe the area of each part as 1/4 of the area of the shape.*

Classify two-dimensional figures into categories based on their properties. **MGSE5.G.3:** Understand that attributes belonging to a category of two-dimensional figures also belong to all subcategories of that category. *For example, all rectangles have four right angles and squares are rectangles, so all squares have four right angles.* **MGSE5.G.4:** Classify two-dimensional figures in a hierarchy based on properties. (polygons, triangles, and quadrilaterals)		

Eagles Landing Christian Academy
Mathematics Standards of Excellence

Grade 2	Grade 1	Grade K-5
Numbers and Quantity	**Numbers and Quantity**	**Numbers and Quantity (Cardinality)**
The student will **Understand place value.** **MGSE2.NBT.1:** Understand that the three digits of a three-digit number represent amounts of hundreds, tens, and ones; e.g., 706 equals 7 hundreds, 0 tens, and 6 ones. Understand the following as special cases: a. 100 can be thought of as a bundle of ten tens – called a "hundred." b. The numbers 100, 200, 300, 400, 500, 600, 700, 800, 900 refer to one, two, three, four, five, six, seven, eight, or nine hundreds (and 0 tens and 0 ones). **MGSE2.NBT.2:** Count within 1000; skip-count by 5s, 10s, and 100s. a. Count by 3's to 36 & 4's to 48 & 25's to 500. b. Count backwards from 200 by 1's, 2's, 5's, & 10's. c. Count & write by evens & odds to 200. d. Recognize & read ordinal numbers 1-50. **MGSE2.NBT.3**: Read & write numbers to 1000 using base-ten numerals, number names, and expanded form. **MGSE2.NBT.4:** Compare two three-digit	**The student will** **Extend the counting sequence.** **MGSE1.NBT.1:** Count to 120, starting at any number less than 120. In this range, read and write numerals and represent a number of objects with a written numeral. a. Count & write to 200. b. Count backwards from 200 by 1's, 2's, 5's, and 10's. c. Skip count by 2's, 5's, 10's, & 25's to 200. d. Count & write by evens & odds to 200. e. Recognize & read ordinal numbers 1-20. **Understand place value.** **MGSE1.NBT.2**: Understand that the two digits of a two-digit number represent amounts of tens and ones. Understand the following as special cases: a. 10 can be thought of as a bundle of ten ones – called a "ten" b. The numbers from 11 – 19 are composed of a ten and one, two, three, four, five, six, seven, eight, or nine ones. c. Numbers 10, 20… refer to one, two,… or nine tens (and 0 ones). d. Place value to hundreds. e. Order numbers least to greatest. f. Bundles of ten tens equals 100	**The student will** **Know number names and the count sequence** **MGSEK.CC.1** : Count to 100 by ones and by tens. Count to 100 by twos & fives. **MGSEK.CC.2** : Count forward beginning from a given number within the know sequence (instead of having to begin at 1). **MGSEK.CC.3**: Write numbers from 0 to 20. Write numbers to 100. Represent a number of objects with a written numeral 0-20 (with 0 representing a count of no objects). **Count to tell the number of objects.** **MGSEK.CC.4**: Understand the relationship between numbers and quantities; connect counting to cardinality. a. When counting objects, say the number names in the standard order, pairing each object with one and only one number name and each number name with one and only one object (one to one correspondence). b. Understand that the last number name said tells the number of objects counted (cardinality). The number of objects is the same regardless of their arrangement or the order in which they were counted.

numbers and 4-digit numbers based on meanings of the hundreds, tens, and ones digits, using <,=,> symbols to record the results of comparisons.

a. Order greatest to least & least to greatest
b. Introduce - Round to nearest 10

Use place value understanding and properties of operations to add and subtract.

MGSE2.NBT.5: Fluently add and subtract within 100 using strategies based on place value, properties of operations, and/or the relationship between addition and subtraction.

MGSE2.NBT.6: Add up to four two-digit numbers using strategies based on place value and properties of operations.

MGSE2.NBT.7: Add and subtract within 1000 using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; relate the strategy to a written method.

a. Introduce adding and carrying to 10,000.
b. Add or subtract composing or decomposing thousands.

MGSE2.NBT.8: Mentally add and subtract 10 or 100 to/from a given number 100-900.

MGSE2.NBT.9: Explain why addition and

MGSE1.NBT.3: Compare two 2-digit numbers based on meanings of the tens and ones digits recording the results of comparisons with the symbols <, =, >.

a. Compare two 3-digit numbers

Use place value understanding and properties of operations to add and subtract.

MGSE1.NBT.4: Add within 100 including adding a 2-digit number and a 1-digit number, and adding a 2-digit number and a multiple of 10 (e.g., 24+9, 13+10, 27+40), using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; relate the strategy to a written method and explain the reasoning used.

a. Introduce adding 3-digit numbers within 1000 with carrying.

MGSE1.NBT.5: Given 2-digit number, mentally find 10 more or 10 less than the number without having to count; explain the reasoning used.

MGSE1.NBT.6: Subtract multiplies of 10 in the range 10-90 from multiples of 10 in the range 10-90 (positive or zero differences), using concrete models or drawings, and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; relate the strategy to a written

c. Understand that each successive number name refers to a quantity that is one larger.

MGSEK.CC.5: Count to answer "how many?" questions.

a. Count to answer "how many?" questions about as many as 20 things arranged in a variety of ways (a line, a rectangular array, or a circle), or as many as 10 things in a scattered configuration.
b. Given a number from 1-20, count out that many objects.
c. Identify and be able to count pennies within 20. (Use pennies as manipulatives in multiple mathematical contexts.)

MGSEK.CC.6: Identify whether the number of objects in one group is greater than, less than, or equal to the number of objects in another group, e.g., by using matching and counting strategies.

MGSEK.CC.7: Compare 2 numbers between 1 and 10 presented as written numerals.

Work with numbers 11-19 to gain foundation for place value.

MGSEK.NBT.1: Compose and decompose numbers from 11-19 into ten ones and some further ones by using objects or drawings, and record each composition or decomposition by a drawing or equation (e.g., 18 = 10 + 8); understand that these numbers are composed of ten ones and one two, three, four, five, six, seven, eight, or nine ones.

subtraction strategies work, using place value and the properties of operation.	method and explain the reasoning used. (e.g., 70-30, 30-10, 60-60) a. Subtract 2-digit numbers within 100 – no borrowing. **MGSE1.NBT.7:** Identify dimes, and understand ten pennies can be thought of as a dime. (Use dimes as manipulatives in multiple mathematical contexts.)	1. Recognize numbers to 100 2. Recognize & read ordinal numbers 1-10

Eagles Landing Christian Academy
Mathematics Standards of Excellence

Grade 5	Grade 4	Grade 3
Numbers and Quantity	**Numbers and Quantity**	**Numbers and Quantity**
The student will	**The student will**	**The student will**
Understand the place value system. **MGSE5.NBT.1:** Recognize that in a multi-digit number, a digit in one place represents 10 times as much as it represents in the place to its right and 1/10 of what it represents in the place to its left. **MGSE5.NBT.2:** Explain patterns in the number of zeros of the product when multiplying a number by powers of 10, and explain patterns in the placement of the decimal point when a decimal is multiplied or divided by a power of 10. Use whole number exponents to denote powers of 10. **MGSE5.NBT.3:** Read, write, and compare decimals to thousandths. a. Read and write decimals to thousandths using base-ten numerals, number names, and expanded form, e.g. 347.392 = 3 x 100 + 4 x 10 + 7 x 1 +3 x (1/10) + 9 x (1/100) + 2 x (1/1000). b. Compare two decimals to thousandths based on meanings of the digits in each place, using >, =, < symbols to record the results of	**Generalize place value understanding for multi-digit whole numbers.** **MGSE4.NBT.1:** Recognize that in a multi-digit whole number, a digit in any one place represents ten times what it represents in the place to its right. For example, recognize that 700 ÷ 70 = 10 by applying concepts of place value and division. **MGSE4.NBT.2:** Read and write multi-digit whole numbers using base-ten numerals, number names, and expanded form. Compare two multi-digit numbers based on meanings of the digits in each place, using >, =, < symbols to record the results of comparisons. **MGSE4.NBT.3:** Use place value understanding to round multi-digit whole numbers to any place. **Use place value understanding and properties of operations to perform multi-digit arithmetic**. **MGSE4.NBT.4:** Fluently add and subtract multi-digit whole numbers using the standard algorithm.	**Use place value understanding and properties of operations to perform multi-digit arithmetic.** **MGSE3.NBT.1:** Use place value understanding to round whole numbers to the nearest 10 or 100. **MGSE3.NBT.2:** Fluently add and subtract within 1000 and 10,000 using strategies and algorithms based on place value, properties of operations, and/or the relationship between addition and subtraction. **MGSE3.NBT.3:** Multiply one-digit whole numbers by multiples of 10 in the range 10 – 90 (e.g., 9 x 80, 5 x 60) using strategies based on place value and properties of operations. Develop identifying and applying rules to convert from Roman Numerals up to 1000 (M) to Arabic. **Develop understanding of fractions as numbers.** **MGSE3.NF.1:** Understand a fraction 1/*b* as the quantity formed by 1 part when a whole is partitioned into *b* equal parts (unit fraction); understand a fraction *a/b* as the quantity formed by *a* parts of size 1/*b*. *For example, ¾ means there are three ¼ parts, so ¾ = ¼ + ¼ + ¼ .* **MGSE3.NF.2:** Understand a fraction as a number

comparisons.

MGSE5.NBT.4: Use place value understanding to round decimals up to the hundredth place.

Perform operations with multi-digit whole numbers and with decimals to hundredths and thousandths.

MGSE5.NBT.5: Fluently multiply multi-digit whole numbers using standard algorithm (or other strategies demonstrating understanding of multiplication) up to a 3 digit by 2 digit factor.

MGSE5.NBT.6: Fluently divide up to four-digit dividends and two-digit divisors, with remainders as fractions, using at least one of the following methods: strategies based on place value, the properties of operations, and/or the relationship between multiplication and division. Illustrate and explain the calculation by using equations or concrete models (rectangular arrays or area models).

MGSE5.NBT.7: Add, subtract, multiply, and divide decimals to hundredths and thousandths using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between

MGSE4.NBT.5: Multiply a whole number of up to four digits by a one-digit whole number, and multiply two two-digit numbers, using strategies based on place value and the properties of operations. Illustrate and explain the calculation by using equations, rectangular arrays, and/or are models.

MGSE4.NBT.6: Find whole-number quotients and remainders as fractions with up to four-digit dividends and one and two-digit divisors using strategies based on place value, the properties of operations, and/or the relationship between multiplication and division. Illustrate and explain the calculation by using equations, rectangular arrays, and/or area models

MGSE6.NS.4 : Introduce the ability to find the greatest common factor of two whole numbers less than or equal to 100 and the least common multiple of two whole numbers less than or equal to 12

Develop identifying and applying rules to convert from Roman Numerals up to 1000 (M) to Arabic.

Extend understanding of fraction equivalence and ordering.

MGSE4.NF.1: Explain why two or more fractions are equivalent $a/b = (n \times a)/(n \times b)$ by using

on the number line; represent fractions on a number line diagram.

a. Represent a fraction $1/b$ on a number line diagram by defining the interval from 0 to 1 as the whole and partitioning it into b equal parts. Recognize that each part has size $1/b$. Recognize that a unit fraction 1/b is located 1/b whole units from 0 on the number line.
b. Represent a fraction a/b on a number line diagram by marking off a lengths $1/b$ from 0. Recognize that the resulting interval has size a/b and that its endpoint locates the non-unit fraction a/b on the number line.

MGSE3.NF.3: Explain equivalence of fractions through reasoning with visual models. Compare fractions by reasoning about their size.

a. Understand two fractions as equivalent (equal) if they are the same size, or the same point on a number line.
b. Recognize and generate simple equivalent fractions, (e.g., ½ = 2/4, 4/6 = 2/3). Explain why the fractions are equivalent, e.g., by using visual fraction model.
c. Express whole numbers as fractions, and recognize fractions that are

addition and subtraction; relate the strategy to a written method and explain the reasoning used.

MGSE6.NS.4 : Develop the ability to find the greatest common factor of two whole numbers less than or equal to 100 and the least common multiple of two whole numbers less than or equal to 12**.**

Develop identifying and applying rules to convert from Roman Numerals up to 1000 (M) to Arabic.

Use equivalent fractions as a strategy to add and subtract fractions.

MGSE5.NF.1: Add and subtract fractions with unlike denominators (including mixed numbers) by finding a common denominator and equivalent fractions to produce like denominators.

MGSE5.NF.2: Solve word problems involving addition and subtraction of fractions referring to the same whole, including cases of unlike denominators, e.g., by using visual fraction models or equations to represent the problem. Use benchmark fractions and number sense of fractions to estimate mentally and assess the reasonableness of answers. *For example, recognize an incorrect result 2/5 + ½ = 3/7, by*

visual fractions models. Focus attention to how the number and size of the parts differ even though the two fractions themselves are the same size. Using this principle to recognize and generate equivalent fractions.

MGSE4.NF.2: Compare two fractions with different numerators and different denominators, e.g., by using visual fraction models, by creating common denominators or numerators, or by comparing to a benchmark fraction such as 1/2 . Recognize that comparisons are valid only when the two fractions refer to the same whole. Record the results of comparisons with symbols >, =, <, and justify the conclusions.

Build fractions from unit fractions by applying and extending previous understandings of operations on whole numbers.

MGSE4.NF.3: Understand a fraction *a/b* with *a* >1 as a sum of fractions 1/*b*.

a. Understand addition and subtraction of fractions as joining and separating parts referring to the same whole.
b. Decompose a fraction into a sum of fractions with the same

equivalent to whole numbers. *Examples: Express 3 in the form 3 = 3/1;recognize that 6/1 = 6; locate 4/4 and 1 at the same point of a number line diagram.*

d. Compare two fractions with the same numerator or the same denominator by reasoning about their size. Recognize that comparisons are valid only when the two fractions refer to the same whole. Record the results of comparisons with the symbols >, =, < and justify the conclusions, e.g., by using a visual fraction model.

observing that 3/7 < ½. **Apply and extend previous understandings of multiplication and division to multiply and divide fractions.** **MGSE5.NF.3:** Interpret a fraction as division of the numerator by the denominator ($a/b = a \div b$). Solve word problems involving division of whole numbers leading to answers in the form of fractions or mixed numbers, e.g., by using visual fraction models or equations to represent the problem. Example: 3/5 can be interpreted as "3 divided by 5 and as 3 shared by 5." **MGSE5.NF.4:** Apply and extend previous understandings of multiplication to multiply a fraction or whole number by a fraction. *a.* Apply and use understanding of multiplication to multiply a fraction or whole number by a fraction. Examples: a/b x q as a/b x q/1 and a/b x c/d = ac/bd **b.** Find the area of a rectangle with fractional side lengths by tiling it with unit squares of the appropriate unit fraction side lengths, and show that the area is the same as would be found by multiplying the side lengths.	denominator in more than one way, recording each decomposition by an equation. Justify decomposition, e.g., by using a visual fraction model. *Examples: 3/8 = 1/8 + 1/8 + 1/8; 2 1/8 = 1 + 1 + 1/8; or 8/8 + 8/8 + 1/8* c. Add and subtract mixed numbers with like denominators, e.g., by replacing each mixed number with an equivalent fraction, and/or by using properties of operations and the relationship between addition and subtraction. d. Solve word problems involving addition and subtraction of fractions referring to the same whole and having like denominators, e.g. by using fraction models and equations to represent the problem. **MGSE4.NF.4:** Apply and extend previous understandings of multiplication to multiply a fraction by a whole number e.g., by using a visual such as a number line or area model.	

MGSE5:NF.5: Interpret multiplication as scaling (resizing), by: a. Comparing the size of a product to the size of one factor on the basis of the size of the other factor, without performing the indicated multiplication. Example: 4 x 10 is twice as large as 2 x 10. b. Explaining why multiplying a given number by a fraction greater than 1 results in a product greater than the given number (recognizing multiplication by whole numbers greater than 1 as a familiar case); explaining why multiplying a given number by a fraction less than 1 results in a product smaller than the given number; and relating the principle of fraction equivalence *a/b = (n×a)/(n×b)* to the effect of multiplying *a/b* by 1. **MGSE5.NF.6:** Solve real world problems involving multiplication of fractions and mixed numbers, e.g., by using visual fraction models or equations to represent the problem. **MGSE5.NF.7:** Apply and extend previous understandings of division to divide unit fractions by whole numbers and whole numbers by unit fractions.	*a.* Understand a fraction *a/b* as a multiple of 1/*b*. *For example, use visual fraction model to represent 5/4 as the product 5 x (1/4), recording the conclusion by the equation 5/4 = 5 x (1/4).* b. Understand a multiple of *a*/*b* as a multiple of 1/*b*, and use this understanding to multiply a fraction by a whole number. *For example, use a visual fraction model to express 3 × (2/5) as 6 × (1/5), recognizing this product as 6/5. (In general, n × (a/b) = (n × a)/b.)* c. Solve word problems involving multiplication of a fraction by a whole number, e.g., by using visual fraction models and equations to represent the problem. *For example, if each person at a party will eat 3/8 of a pound of roast beef, and there will be 5 people at the party, how many pounds of roast beef will be needed? Between what two whole numbers does your answer lie?* **Understand decimal notation for fractions, and compare decimal fractions.** **MGSE4.NF.5:** Express a fraction with denominator 10 as an equivalent fraction with denominator 100, and use this technique to add two fractions with respective denominators 10	

a. Interpret division of a unit fraction by a non-zero whole number, and compute such quotients. *For example, create a story context for (1/3) ÷ 4, and use a visual fraction model to show the quotient. Use the relationship between multiplication and division to explain that (1/3) ÷ 4 = 1/12 because (1/12) × 4 = 1/3.* *b.* Interpret division of a whole number by a unit fraction, and compute such quotients using reciprocals. *For example, create a story context for 4 ÷ (1/5), and use a visual fraction model to show the quotient. Use the relationship between multiplication and division to explain that 4 ÷ (1/5) = 20 because 20 × (1/5) = 4.* *c.* Solve real world problems involving division of unit fractions by non-zero whole numbers and division of whole numbers by unit fractions, e.g., by using visual fraction models and equations to represent the problem. *For example, how much chocolate will each person get if 3 people share 1/2 lb. of chocolate equally? How many 1/3-cup servings are in 2 cups of raisins?*	and 100. *For example, express 3/10 as 30/100, and add 3/10 + 4/100 = 34/100.* **MGSE4.NF.6:** Use decimal notation for fractions with denominators 10 or 100. *For example, rewrite 0.62 as 62/100; describe a length as 0.62 meters; locate 0.62 on a number line diagram.* **MGSE4.NF.7**: Compare two decimals to hundredths by reasoning about their size. Recognize that comparisons are valid only when the two decimals refer to the same whole. Record the results of comparisons with the symbols >, =, or <, and justify the conclusions, e.g., by using a visual model.	

Eagles Landing Christian Academy
Mathematics Standards of Excellence

Grade 2	Grade 1	Grade K-5
Measurement and Data	**Measurement and Data**	**Measurement and Data**
The student will **Measure and estimate lengths in standard units.** **MGSE2.MD.1:** Measure the length of an object by selecting and using appropriate tools such as rulers, yardsticks, meter sticks, and measuring tapes. Measure and draw a line to ¼ inch and to the nearest centimeter. **MGSE2.MD.2:** Measure the length of an object twice, using length units of different measurements; describe how the two measurements relate to the size of the unit chosen. Understand the relative size of units in different systems of measurement. For example, an inch is longer than a centimeter. (Students are not expected to convert between systems of measurement.) Measure the perimeter of a various shapes. **MGSE2.MD.3:** Estimate lengths using units of inches, feet, centimeters, and meters. **MGSE2.MD.4:** Measure to determine how much longer one object is than another, expressing the length difference in terms of a standard length unit. **Relate addition and subtraction to length.** **MGSE2.MD.5:** Use addition and subtraction	**The student will** **Measure lengths indirectly and by iterating length units.** **MGSE1.MD.1:** Order three objects by length; compare the length of two objects indirectly by using a third object. **MGSE1.MD.2:** Express the length of an object as a whole number of length units, by laying multiply copies of a shorter object (the length unit) end to end; understand that the length measurement of an object is the number of same-size length units that span it with no gaps or overlaps. (Iteration) Introduce measuring the length of an object in inches, feet, yards, and centimeters. Draw lines in a given number of inches or centimeters. Measure the perimeter of a rectangle. **Tell and write time** **MGSE1.MD.3:** Develop -Tell and write time in hours and half-hours using analog and digital clocks. Introduce telling time to 5 minute increments using a.m. & p.m. **Represent and interpret data**	**The student will** **Describe and compare measurable attributes.** **MGSEK.MD.1:** Describe several measurable attributes of an object, such as length, or weight. For example, a student may describe a shoe as, "This shoe is heavy! It is all really long!" Measure objects in inches. **MGSEK.MD.2:** Directly compare two objects with a measurable attribute in common, to see which object has "more of"/"less of" the attribute, and describe the difference. *For example, directly compare the heights of two children and describe one child as taller/shorter.* **Classify objects and count the number of objects in each category.** **MGSEK.MD.3:** Classify objects into given categories; count the numbers of objects in each category and sort the categories by count. **Work with Time and Money.** 1. Introduce - Tell and write time in hours and half-hours using analog and digital clocks. 2. Recognize the value of dollar, dime, nickel, and penny. 3. Recognize dollar and cent signs. 4. Add unlike coins – nickels and pennies.

within 100 to solve word problems involving lengths that are given in the same units, e.g., by using drawings (such as drawings of rulers) and equations with a symbol for the unknown number to represent the problem. **MGSE2.MD.6:** Represent whole numbers as lengths from 0 on a number line diagram with equally spaced points corresponding to the numbers 0, 1, 2, …, and represent whole-number sums and differences within 100 on a number line diagram. **Work with time and money.** **MGSE2.MD.7:** Master - Tell and write time from analog and digital clocks to the nearest five minutes, and to the nearest minute using a.m. and p.m. Determine lapse of time; going forward and backward – Time lapse of 15 minutes, 30 minutes, hours. **MGSE2.MD.8:** Solve word problems involving dollar bills, quarters, dimes, nickels, and pennies, using $ and ¢ symbols appropriately. *Example: If you have 2 dimes and 3 pennies, how many cents do you have?* Add and subtract dollars and cents within $50.00. Make change. **Represent and interpret data.** **MGSE2.MD.9:** Generate measurement data by measuring lengths of several objects to the	**MGSE1.MD.4:** Organize, represent, and interpret data with up to three categories; ask and answer questions about the total number of data points, how many in each category, and how many more or less are in one category than in another.	

nearest whole unit, or by making repeated measurements of the same object. Show the measurements by making a line plot, where the horizontal scale is marked off in whole-number units. **MGSE2.MD.10**: Draw a picture graph and a bar graph (with single-unit scale) to represent a data set with up to four categories. Solve simple put-together, take-apart, and compare problems using information presented in a bar graph.		

Eagles Landing Christian Academy
Mathematics Standards of Excellence

Grade 5	Grade 4	Grade 3
Measurement and Data	**Measurement and Data**	**Measurement and Data**
The student will **Convert like measurement units within a given measurement system.** **MGSE5.MD.1:** Convert among different-sized standard measurement units (mass, weight, length, time, etc.) within a given measurement system (customary and metric)(e.g., convert 5 cm to 0.05 m), and use these conversions in solving multi-step, real world problems. **Represent and interpret data.** **MGSE5.MD.2:** Make a line plot to display a data set of measurements in fractions of a unit (1/2, 1/4, 1/8). Use operations on fractions for this grade to solve problems involving information presented in line plots. *For example, given different measurements of liquid in identical beakers, find the amount of liquid each beaker would contain if the total amount in all the beakers were redistributed equally.* **Geometric Measurement: understand concepts of volume and relate volume to multiplication and division.** **MGSE5:MD.3:** Recognize volume as an attribute of solid figures and understand	**The student will** **Solve problems involving measurement and conversion of measurements from a larger unit to a smaller unit.** **MGSE4.MD.1:** Know relative sizes of measurement units within one system of units including km, m, cm; kg, g; lb., oz.; l, ml; hr., min., sec. **a.** Understand the relationship between gallons, cups, quarts, and pints. **b.** Express larger unit in terms of a smaller unit. ***c.*** Record measurement equivalents in a two column table. **MGSE4.MD.2:** Use the four operations to solve word problems involving distances, intervals of time, liquid volumes, masses of objects, and money, including problems involving simple fractions or decimals, and problems that require expressing measurements given in a larger unit in terms of a smaller unit. Represent measurement quantities using diagrams such as number line diagrams that feature a measurement scale. **MGSE4.MD.3:** Apply the area and perimeter formulas for rectangles in real world and mathematical problems. For example, find the width of a rectangular room given the area of	**The student will** **Solve problems involving measurement and estimation of intervals of time, liquid volumes, and masses of objects.** **MGSE3.MD.1:** Tell and write time to the nearest minute and measure elapsed time intervals in minutes. Solve word problems involving addition and subtraction of time intervals in minutes, e.g., by representing the problem on a number line diagram, drawing a pictorial representation on a clock face, etc. **MGSE3.MD.2:** Measure and estimate liquid volumes and masses of objects using standard units of grams (g), kilograms (kg), and liters (l).[17] Add, subtract, multiply, or divide to solve one-step word problems involving masses or volumes that are given in the same units, e.g., by using drawings (such as a beaker with a measurement scale) to represent the problem. **Represent and interpret data.** **MGSE3.MD.3:** Draw a scaled picture graph and a scaled bar graph to represent a data set with several categories. Solve one- and two-step "how many more" and "how many less" problems using information presented in scaled bar graphs. *For example, draw a bar graph in which each square in the bar graph might represent 5 pets.*

concepts of volume measurement.

a. A cube with side length 1 unit, called a "unit cube," is said to have "one cubic unit" of volume, and can be used to measure volume.
b. A solid figure which can be packed without gaps or overlaps using *n* unit cubes is said to have a volume of *n* cubic units.

MGSE5.MD.4: Measure volumes by counting unit cubes, using cubic cm, cubic in., cubic ft., and improvised units.

MGSE5.MD.5: Relate volume to the operations of multiplication and addition and solve real world and mathematical problems involving volume.

a. Find the volume of a right rectangular prism with whole-number side lengths by packing it with unit cubes, and show that the volume is the same as would be found by multiplying the edge lengths, equivalently by multiplying the height by the area of the base. Represent threefold whole-number products as volumes, e.g., to represent the associative property of multiplication.
b. Apply the formulas V = l × w × h and V = b × h for rectangular prisms to find volumes of right rectangular prisms with whole number edge

the flooring and the length, by viewing the area formula as a multiplication equation with an unknown factor.

Represent and interpret data.

MGSE4.MD.4: Make a line plot to display a data set of measurements in fractions of a unit (1/2, 1/4, 1/8). Solve problems involving addition and subtraction of fractions by using information presented in line plots. *For example, from a line plot find and interpret the difference in length between the longest and shortest specimens in an insect collection.*

Geometric Measurement: understand concepts of angle and measure angles.

MGSE4.MD.5: Recognize angles as geometric shapes that are formed wherever two rays share a common endpoint, and understand concepts of angle measurement:

a. An angle is measured with reference to a circle with its center at the common endpoint of the rays, by considering the fraction of the circular arc between the points where the two rays intersect the circle. An angle that turns through 1/360 of a circle is called a "one-degree angle," and can be used to measure angles.
b. An angle that turns through *n* one-degree angles is said to have an

MGSE3.MD.4: Generate measurement data by measuring lengths using rulers marked with halves and fourths of an inch. Show the data by making a line plot, where the horizontal scale is marked off in appropriate units— whole numbers, halves, or quarters.

Geometric Measurement: understand concepts of area and relate area to multiplication and to addition.

MGSE3.MD.5: Recognize area as an attribute of plane figures and understand concepts of area measurement.

a. A square with side length 1 unit, called "a unit square," is said to have "one square unit" of area, and can be used to measure area.
b. A plane figure which can be covered without gaps or overlaps by *n* unit squares is said to have an area of *n* square units.

MGSE3.MD.6: Measure areas by counting unit squares (square cm, square m, square in., square ft., and improvised units).

MGSE3.MD.7: Relate area to the operations of multiplication and addition.

a. Find the area of a rectangle with whole-number side lengths by tiling it, and show that the area is the same as would be found by multiplying the side lengths.
b. Multiply side lengths to find areas of

lengths in the context of solving real world and mathematical problems. c. Recognize volume as additive. Find volumes of solid figures composed of two non-overlapping right rectangular prisms by adding the volumes of the non-overlapping parts, applying this technique to solve real world problems.	angle measure of *n* degrees. **MGSE4.MD.6:** Measure angles in whole-number degrees using a protractor. Sketch angles of specified measure. **MGSE4.MD.7:** Recognize angle measure as additive. When an angle is decomposed into non-overlapping parts, the angle measure of the whole is the sum of the angle measures of the parts. Solve addition and subtraction problems to find unknown angles on a diagram in real world and mathematical problems, e.g., by using an equation with a symbol for the unknown angle measure. **MGSE4.MD.8:** Recognize area as additive. Find areas of rectilinear figures by decomposing them into non-overlapping rectangles and adding the areas of the non-overlapping parts, applying this technique to solve real world problems.	rectangles with whole number side lengths in the context of solving real world and mathematical problems, and represent whole-number products as rectangular areas in mathematical reasoning. c. Use tiling to show in a concrete case that the area of a rectangle with whole-number side lengths a and $b + c$ is the sum of $a \times b$ and $a \times c$. Use area models to represent the distributive property in mathematical reasoning. **Geometric measurement: recognize perimeter as an attribute of plane figures and distinguish between linear and area measures.** **MGSE3.MD.8:** Solve real world and mathematical problems involving perimeters of polygons, including finding the perimeter given the side lengths, finding an unknown side length, and exhibiting rectangles with the same perimeter and different areas or with the same area and different perimeters.

Grade 8	Grade 7	Grade 6
See Algebra I Standards	**The Number System**	**The Number System**
	The student will **Apply and extend previous understandings of operations with fractions to add, subtract, multiply, and divide rational numbers** **MGSE7.NS.1** Demonstrates the ability to apply and extend previous understanding of addition and subtraction to add and subtract rational numbers; represent addition and subtraction on a horizontal or vertical number line diagram. **MGSE7NS.1a** Show that a number and its opposite have a sum of 0 (are additive inverses). Describe situations in which opposite quantities combine to make 0. For example, your bank account balance is -$25.00. You deposit $25.00 into your account. The net balance is $0.00 **MGSE7NS.1b** Demonstrates an understand p + q as the number located a distance |q| from p, in the positive or negative direction depending on whether q is positive or negative. Demonstrates the ability to Interpret sums of rational numbers by	**The student will** **Apply and extend previous understandings of multiplication and division to dive fractions by fractions.** **MGSE6.NS.1** Demonstrates the ability to interpret and compute quotients of fractions, and solve word problems involving division of fractions by fractions including reasoning strategies such as using visual fraction models and equations to represent the problem. For example: • Create a story context for (2/3) ÷ (3/4) and use a visual fraction model to show the quotient • Use the relationship between multiplication and division to explain that (2/3) ÷ (3/4) = 8/9 because ¾ of 8/9 is 2/3. (In general, (a/b) ÷ (c/d) = ad/bc. • How much chocolate will each person get if 3 people share ½ lb of chocolate equally? • How many ¾-cup servings are in 2/3 of a cup of yogurt? • How wide is a rectangular strip of land with length ¾ mi and area ½ square mi? **MGSE6.NS.2** Demonstrates the ability to fluently divide multi-digit numbers using the standard algorithm. **MGSE6.NS.3** Demonstrates the ability to fluently add, subtract, multiply, and divide multi-digit

	describing real-world contexts**.** **MGSE7NS.1c** Demonstrates an understanding that subtraction of rational numbers is adding the additive inverse, p-q=p+(-q). Demonstrates the ability to show that the distance between two rational numbers on the number line is the absolute value of their difference, and apply this principle in real-world contexts.	decimals using the standard algorithm for each operation. **MGSE6.NS.4** Masters the ability to find common multiples of two whole numbers less than or equal to 12 and the common factors of two whole numbers less than or equal to 100. a. Find the greatest common factor of 2 whole numbers and use the distributive property to express a sum of two whole numbers 1-100 with a common factor as a multiple of a sum of two whole numbers with no common factors. (GCF) Example: 36+8=4(9+2) b. Apply the least common multiple of two whole numbers less than or equal to 12 to solve real-world problems. **MGSE6.NS.5** Understand that positive and negative numbers are used together to describe quantities having opposite directions or values (e.g. temperature above/below zero, elevation above/below sea level, credits/debits, positive/negative electric charge); use positive and negative numbers to represent quantities in real-world contexts, explaining the meaning of 0 in each situation. **MGSE6.NS.6** Demonstrates understanding of a rational number as a point on the number line. Demonstrates the ability to extend number line diagrams and coordinate axes familiar from previous grades to represent points on the line and in the plane with negative number coordinates. **MGSE6.NS.6a** Demonstrates the ability to recognize opposite signs of numbers as

		indicating location on opposite sides of 0 on the number line; recognize that the opposite of a number is the number itself, e.g. -(-3) = 3, and that 0 is its own opposite. **MGSE6.NS.6b** Demonstrates an understanding of signs of numbers in ordered pairs as indicating locations in quadrants of the coordinate plane; recognize that when two ordered pairs differ only by signs, the locations of the points are related by reflections across one or both axes. **MGSE6.NS.6c** Demonstrates the ability to find and position integers and other rational numbers on a horizontal or vertical number line diagram; find and position pairs of integers and other rational numbers on a coordinate plane. **MGSE6.NS.7** Demonstrates an understanding of ordering and absolute value of rational numbers. **MGSE6.NS.7a** Demonstrates the ability to interpret statements of inequality as statements about the relative position of two numbers on a number line diagram. For example, interpret -3 > -7 as a statement that -3 is located to the right of -7 on a number line oriented from left to right. **MGSE6.NS.7b** Demonstrates the ability to write, interpret, and explain statements of order

		for rational numbers in real-world contexts. For example, write -3°C > -7°C to express the fact that -3°C is warmer than -7°C. **MGSE6.NS.7c** Demonstrates an understanding of the absolute value of a rational number as its distance from 0 on the number line; demonstrates the ability to interpret absolute value as magnitude for a positive or negative quantity in a real-world situation. For example, for an account balance of -30 dollars, write |-30| = 30 to describe the size of the debt in dollars. **MGSE6.NS.7d** Demonstrates the ability to distinguish comparisons of absolute value from statements about order. For example, recognize that an account balance less than -30 dollars represents a debt greater than 30 dollars. **MGSE6.NS.8** Demonstrates the ability to solve real-world and mathematical problems by graphing points in all four quadrants of the coordinate plane. Demonstrates the ability to use coordinates and absolute value to find distances between points with the same first coordinate or the same second coordinate. **MGSE7.NS.1** Demonstrates the ability to apply and extend previous understandings of addition and subtraction to add and subtract rational numbers; represent addition and subtraction on a horizontal or vertical number line diagram. **MGSE7.NS.1a** Demonstrates the ability to

		show that a number and its opposite have a sum of 0 (are additive inverses). Describe situations in which opposite quantities combine to make 0. For example, your bank account balance is -$25.00. You deposit $25.00 into your account. The net balance is $0.00 **MGSE7.NS.1b** Demonstrates an understanding of p + q as the number located a distance |q| from p, in the positive or negative direction depending on whether q is positive or negative. Interpret sums of rational numbers by describing real-world contexts. **MGSE7.NS.1c** Demonstrates an understanding that subtraction of rational numbers is adding the additive inverse, p - q = p + (-q). Show that the distance between two rational numbers on the number line is the absolute value of their difference, and apply this principle in real-world contexts. **MGSE7.NS.1d** Demonstrates the ability to apply properties of operations as strategies to add and subtract rational numbers. **MGSE7.NS.2**. Demonstrates the ability to apply and extend previous understandings of multiplication and division and of fractions to multiply and divide rational numbers. **MGSE7.NS.2a** Demonstrates the ability to

		understand that multiplication is extended from fractions to rational numbers by requiring that operations continue to satisfy the properties of operations, particularly the distributive property, leading to products such as (-1)(-1) = 1 and the rules for multiplying signed numbers. Interpret products of rational numbers by describing real-world contexts. **MGSE7.NS.2b** Demonstrates the ability to understand that integers can be divided, provided that the divisor is not zero, and every quotient of integers (with non-zero divisor) is a rational number. If p and q are integers then - (p/q) = (-p)/q = p/(-q). Demonstrates the ability to interpret quotients of rational numbers by describing real-world contexts. **MGSE7.NS.2c** Demonstrates the ability to apply properties of operations as strategies to multiply and divide rational numbers. **MGSE7.NS.2d** Demonstrates the ability to convert a rational number to a decimal using long division; know that the decimal form of a rational number terminates in 0s or eventually repeats. **MGSE7.NS.3** Demonstrates the ability to solve real-world and mathematical problems involving the four operations with rational numbers.

Grade 8	Grade 7	Grade 6
See Algebra I Standards	**Ratios and Proportional Relationships**	**Ratios and Proportional Relationships**
	The student will **Analyze proportional relationships and use them to solve real-world and mathematical problems.** **MGSE7.RP.1** Demonstrates the ability to compute unit rates associated with ratios of fractions, including ratios of lengths, areas and other quantities measured in different units. For example, if a person walks ½ mile in each ¼ hour, compute the unit rate as a complex fraction (1/2)(1/4) miles per hour, equivalently 2 miles per hour. **MGSE7.RP.2** Demonstrates the ability to recognize and represent proportional relationships between quantities. **MGSE7.RP.2a** Demonstrates the ability to decide whether two quantities are in a proportional relationship, e.g., by testing for equivalent ratios in a table or graphing on a coordinate plane and observing	**The student will** **Understand ratio concepts and use ratio reasoning to solve problems.** **MGSE6.RP.1** Demonstrate an understanding of the concept of a ratio and use ratio language to describe a ratio relationship between two quantities. For example, "The ratio of wings to beaks in the bird house at the zoo was 2:1, because for every 2 wings there was 1 beak." "For every vote candidate A received, candidate C received nearly three votes." **MGSE6.RP.2** Demonstrate an understanding of the concept of a unit rate a/b associated with a ratio a:b with b not equal to 0and use rate language in context of a ratio relationship. For example, "This recipe has a ratio of 3 cups of flour to 4 cups of sugar, so there is ¾ cup of flour for each cup of sugar." "We paid $75 for 15 hamburgers, which is a rate of %5 per hamburger." **MGSE6.RP.3** Demonstrates the knowledge to use ratio and rate reasoning to solve real-world and mathematical problems, using strategies such as tables of equivalent ratios, tape diagrams (bar models), double number line diagrams, and/or equations. **MGSE6.RP.3a** Demonstrate the knowledge to make tables of equivalent ratios relating quantities with whole-

	whether the graph is a straight line through the origin. **MGSE7.RP.2b** Demonstrates the ability to identify the constant of proportionality (unit rate) in tables, graphs, equations, diagrams, and verbal description of proportional relationship. **MGSE7.RP.2c** Demonstrates the ability to represent proportional relationships by equations. For example, if total cost t is proportional to the number n of items purchased at a constant price p, the relationship between the total cost and the number of items can be expressed as t = pm. **MGSE7.RP.2d** Demonstrates the ability to explain what a point (x,y) on the graph of a proportional relationship means in terms of the situation, with special attention to the points (0,0) and (1,r) where r is the unit rate. **MGSE7.RP.3** Demonstrates the ability to use proportional relationships to solve multistep ratio	number measurements, find missing values in the tables, and plot the pairs of values on the coordinate plane. Demonstrates the knowledge to use tables to compare ratios. **MGSE6.RP.3b** Demonstrates the knowledge to solve unit rate problems including those involving unit pricing and constant speed. For example, If it took 7 hours to mow 4 lawns, then at that rate, how many lawns could be mowed in 35 hours? At what rate were lawns being mowed? **MGSE6.RP.3c** Demonstrates the knowledge to find a percent of a quantity as a rate per 100 (e.g., 30% of a quantity means 30/100 times the quantity); given a percent, solve problems involving finding the whole given a part and the part given a whole. **MGSE6RP.3d** Demonstrates the knowledge that given a conversion factor, use ratio reasoning to convert measurement units within one system of measurement and between two systems of measurements (customary and metric); manipulate and transform units appropriately when multiplying or dividing quantities. For example, given 1 in. = 2.54 cm, how many centimeters are in 6 inches?

	and percent problems. Examples: simple interest, tax, markups and markdowns, gratuities and commissions, and fees.	

Eagles Landing Christian Academy
Mathematics Standards of Excellence

8th Grade	7th Grade	6th Grade
See Algebra I Standards	**Expressions and Equations**	**Expressions and Equations**
	The student will **Use properties of operations to generate equivalent expressions.** **MGCE6.EE.2c** Develop evaluating expressions at specific values for the variables. Include expressions that arise from formulas in real-world problems. Perform arithmetic operations, including those involving whole-number exponents, in the conventional order when there are no parentheses to specify a particular order (Order of Operations). **MGSE6.EE.3** Master applying the properties of operations to generate equivalent expressions. For example, apply the distributive property to the expressions 3(2+x) to produce the equivalent expressions 6+3x; apply the distributive property of the expression 24x+18y to produce the equivalent expression 6(4x+3y); apply properties of operations to y+y+y to produce the equivalent expressions 3y. **MGSE6.EE.4** Develop identifying when two expressions are equivalent (i.e., when the two expressions name the same numbers regardless of which value is substituted into them). For example,	**The student will** **Apply and extend previous understanding of arithmetic to algebraic expressions.** **MGSE6.EE.1** Master writing and evaluate numerical expressions involving whole-number exponents. **MGSE6.EE.2** Master writing, reading, and evaluating expressions in which letters stand for numbers. **MGSE6.EE.2a** Master writing expressions that record operations with numbers and with letters standing for numbers. For example, express the calculation "Subtract y from 5" as 5-y. **MGSE6.EE.2b** Master identifying parts of an expression using mathematical terms (sum, term, product, factor, quotient, coefficient); view one or more parts of an expression as a single entity. For example, describe the expression 2(8+7) as a product of two factors; view (8+7) as both a single entity and a sum of two terms. **MGSE6.EE.2c** Develop evaluating expressions at specific values for their variables. Include expressions that arise from formulas in real-world problems. Perform arithmetic operations, including

	the expressions y+y+y and 3y are equivalent because they name the same number regardless of which number y stands for. **MGSE6.EE.6** Master using variables to represent numbers and write expressions when solving real-world or mathematical problem; understand that a variable can represent an unknown number, or, depending on the purpose at hand, any number in a specified set. **MGSE6.EE.7** Develop solving real-world mathematical problems by writing and solving equations of the form x+p=q and px=q for cases in which p, q and x are all nonnegative rational numbers. **MGSE6.EE.7** Develop solving real-world mathematical problems by writing and solving equations of the form x+p=q and px=q for cases in which p, q and x are all nonnegative rational numbers. **MGSE6.EE.8** Develop writing an inequality of the form x>c or x<c to represent a constraint or condition in real-world or mathematical problem. Recognize that inequalities of the form	those involving whole-number exponents, in the conventional order when there are no parentheses to specify a particular order (Order of Operations). For example, use the formulas $V=s^3$ and $A=6s^2$ to find the volume and surface area of a cube with sides of length s= ½ . **MGSE6.EE.3** Develop and apply the properties of operations to generate equivalent expressions. For example, apply the distributive property to the expression 3 (2 + x) to produce the equivalent expression 6 + 3x; apply the distributive property to the expression 24x +18y to produce the equivalent expression 6(4x + 3y); apply properties of operations to y + y + y to produce the equivalent expression 3y. **MGSE6.EE.4** Introduce identifying when two expressions are equivalent (i.e. when the two expressions name the same number regardless of which value is substituted into them). For example, the expressions y + y + y and 3y are equivalent because they name the same number regardless of which number y stands for. **MGSE6.EE.5** Master solving an equation or inequality as a process of answering a question: which values from a specified set, if any, make the equation or inequality true? Use substitution to determine whether a given number in a specified set makes an equation or inequality true. **MGSE6.EE.6** Introduce using variables to represent numbers and write expressions when solving a real-world or mathematical problem;

	x>c or x<c have infinitely many solutions; represent solutions of such inequalities on number line diagrams. **MGSE6.EE.9** Introduce using variables to represent two quantities in a real-world problem that change in relationship to one another; write an equation to express one quantity, thought of as the dependent variable, in terms of the other quantity, thought of as the independent variable. Analyze the relationship between the dependent and independent variables using graphs and tables, and relate these to the equation. For example, in a problem involving motion at constant speed, list and graph ordered pairs of distances and times, and write the equation d=65t to represent the relationship between distance and time. **MGSE7.EE.1** Master applying properties of operations as strategies to add, subtract, factor, and expand linear expressions with rational coefficients. **MGSE7.EE.2** Develop their understanding that rewriting an expression in different forms in a problem context can shed light on the problem and how the quantities in it are related. For example, a+0.05a=1.05a means that "increase by 5%" is the same as "multiply by 1.05."	understand that a variable can represent an unknown number, or depending on the purpose at hand, any number in a specified set. **MGSE6.EE.7** Introduce solving real-world and mathematical problems by writing and solving equations of the form x + p = q and px = q for cases in which p, q and x are nonnegative rational numbers. **MGSE6.EE.8** Introduce writing an inequality of the form x is greater than c or x is less than c to represent a constraint or condition in a real-world or mathematical problem. Recognize that inequalities of the form x is greater than c or x is less than c have infinitely many solutions; represent solutions of such inequalities on number line diagrams. **MSGE6.EE.9** Use variables to represent two quantities in a real-world problem that change in relationship to one another. a. Write an equation to express one quantity, the dependent variable, in terms of the other quantity, the independent variable. b. Analyze the relationship between the dependent and independent variables using graphs an tables, and relate these to the equation. For example, in a problem involving motion at constant speed, list and graph ordered pairs of distances and times, and write the equation d = 65t to represent the relationship between distance and time.

	MGSE7.EE.3 Develop how to solve multi-step real-life and mathematical problems posed with positive and negative rational numbers in any form (whole numbers, fractions, and decimals), using tools strategically. Apply properties of operations as strategies to calculate with numbers in any form; convert between forms and appropriate; and assess the reasonableness of answers using mental computation and estimation strategies. For example: If a woman making $25 an hour gets a 10% raise, she will make an additional 1/10 of her salary an hour, or $2.50, for a new salary of $27.50. If you want to place a towel bar 9 ¾ inches long in the center of a door that is 27 ½ inches wide, you will need to place the bar about 9 inches from each edge; this estimate can be used as a check on the exact computation. **MGSE7.EE.4** Develop using variables to represent quantities in a real-world or mathematical problem, and construct simple equations and inequalities to solve problems by reasoning about the quantities. **MGSE7.EE.4a** Develop solving word problems leading to equations by the form px+q=r and p(x+q)=r, where p, q, and r are specific rational numbers. Solve equations of these forms fluently. Compare an algebraic solution to an arithmetic solution, identifying the sequence of the	

	operations used in each approach. For example, the perimeter of a rectangle is 54 cm. Its length is 6 cm. What is the width? **MGSE7.EE.4b** Develop solving word problems leading to inequalities of the form px+q>r or px+q<r, where p, q, and are specific rational numbers. Graph the solution set of the inequality and interpret it in the context of word problem. For example, as a salesperson, you are paid $50 per week plus $3 per sale. This week you want your pay to be at least $100. Write an inequality for the number of sales you need to make, and describe the solution. **MGSE8.EE.1** Introduce to know and apply the properties of integer exponents to generate equivalent numerical expressions. **MGSE8.EE.2** Introduce the use of square roots and cube root symbols to represent solutions to equations of the form x2=p and x3=p, where p is a positive rational number. Evaluate square roots of small perfect squares and cube roots of small perfect cubes. Know that 2 is irrational. **MGSE8.EE.3** Introduce to use numbers expressed in the form of a single digit times an integer power of 10 to estimate very large or very small quantities,	

	and to express how many times as much one is than the other. For example, estimate the population of the United States as 3x108and the population of the world as 7x109,and determine that the world population is more than 20 times larger. **MGSE8.EE.4** Introduce how to perform operations with numbers expressed in scientific notation, including problems where both decimal and scientific notation that are used. Use scientific notation and choose units of appropriate size for measurement of very large or very small quantities (e.g. use millimeters per year for seafloor spreading). Interpret scientific notation that has been generated by technology. **MGSE8.EE.5** Develop graphing of proportional relationships, interpreting the unit rate as the slope of the graph. Compare two different proportional relationships represented in different ways. For example, compare a distance-time graph to a distance-time equation to determine which of two moving objects has greater speed. **MGSE8.EE.6** Develop how to use similar triangles to explain why the slope m is the same between any two distinct point on a non-vertical line in the coordinate plane; derive the equation y=mx for a line through the origin and the equation y=mx+b for a line intercepting the vertical axis at b.	

	MGSE8.EE.7 Master solving linear equations in one variable. **MGSE8.EE.7a** Introduce giving examples of linear equations in one variable with one solution, infinitely many solutions, or no solutions. Show which of the possibilities is the case by successively transforming the given equation into simpler forms, until an equivalent equation of the form x=a, a=a, or a=b results (where a and b are different numbers). **MGSE8.EE.7b** Introduce solving linear equations with rational number coefficients, including equations whose solutions require explaining expressions using the distributive property and collecting like terms. **MGSE8.EE.8** Introduce how to analyze and solve pairs of simultaneous linear equations. **MGSE8.EE.8a** Introduce how to understand that solutions to a system of two linear equations in two variables correspond to points of intersection of their graph, because points of intersection of their graphs, because point of intersection satisfy both equations simultaneously.	

Eagles Landing Christian Academy
Mathematics Standards of Excellence

8th Grade	7th Grade	6th Grade
See Algebra I Standards	**Geometry**	**Geometry**
	The student will **MGSE6.G.2** Master finding the volume of a right rectangular prism with fractional edge lengths by packing it with unit cubes of the appropriate unit fraction edge lengths, and show that the volume is the same as would be found by multiplying the edge lengths of the prism. Apply the formulas V=lwh and V=bh to find volumes of right rectangular prisms with fractional edge lengths in the context of solving real-world and mathematical problems. **MGSE6.G.3** Master drawing polygons in the coordinate plane given coordinates for the vertices; use coordinates to find the length of a side joining points with the same first coordinate or the same second coordinate. Apply these techniques in the context of solving real-world and mathematical problems. **MGSE6.G.4** Master representing three-dimensional figures using nets made up of rectangles and triangles, and use the nets to find the surface area of these figures. Apply these techniques in the context of solving real-world and mathematical problems.	**The student will** **Solve real-world and mathematical problems involving area, surface area, and volume.** **MGSE6.G.1** Introducing finding the area of right triangles, other triangles, special quadrilaterals, and polygons by composing into rectangles or decomposing into triangles and other shapes; apply these techniques in the context of solving real-world and mathematical problems. **MGSE6.G.2** Develop the volume of a rectangular prism with fractional edge lengths by packing it with unit cubes of the appropriate unit fraction edge lengths, and show that the volume is the same as would be found by multiplying the edge lengths of the prism. Apply the formulas V = lwh and V = bh to find volumes of right rectangular prisms with fractional edge lengths in the context of solving real-world and mathematical problems. **MGSE6.G.3** Introduce drawing polygons in the coordinate plane given coordinates for the vertices; use coordinates to find the length of a side joining points with the same first coordinate or the same second coordinate. Apply these techniques in the context of solving real-world and mathematical problems. **MGSE6.G.4** Introduce representing three-dimensional figures using nets made up of

	MGSE7.G.1 Develop solving problems involving scale drawings of geometric figures, including computing actual lengths and areas from a scale drawing at a different scale. **MGSE7.G.2** Develop drawing (freehand, with ruler and protractor, and with technology) geometric shapes with given conditions. Focus on constructing triangles from three measures of angles or sides, noticing when the conditions determine a unique triangle, more than one triangle, or no triangle. **MGSE7.G.3** Introduce how to describe the two-dimensional figures that result from slicing three-dimensional figures, as in plane sections of right rectangular prisms and right rectangular pyramids. **MGSE7.G.4** Develop the knowledge of formulas for the area and circumference of a circle and use them to solve problems; given an informal derivation of the relationship between the circumference and area of a circle. **MGSE7.G.5** Introduce the use of facts about supplementary, complementary, vertical, and adjacent angles in a multi-step problem to write and solve simple equations for an unknown angle in a	rectangles and triangles, and use the nets to find the surface area of these figures. Apply these techniques in the context of solving real-world and mathematical problems. **MGSE7.G.1** Introduce solving problems involving scale drawings of geometric figures, including computing actual lengths and areas from a scale drawing and reproducing a scale drawing at a different scale. **MGSE7.G.2** Introduce drawing (freehand, with ruler and protractor, and with technology) geometric shapes with given conditions. Focus on constructing triangles from three measures of angles or sides, noticing when the conditions determine a unique triangle, more than one triangle, or no triangle. **MGSE7.G.4** Introduce the formulas for the area and circumference of a circle and use them to solve problems; give an informal derivation of the relationship between the circumference and area of a circle.

	figure. **MGSE7.G.6** Introduce solving real-world mathematical problems involving area, volume and surface area of two-and three-dimensional objects composed of triangles, quadrilateral, polygons, cubes and right prisms. **MGSE8.G.1** Introduce how to verify experimentally the properties of rotations, reflections, and translations: a. Lines are taken to lines, and line segments to line segments of the same length. b. Angles are taken to angles of the same measure. c. Parallel lines are taken to parallel lines. **MGSE8.G.6** Introduce how to explain a proof of the Pythagorean Theorem and its converse. **MGSE8.G.7** Introduce how to apply the Pythagorean Theorem to determine unknown side lengths in right triangles in real-world and mathematical problems in two and three dimensions. **MGSE8.G.9** Introduces the formulas for the volume of cones, cylinders, and spheres and use them to solve real-world and mathematical problems.	

Eagles Landing Christian Academy
Mathematics Standards of Excellence

8th Grade	7th Grade	6th Grade
See Algebra I Standards	**Statistics and Probability**	**Statistics and Probability**
	The student will **MGSE6.SP.1** Develop recognizing a statistical questions as one that anticipates variability in the data related to the question and accounts for it in the answers. For example, "How old am I?" is not a statistical question, but "How old are the students in my school?" is a statistical question because one anticipates variability in students' ages. **MGSE6.SP.2** Develop understanding that a set of data collected to answer a statistical question has a distribution which can be described by its center, spread, and overall shape. **MGSE6.SP.3** Develop recognizing that a measure of center for a numerical data set summarizes all of its values with a single number, while a measure of variation describes how its values vary with a single number. **MGSE6.SP.4** Develop displaying numerical data in pots on a number line, including dot plots, histograms, and box plots.	**The student will** **Develop understanding of statistical variability.** **MGSE6.SP.1** Introduce a statistical question as one that anticipates variability in the data related to the question and accounts for it in the answers. For example, "How old am I?" is not a statistical question, but "How old are the students in my school?" is a statistical question because one anticipates variability in students' ages. **MGSE6.SP.2** Introduce that a set of data collected to answer a statistical question has a distribution which can be described by its center, spread, and overall shape. **MGSE6.SP.3** Introduce that a measure of center for a numerical data set summarizes all of its values with a single number, while a measure of variation describes how its values vary with a single number. **MGSE6.SP.4** Introduce displaying numerical data in plots on a number line, including dot plots, histograms, and box plots.

	MGSE6.SP.5b. Develop describing the nature of the attribute under investigation, including how it was measured and its units of measurement. **MGSE6.SP.5c** Introduce giving quantitative measures of center (median and/or mean) and variability (interquartile range/or mean absolute deviation), as well as describing any overall pattern and any striking deviations from the overall pattern with reference to the context in which the data was gathered. **MGSE7.SP.1** Introduce the understanding that statistics can be used to gain information about a population by examining a sample of the population; generalizations about a population from a sample are valid only if the sample is representative of the population. Understand that random sampling tends to produce representative samples and support valid inferences. **MGSE7.SP.3** Introduce the use of data from a random sample to draw inferences about a population with an unknown characteristics of interest. Generate multiple samples (or simulated samples) or the same size to gauge the variation in estimates or predictions. For example, estimate the mean word length in a book by randomly sampling words from the book; predict the winner of a school election based on randomly sampled survey	**MGSE6.SP.5** Summarize numerical data sets in relation to their context, such as by: a. Reporting the number of observations. b. Describing the nature of the attribute under investigation, including how it was measured and its units of measurement. c. Giving quantitative measures of center (median and/or mode) and variability (interquartile range). d. Relating the choice of measures of center and variability to the shape of the data distribution and the context in which the data was gathered. **MCC9-12.A.APR.7** Introduce that rational expressions form a system analogous to the rational numbers, closed under addition, subtraction multiplication, and division by a nonzero rational expression; add, subtract, multiply, and divide rational expressions.

	data. Gauge how far off the estimate or predictions might be. **MGSE7.SP.6** Intro approximating the probability of a chance event by collecting data on the chance process that produces it and observing its long-run relative frequency, and predict the approximate relative frequency given the probability. For example, when rolling a number cube 600 times, predict that a 3 or 6 would be rolled roughly 200 times, but probably not exactly 200 times. **MGSE7.SP.7a** Introduce developing a uniform probability model by assigning equal probability to all outcomes, and use the model to determine probabilities of events. For example, if a student is selected at random from a class, find the probability that Jane will be selected and the probability that a girl will be selected. **MGSE7.SP.8c** Introduce designing and using a simulation to generate frequencies for compound events. For example, use random digits as a simulation tool to approximate the answer to the question: If 40% of donors have type A blood, what is the probability that it will take at least 4 donors to find one with type A blood?	

	MGSE8.G.1 Introduce verifying experimentally the properties of rotations, reflections, and translations: a. Lines are taken to lines, and line segments to line segments of the same length. b. Angles are taken to angles of the same measure. c. Parallel lines are taken to parallel lines. **MGSE8.SP.1** Introduce constructing and interpreting scatter plots for bivariate measurement data to investigate patterns of association between two quantities. Describe patterns such as clustering, outliers, positive or negative association, linear association, and nonlinear association.	

Eagles Landing Christian Academy
Mathematics Standards of Excellence

Grade 12	Grade 11	Grade 10	Grade 9	Grade 9
Calculus, AP Calc, AP Stats	**Trig and Honor's Pre-Calc**	**Algebra II**	**Geometry**	**Algebra I**
	Numbers and Quantity **The student will…** **MGSE.HS.N.CN4** . Represent complex numbers on the complex plane in rectangular and polar form (including real and imaginary numbers), and explain why the rectangular and polar forms of a given complex number represent the same number. **MGSE.HS.N.CN5**. Represent addition, subtraction, multiplication, and conjugation of complex numbers geometrically on the complex plane; use properties of this representation for computation. For example, $(-1+\sqrt{3}i)^3 = 8$ because $(-1+\sqrt{3}i)$ has modulus 2 and argument	**Numbers and Quantity** **The student will…** **MGSE.HS.N.RN1**. Explain how the definition of the meaning of rational exponents follows from extending the properties of integer exponents to those values, allowing for a notation for radicals in terms of rational exponents. For example, we define 51/3 to be the cube root of 5 because we want (51/3)3 = 5(1/3)3 to hold, so (51/3)3 must equal 5. **MGSE.HS.N.RN2**. Rewrite expressions involving radicals and rational exponents using the properties of exponents. **MGSE HS.N.RN3**. Explain why the sum or product of two rational numbers is rational; that the sum of a rational	**Numbers and Quantity** **The student will…** **MGSE.HS.N.Q1**. Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays. **MGSE.HS.N.Q2**. Define appropriate quantities for the purpose of descriptive modeling. **MGSE.HS.N.Q3**. Choose a level of accuracy appropriate to limitations on measurements when reporting quantities. **Geometry**	**Numbers and Quantity** **The student will…** **MGSE8.NS.1** Demonstrates the knowledge that numbers that are not rational are called irrational. Demonstrates the knowledge that that every number has a decimal expansion; Demonstrates the ability to (for rational numbers) show that the decimal expansion repeats eventually, and converts a decimal expansion which repeats eventually into a rational number. **MGSE8.NS.2** Demonstrates the use of rational approximations of irrational numbers to compare the size of irrational numbers, locate them approximately on a number line diagram, and estimate the value of

Grade 12	Grade 11	Grade 10	Grade 9	Grade 9
Calculus, AP Calc, AP Stats	**Trig and Honor's Pre-Calc**	**Algebra II**	**Geometry**	**Algebra I**
	120°. **MGSE.HS.N.CN6**. Calculate the distance between numbers in the complex plane as the modulus of the difference, and the midpoint of a segment as the average of the numbers at its endpoints. **MGSE.HS.N.VM1.** Recognize vector quantities as having both magnitude and direction. Represent vector quantities by directed line segments, and use appropriate symbols for vectors and their magnitudes (e.g., v, |v|, |v||, v). **MGSE.HS.N.VM2**. Find the components of a vector by subtracting the coordinates of an initial point from the coordinates of a terminal point. **MGSE.HS.N.VM3**. Solve	number and an irrational number is irrational; and that the product of a nonzero rational number and an irrational number is irrational. **MGSE.HS.N.CN1**. Know there is a complex number I such that $i^2 = -1$, and every complex number has the form a + bi with a and b real. **MGSE.HS.N.CN2**. Use the relation $i^2 = -1$ and the commutative, associative, and distributive properties to add, subtract, and multiply complex numbers. **MGSE.HS.N.CN3**. Find the conjugate of a complex number; use conjugates to find moduli and quotients of complex numbers. **MGSE.HS.N.CN7**. Solve quadratic equations with real coefficients that have complex solutions.	**MGSE.HS.G.CO1**. Know precise definitions of angle, circle, perpendicular line, parallel line, and line segment, based on the undefined notions of point, line, distance along a line, and distance around a circular arc. **MGSE.HS.G.CO2**. Represent transformations in the plane using, e.g., transparencies and geometry software; describe transformations as functions that take points in the plane as input and give other points as outputs. Compare transformations that preserve distance and angle to those that do not. **MGSE.HS.G.CO3**. Given a rectangle, parallelogram, trapezoid, or regular polygon, describe the rotations and reflections that carry it onto itself. **MGSE.HS.G.CO4**. Develop definitions of rotations, reflections, and translations in	expressions (e.g.2). **Algebra** **MGSE9-12.A.SSE.1a** Master the ability to interpreting parts of an expression, such as terms, factors, and coefficients. **MGSE9-12.A.SSE.1b**Master the ability to interpret complicated expressions by viewing one or more of their parts as a single entity. For example, interpret $P(1 + r)^n$as the product of P and a factor not depending on P. **MGSE9-12A.SSE.2**Be introduced to the use of the structure of an expression to identify ways to rewrite it. For example, see $x^4 - y^4$ as $(x^2)^2 - (y^2)^2$, thus recognizing it as a

Grade 12	Grade 11	Grade 10	Grade 9	Grade 9
Calculus, AP Calc, AP Stats	**Trig and Honor's Pre-Calc**	**Algebra II**	**Geometry**	**Algebra I**
	problems involving velocity and other quantities that can be represented by vectors. **MGSE.HS.N.VM4**. Add and subtract vectors. a. Add vectors end-to-end, component-wise, and by the parallelogram rule. Understand that the magnitude of a sum of two vectors is typically not the sum of the magnitudes. b. Given two vectors in magnitude and direction form, determine the magnitude and direction of their sum. c. Understand vector **v-w** as **v + (-w)**, where **–w** is the additive inverse of **w**, with the same magnitude as **w** and pointing in the opposite direction. Represent vector subtraction graphically by	**MGSE.HS.N.CN8**. Extend polynomial identities to the complex numbers. For example, $x^2 + 4$ as $(x + 2i)(x–2i)$. **MGSE.HS.N.CN9**. Know the Fundamental Theorem of Algebra; show that it is true for quadratic polynomials. **MGSE.HS.N.VM6**. Use matrices to represent and manipulate data, e.g., to represent payoffs or incidence relationships in a network. **MGSE.HS.N.VM7**. Multiply matrices by scalars to produce new matrices, e.g., as when all of the payoffs in a game are doubled. **MGSE.HS.N.VM8**. Add, subtract, and multiply matrices of appropriate dimensions. **MGSE.HS.N.VM9**. Understand that, unlike multiplication of	terms of angles, circles, perpendicular lines, parallel lines, and line segments. **MGSE.HS.G.CO5**. Given a geometric figure and a rotation, reflection, or translation, draw the transformed figure using, e.g., graph paper, tracing paper, or geometry software. Specify a sequence of transformations that will carry a given figure onto another. **MGSE.HS.G.CO6**. Use geometric descriptions of rigid motions to transform figures and to predict the effect of a given rigid motion on a given figure; given two figures, use the definition of congruence in terms of rigid motions to decide if they are congruent. **MGSE.HS.G.CO7**. Use the definition of congruence in terms of rigid motions to show that two triangles are congruent if and only if corresponding pairs of sides	difference of squares that can be factored as $(x^2 - y^2)(x^2 + y^2)$. **MGSE9-12A.SSE.3a**Be introduced to factoring a quadratic expression to reveal the zeroes of the function it defines. **MGSE9-12A.SSE.3b**Be introduced to completing the square in a quadratic expression to reveal the maximum or minimum value of the function it defines. **MGSE9-12.A.APR.1**Master the ability to understand that polynomials form a system analogous to the integers, namely they are closed under the operations of addition, subtraction, and multiplication; add, subtract, and multiply polynomials.

Grade 12	Grade 11	Grade 10	Grade 9	Grade 9
Calculus, AP Calc, AP Stats	**Trig and Honor's Pre-Calc**	**Algebra II**	**Geometry**	**Algebra I**
	connecting the tips in the appropriate order, and perform vector subtraction component-wise. **MGSE.HS.N.VM5**. Multiply a vector by a scalar. a. Represent scalar multiplication graphically by scaling vectors and possibly reversing their direction; perform scalar multiplication component-wise, e.g., as $c(Vx, Vy) = (cv_x, cv_y)$. b. Compute the magnitude of a scalar multiple c**v** using ||c**v**||=|c|v. Compute the direction of c**v** knowing that when |c|v ≠ 0, the direction of cv is either along **v** (for c > 0) or against **v** (for c < 0). **MGSE.HS.N.VM11**. Multiply a vector (regarded as a matrix with one column)	numbers, matrix multiplication for square matrices is not a commutative operation, but still satisfies the associative and distributive properties. **MGSE.HS.N.VM10**. Understand that the zero and identity matrices play a role in matrix addition and multiplication similar to the role of 0 and 1 in the real numbers. The determinant of a square matrix is nonzero if and only if the matrix has a multiplicative inverse. **MGSE.HS.N.Q1** . Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data	and corresponding pairs of angles are congruent. **MGSE.HS.G.CO8**. Explain how the criteria for triangle congruence (ASA, SAS, and SSS) follow from the definition of congruence in terms of rigid motions. **MGSE.HS.G.CO9**. Prove theorems about lines and angles. Theorems include vertical angles are congruent; when a transversal crosses parallel lines, alternate interior angles are congruent and corresponding angles are congruent; points on a perpendicular bisector of a line segment are exactly those equidistant from the segment's endpoints. **MGSE.HS.G.CO10**. Prove theorems about triangles. Theorems include: measures of interior angles of a triangle sum to 180˚; base angles of isosceles triangles are congruent; the segment	**MGSE9-12.A.APR.6**Be introduced to rewriting simple rational expressions in different forms; write a(x)/b(x) in the form q(x) + r(x)/b(x), where a(x), b(x), q(x), and r(x) are polynomials with the degree of r(x) less than the degree of b(x), using, ... long division... **MGSE9-12.A.APR.7**Understand that rational expressions form a system analogous to the rational numbers, closed under addition, subtraction, multiplication, and division by a nonzero rational expression; add, subtract, multiply and divide rational expressions. **MGSE9-12.A.CED.1** Create equations and inequalities in one variable and use them to solve

Grade 12	Grade 11	Grade 10	Grade 9	Grade 9
Calculus, AP Calc, AP Stats	**Trig and Honor's Pre-Calc**	**Algebra II**	**Geometry**	**Algebra I**
	by a matrix of suitable dimensions to produce another vector. Work with matrices as transformations of vectors. **MGSE.HS.N.VM12**. Work with 2x2 matrices as transformations of the plane, and interpret the absolute value of the determinant in terms of area. **MGSE.HS.N.Q1.** Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays. **MGSE.HS.N.Q2**. Define appropriate quantities for the purpose of descriptive	displays. **MGSE.HS.N.Q2**. Define appropriate quantities for the purpose of descriptive modeling. **MGSE.HS.N.Q3**. Choose a level of accuracy appropriate to limitations on measurements when reporting quantities. **Algebra** **MGSE.HS.A.SSE1**. Interpret expressions that represent a quantity in terms of its context. a. Interpret parts of an expression, such as terms, factors, and coefficients. b. Interpret complicated expression by viewing one or more of their parts as a single entity. **MGSE.HS.A.SSE2**. Use the structure of an expression to identify ways to rewrite	joining midpoints of two sides of a triangle is parallel to the third side and half the length; the medians of a triangle meet at a point. **MGSE.HS.G.CO11**. Prove theorems about parallelograms. Theorems include: opposite sides are congruent, opposite angles are congruent, the diagonals of parallelogram bisect each other, and conversely, rectangles are parallelograms with congruent diagonals. **MGSE.HS.G.CO12**. Make formal geometric constructions with a variety of tools and method (compass and straightedge, string, reflective devices, paper folding, dynamic geometric software, etc). Coping a segment; copying an angle; bisecting a segment; bisecting an angle; constructing perpendicular lines, including the perpendicular bisector of a	problems. Include equations arising from linear and quadratic functions, and simple rational functions. **MGSE9-12.A.CED.2** Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales. **MGSE9-12.A.CED.3** Represent constraints by equations or inequalities, and by systems of equations and/or inequalities, and interpret solutions as viable or nonviable options in a modeling context. For example, represent inequalities describing nutritional and cost constraints on combinations of different foods. (graphing,

Grade 12	Grade 11	Grade 10	Grade 9	Grade 9
Calculus, AP Calc, AP Stats	**Trig and Honor's Pre-Calc**	**Algebra II**	**Geometry**	**Algebra I**
	modeling. **MGSE.HS.N.Q3.** Choose a level of accuracy appropriate to limitations on measurements when reporting quantities. **Functions** **MGSE.HS.F.IF4**. For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship. **MGSE.HS.F.IF5**. Relate the domain of a function to its graph and, where applicable, to the quantitative relationship it describes.	it. Example: writing binomials as a different of squares. **MGSE.HS.A.SSE3**. Choose and produce an equivalent form of an expression to reveal and explain properties of the quantity represented by the expression. a. Factor a quadratic expression to reveal the zeros of the function it defines. b. Complete the square in a quadratic expression to reveal the max or min value of the function it defines. c. Use the properties of exponents to transform expressions for exponential functions. **MGSE.HS.A.SSE4**. Derive the formula for the sum of a finite geometric series (when the common ratio is not 1), and use the formula	line segment; and constructing a line parallel to a given line through a point not on the line. **MGSE.HS.G.CO13**. Construct an equilateral triangle, a square, and a regular hexagon inscribed in a circle. **MGSE.HS.G.SRT1**. Verify experimentally the properties of dilations given by a center and a scale factor. a. A dilation takes a line not passing through the center of the dilation to a parallel line, and leaves a line passing through the center unchanged. b. The dilation of a line segment is longer or shorter in the ratio given by the scale factor. **MGSE.HS.G.SRT2**. Given two figures, use the definition of	elimination, substitution) **MGSE9-12.A.CED.4** Introduce rearranging formulas to highlight a quantity of interest, using the same reasoning as in solving equations. For example, rearrange Ohm's law V = IR to highlight resistance R. **MGSE9-12.A.REI.1** Explain each step in solving a simple equation as following from the equality of numbers asserted at the previous step, starting from the assumption that the original equation has a solution. Construct a viable argument to justify a solution method. **MGSE9-12.A.REI.2** Introduce solving simple rational and radical equations in one variable, and give examples showing

Grade 12	Grade 11	Grade 10	Grade 9	Grade 9
Calculus, AP Calc, AP Stats	**Trig and Honor's Pre-Calc**	**Algebra II**	**Geometry**	**Algebra I**
	MGSE.HS.F.IF6. Calculate and interpret the average rate of change of a function (presented symbolically or as a table) over a specified interval. Estimate the rate of change from a graph. **MGSE.HS.F.IF7.** Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases. b. Graph square root, cube root, and piecewise-defined functions, including step functions and absolute value functions. d. Graph rational functions, identifying zeros and asymptotes when suitable factorization are available, and showing end	to solve problems. **MGSE.HS.A.APR1**. Understand that polynomials form a system analogous to the integers, namely, they are closed under the operations of addition, subtraction, and multiplication; add, subtract, and multiply polynomials. **MGSE.HS.A.APR2**. Know and apply the Remainder Theorem. **MGSE.HS.A.APR3**. Identify zeros of polynomials when suitable factorizations are available, and use the zeros to construct a rough graph of the function defined by the polynomial. **MGSE.HS.A.APR4**. Prove polynomial identities and use them to describe numerical relationships. **MGSE.HS.A.APR5**. Know and	similarity in terms of similarity transformations to decide if they are similar; explain using similarity transformations the meaning of similarity for triangles as the equality of all corresponding pairs of angles and the proportionality of all corresponding pairs of sides. **MGSE.HS.G.SRT3**. Use the properties of similarity transformations to establish the AA criterion for two triangles to be similar. **MGSE.HS.G.SRT4**. Prove theorems about triangles. Theorems include: a line parallel to one side of a triangle divides the other two proportionally, and conversely; the Pythagorean Theorem proved using triangle similarity. **MGSE.HS.G.SRT5**. Use congruence and similarity criteria for triangles to solve problems and to prove relationships in geometric	how extraneous solutions may arise. **MGSE9-12.A.REI.3** Solve linear equations and inequalities in one variable, including equations with coefficients represented by letters. **MGSE9-12.A.REI.4** Introduce solving quadratic equations in one variable. **MGSE9-12.A.REI.4a** Introduce using the method of completing the square to transform any quadratic equation in (x) into an equation of the form (x-p)^2 = q that has the same solutions. Derive the quadratic formula from this form. **MGSE9-12.A.REI.4b** Introduce solving quadratic equations by inspection, taking square roots, completing the square, the

Grade 12	Grade 11	Grade 10	Grade 9	Grade 9
Calculus, AP Calc, AP Stats	**Trig and Honor's Pre-Calc**	**Algebra II**	**Geometry**	**Algebra I**
	behavior. e. Graph trigonometric functions, showing period, midline, and amplitude. **MGSE.HS.F.BF3**. Identify the effects of transformations on trigonometric graphs. **MGSE.HS.F.BF4.** Find inverse functions. a. Solve an equation of the form f(x) = c for a simple function f that has as inverse and write an expression for the inverse. b. Verify by composition that one function is the inverse of another. c. Read values of an inverse function from a graph or a table, given that the function has an inverse.	apply the Binomial Theorem for the expansion of binomials in powers of x and y for a positive integer, where x and y are any numbers, with coefficients determined for example by Pascal's Triangle. **MGSE.HS.A.APR6**. Rewrite simple rational expressions in different forms. Divide polynomials where the degree in the numerator is less than the degree in the denominator by long division and synthetic division. **MGSE.HS.A.APR7**. Understand that rational expressions form a system analogous to the rational numbers, closed under addition, subtraction, multiplication, and division by a nonzero rational expression; add, subtract, multiply and divide rational expressions. **MGSE.HS.A.CED1**. Create	figures. **MGSE.HS.G.C1**. Prove that all circles are similar. **MGSE.HS.G.C2**. Identify and describe relationships among inscribed angles, radii, and chords. Include the relationships between central, inscribed, and circumscribed angles; inscribed angles on a diameter are right angles; the radius of a circle is perpendicular to the tangent where the radius intersects the circle. **MGSE.HS.G.C3**. Construct the inscribed and circumscribed circles of a triangle, and prove properties of angles for a quadrilateral inscribed in a circle. **MGSE.HS.G.C4**. Construct a tangent line from a point outside a given circle to the circle. **MGSE.HS.G.C5**. Derive using	quadratic formula and factoring, as appropriate to the initial form of the equation. Recognize when the quadratic formula gives complex solutions and write them as a+bi for real numbers a and b. **MGSE9-12.A.REI.5** Introduce and prove that given a system of two equations in two variables, replacing one equation by the sum of that equation and a multiple of the produces a system with the same solutions using substitution. **MGSE9-12.A.REI.6** Introduce solving systems of linear equations exactly and approximately, using graphing, focusing on pairs of linear equations in two variables.

Grade 12	Grade 11	Grade 10	Grade 9	Grade 9
Calculus, AP Calc, AP Stats	**Trig and Honor's Pre-Calc**	**Algebra II**	**Geometry**	**Algebra I**
	d. Produce an invertible function from a non-invertible function by restricting the domain. **MGSE.HS.F.BF5.** Understand the inverse relationship between exponents and logarithms and use this relationship to solve problems involving logarithms and exponents. **MGSE.HS.F.TF1**. Understand radian measure of an angle as the length of the arc on the unit circle subtended by the angle. **MGSE.HS.F.TF2.** Explain how the unit circle in the coordinate plane enables the extension of trigonometric functions to all real numbers, interpreted as radian measures of angles traversed counterclockwise around the unit circle.	equations and inequalities and use them solve problems. Include linear, quadratics, rational, and exponential functions. **MGSE.HS.A.CED2**. Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales. **MGSE.HS.A.CED3**. Represent constraints by equations or inequalities, and by systems of equations and/or inequalities, and interpret solutions as viable or nonviable options in a modeling context. **MGSE.HS.A.CED4**. Rearrange formulas to highlight a quantity of interest, using the same reasoning as in solving equations. **MGSE.HS.A.REI1**. Explain each step in solving a simple	similarity the fact that the length of the arc intercepted by an angle is proportional to the radius, and define the radian measure of the angle as the constant of proportionality; derive the formula for the area of a sector. **MGSE.HS.G.GPE4**. Use coordinates to prove simple geometric theorems algebraically. For example, prove or disprove that a figure defined by four given points in the coordinate plane is a rectangle; prove or disprove that the point $(1, \sqrt{3})$ lies on the circle centered at the origin and containing the point (0,2). **MGSE.HS.G.GPE5**. Prove the slope criteria for a parallel and perpendicular lines and use them to solve geometric problems (e.g., find the equation of a line parallel or perpendicular to a given line	**MGSE9-12.A.REI.7** Solve a simple system consisting of a linear equation and a quadratic equation in two variables algebraically and graphically. **MGSE9-12.A.REI.10** Master the understanding that the graph of an equation in two variables is the set of all its solutions plotted in the coordinate plane, often forming a curve (which could be a line.) **MGSE9-12.A.REI.11** Explain why the x-coordinates of the points where the graphs of the equations y = f(x) and y = g(x) intersect are the solutions of the equation f(x) = g(x); find the solution approximately, e.g, using technology to graph the functions, make tables of values, or find successive approximations.

Grade 12	Grade 11	Grade 10	Grade 9	Grade 9
Calculus, AP Calc, AP Stats	**Trig and Honor's Pre-Calc**	**Algebra II**	**Geometry**	**Algebra I**
	MGSE.HS.F.TF3. Use special triangles to determine geometrically the values of sine, cosine, tangent for π/3, π/4, and π/6, and use the unit circle to express the value of sine, cosine, and tangent for π-x, π+x, and 2π-x in terms of their values for x, and where x is any real number. **MGSE.HS.F.TF4.** Use the unit circle to explain symmetry (odd and even) and periodicity of trigonometric functions. **MGSE.HS.F.TF5.** Choose trigonometric functions to model periodic phenomena with specified amplitude, frequency, and midline. **MGSE HS.F.TF6.** Understand that restricting a trigonometric function to a domain on which it is always increasing or always decreasing allows	equation as following from the equality of numbers asserted at the previous step, starting from the assumption that the original equation has a solution. Construct a viable argument to justify a solution method. **MGSE.HS.A.REI2**. Solve simple rational and radical equations in one variable, and give examples showing how extraneous solutions may arise. **MGSE.HS.A.REI3**. Solve linear equations and inequalities in one variable, including equations with coefficients represented by letters. **MGSE.HS.A.REI4**. Solve quadratic equations in one variable.	that passes through a given point). **MGSE.HS.G.GPE6**. Find the point on a directed line segment between two given points that partitions the segment in a given ratio. **MGSE.HS.G.GPE7**. Use coordinates to compute perimeters of polygons and areas of triangles and rectangles, e.g., using the distance formula. **MGSE.HS.G.GMD1**. Give an informal argument for the formulas for the circumference of a circle, area of a circle, volume of a cyclinder, pyramid, and cone. Use dissection arguments, Cavalieri's principle, an informal limit arguments. **MGSE.HS.G.GMD2**. Give an informal argument using Cavalieri's principle for the formulas for the volume of a	Include cases where f(x) and/or g(x) are linear and absolute value. **MGSE9-12.A.REI.12** Graph the solutions to a linear inequality in two variables as a half-plane and graph the solution set to a system of linear inequalities in two variables as the intersection of the corresponding half-planes. **MGSE8.EE.1** Demonstrate the ability to apply the properties of integer exponents to generate equivalent numerical expressions. For example, $3^2 \times 3^{(-5)} = 3^{(-3)} = \frac{1}{3^3} = \frac{1}{27}$. **MGSE8.EE.2** Demonstrate the ability to use square roots and cube root symbols to represent solutions to equations of the form $x^2 = p$ and $x^3 = p$

Grade 12	Grade 11	Grade 10	Grade 9	Grade 9
Calculus, AP Calc, AP Stats	**Trig and Honor's Pre-Calc**	**Algebra II**	**Geometry**	**Algebra I**
	its inverse to be constructed. **MGSE.HS.F.TF7.** Use inverse functions to solve trigonometric equations that arise in modeling contexts; evaluate the solutions using technology, and interpret them in terms of the context. **MGSE.HS.F.TF8.** Prove the Pythagorean identity $\sin^2 x + \cos^2 x = 1$ and use it find sin(x), cos(x), or tan(x) given sin(x), cos(x), or tan(x) and the quadrant of the angle **MGSE.HS.F.TF9.** Prove the addition and subtraction formulas for sine, cosine, and tangent and use them to solve problems.	a. Solve quadratic equations using the method of completing the square to transform any quadratic equation of the form $(x-p)^2=q$ that has the same solutions. Derive the quadratic formula from this form. b. Solve quadratic equations by inspection taking square roots, completing the square, the quadratic formula and factoring, as appropriate to the initial form of the equation. Recognize when the quadratic formula gives complex solutions and write them as a + bi for real numbers of a and b. **MGSE.HS.A.REI5**. Prove that, given a system of two equations in two variables, replacing one equation by the sum of that equation and a multiple of the other produces a system with the	sphere and other solid figures. **MGSE.HS.G.GMD3**. Use volume formulas for cylinders, pyramids, cones, and spheres to solve problems. **MGSE.HS.G.GMD4**. Identify the shapes of two-dimensional cross-sections of three-dimensional objects, and identify three-dimensional objects generated by rotations of two-dimensional objects. **MGSE.HS.G.MG1**. Use geometric shapes, their measures, and their properties to describe objects (e.g., modeling a tree trunk or a human torso as a cylinder). **MGSE.HS.G.MG2**. Apply concepts of density based on area and volume in modeling situations (e.g., persons per square mile, BTUs per cubic foot). **MGSE.HS.G.MG3**. Apply	where p is a positive rational number. Evaluate square roots and cube roots of small perfect cubes. Know that $\sqrt{2}$is irrational. **MGSE8.EE.3**Master the ability to use numbers expressed in the form of a single digit times an integer power of 10 to estimate very large or very small quantities, and to express how many times as much one is than the other. For example estimate the population of the Unites States as $3 \times 10^8$and the population of the world as 7×10^9, and determine that the world population is more than 20 times larger. **MGSE8.EE.4**Master the ability to perform operations with numbers expressed in scientific notation, including problems where both

Grade 12	Grade 11	Grade 10	Grade 9	Grade 9
Calculus, AP Calc, AP Stats	**Trig and Honor's Pre-Calc**	**Algebra II**	**Geometry**	**Algebra I**
	Geometry **MGSE.HS.G.SRT6**. Understand that by similarity, side ratios in right triangles are properties of the angles in the triangle, leading to definitions of trigonometric ratios for acute angles. **MGSE.HS.G.SRT7**. Explain and use the relationship between the sine and cosine of complementary angles. **MGSE.HS.G.SRT8**. Use trigonometric ratios and the Pythagorean Theorem to solve right triangles in applied problems. **MGSE.HS.G.SRT9**. Derive the formula A= ½ absin(c) for the area of a triangle by drawing an auxillary	same solutions. **MGSE.HS.A.REI6**. Solve systems of linear equations exactly and approximately (with graphs) focusing on pairs of linear equations in two variables. **MGSE.HS.A.REI7**. Solve a simple system consisting of a linear equation and a quadratic equation in two variables algebraically and graphically. **MGSE.HS.A.REI8**. Represent a system of linear equations as a single matrix equation in vector variable. **MGSE.HS.A.REI9**. Find the inverse of a matrix if it exists and use it to solve systems of linear equations (using technology for matrices of dimension 3x3 or greater.) **MGSE.HS.A.REI10**. Understand that the graph of an	geometric methods to solve design problems (e.g., designing an object or structure to satisfy physical constraints or minimize cost; working with typographic grid systems based on ratios). **Statistics and Probability** **MGSE.HS.S.ID1**. Represent data with plots on the real number line (dot plots, histograms, and box plots). **MGSE.HS.S.CP1**. Describe events as subsets of a sample space (the set of outcomes) using characteristics (or categories) of the outcomes, or as unions, intersections, or complements of other events. **MGSE.HS.S.CP2.** Understand that two events A and B are independent if the	decimal and scientific notation are used. Used scientific notation and choose units of appropriate size for measurements of very large or very small quantities (e.g., use millimeters per year for seafloor spreading). Interpret scientific notation that has been generated by technology. **MGSE8.EE.5** Master the ability to graph proportional relationships, interpreting unit rate as the slope of the graph. Compare two different proportional relationships represented in different ways. For example, compare a distance-time graph to distance-time equation to determine which of the two moving objects has greater speed. **MGSE8.EE.6** Use similar triangles to explain why the

Grade 12	Grade 11	Grade 10	Grade 9	Grade 9
Calculus, AP Calc, AP Stats	**Trig and Honor's Pre-Calc**	**Algebra II**	**Geometry**	**Algebra I**
	line from a vertex perpendicular to the opposite side. **MGSE.HS.G.SRT10**. Prove the Laws of Sines and Cosines and use them to solve problems. **MGSE.HS.G.SRT11**. Understand and apply the Law of Sines and the Law of Cosines to find unknown measurements in right and non-right triangles (e.g., surveying problems, resultant forces) **Statistics and Probability** **MGSE.HS.S.ID1.** Represent data with plots on the real number line (dot plots, histograms, and box plots). **MGSE.HS.S.ID2.** Use statistics appropriate to the shape of the data distribution to compare	equation in two variables is the set of all its solutions plotted in the coordinate plane, often forming a curve (which could be a line). **MGSE.HS.A.REI11**. Explain why the x-coordinates of the points where the graphs of the equations y = f(x) and y = g(x) intersect are the solutions of the equation f(x) = g(x); find the solutions approximately, e.g., using technology to graph the functions. Include cases where f(x) and/or g(x) are linear, polynomial, rational, absolute value, exponential, and logarithmic functions. **MGSE.HS.A.REI12.** Graph the solutions to a linear inequality in two variables as a half-plane (excluding the boundary in the case of a strict inequality), and graph the solution set to a system of linear inequalities in two variables as the	probability of A and B occurring together is the product of the probabilities, and use this characterization to determine if they are independent. **MGSE.HS.S.CP3.** Understand the conditional probability of A given B as P(A and B)/P(B), and interpret independence of A and B as saying that the conditional probability A given B is the same as the probability of A, and the conditional probability of B given A is the same as the probability of B. **MGSE.HS.S.CP4.** Construct and interpret two-way frequency tables of data when two categories are associated with each object being classified. Use the two-way table as a sample space to decide if events are independent and to	slope m is the same between any two distinct points on a non-vertical line in the coordinate plane; derive the equation y = mx for a line through the origin and the equation y = mx + b for a line intercepting the vertical axis at b. **MGSE.8.EE.7** Master the ability to solve linear equations in one variable. a. Master the ability to give examples of linear equations in one variable with one solution, infinitely many solutions, or no solutions. Show which of these possibilities is the case by successively transforming the given equation into simpler forms, until an equivalent equation of the form $x = a$, $a = a$, or $a = b$ results (where a and b are different

Grade 12	Grade 11	Grade 10	Grade 9	Grade 9
Calculus, AP Calc, AP Stats	**Trig and Honor's Pre-Calc**	**Algebra II**	**Geometry**	**Algebra I**
	center (median, mean) and spread (interquartile range, standard deviation) of two or more different data sets. **MGSE.HS.S.ID3.** Interpret differences in shape, center, and spread in the context of the data sets, accounting for possible effects of extreme data points (outliers). **MGSE.HS.S.ID4.** Use the mean and standard deviation of a data set to fit it to a normal distribution and to estimate population percentages. Recognize that there are data sets for which such a procedure is not appropriate. Use calculators, spreadsheets, and tables to estimate areas under the normal curve. **MGSE.HS.S.ID5.** Summarize categorical data for two	intersection of the corresponding half-planes. **Functions** **MGSE.HS.F.IF1**. Understand that a function from one set (called the domain) to another set (called the range) assigns to each element of the domain exactly one element of the range. If f is a function and x is an element of its domain, then f(x) denotes the output of f corresponding to the input x. The graph of *f* is the graph of the equation y=f(x). **MGSE.HS.F.IF2.** Use function notation, evaluate functions for inputs in their domains, and interpret statements that use function notation in terms of a context. **MGSE.HS.F.IF3.** Recognize that sequences are	approximate conditional probabilities. **MGSE.HS.S.CP5.** Recognize and explain the concepts of conditional probability and independence in everyday language and everyday situations. **MGSE.HS.S.CP6.** Find the conditional probability of A given B as the fraction of B's outcomes that also belong to A, and interpret the answer in terms of the model. **MGSE HS.S.CP7.** Apply the Addition Rule, P(A or B)= P(A) + P(B) – P(A and B), and interpret the answer in terms of the model. **MGSE.HS.S.CP8.** Apply the general Multiplication Rule in a uniform probability model, P(A and B)= P(A)P(B|A) = P(B)P(A|B), and interpret the answer in	number). b. Master the ability to solve linear equations with rational number coefficients, including equations whose solutions require expanding expressions using the distributive property and collecting terms. **MGSE.8.EE.8**Demonstrate the ability to analyze and solve pairs of simultaneous linear equations. a. Demonstrate understanding that solutions to a system of two linear equations in two variables correspond to points of intersection of their graphs, because points of intersection satisfy both equations simultaneously. b. Be introduced to solving systems of two

Grade 12	Grade 11	Grade 10	Grade 9	Grade 9
Calculus, AP Calc, AP Stats	**Trig and Honor's Pre-Calc**	**Algebra II**	**Geometry**	**Algebra I**
	categories in two-way frequency tables. Interpret relative frequencies in the context of the data (including joint, marginal, and conditional relative frequencies). Recognize possible associations and trends in the data. **MGSE.HS.S.ID6.** Represent data on two quantitative variables on a scatter plot, and describe how the variables are related. a. Fit a function to the data; use functions fitted to data to solve problems in the context of the data. b. Informally assess the fit of a function by plotting and analyzing residuals. c. Fit a linear function for a scatter plot that suggests a linear association. **MGSE.HS.S.IC1**. Understand statistics as a process for making inferences about	functions, sometimes defined recursively, whose domain is a subset of the integers. **MGSE.HS.F.IF4.** For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship. Key features include: intercepts; intervals where the function is increasing, decreasing, positive, or negative; relative maximums and minimums; symmetries; end behavior; and periodicity. **MGSE.HS.F.IF5.** Relate the domain of a function to its graph and, where applicable, to the quantitative relationship it describes. **MGSE.HS.F.IF6.** Calculate and interpret the average rate of	terms of the model. **MGSE.HS.S.CP9**. Use permutations and combinations to compute probabilities of compound events and solve problems.	linear equations in two variables algebraically, and estimate solutions by graphing the equations. Solve simple cases by inspection. For example, $3x + 2y = 5$ *and* $3x + 2y = 6$ have no solution because $3x + 2y$ cannot simultaneously be 5 and 6. c. Be introduced to solving real-world and mathematical problems leading to two linear equations in two variables. For example, given coordinates for two pairs of points, determine whether the line through the first pair of points intersects the line through the second pair. **Geometry** **MGSE7.G.1** Master solving problems involving

Grade 12	Grade 11	Grade 10	Grade 9	Grade 9
Calculus, AP Calc, AP Stats	**Trig and Honor's Pre-Calc**	**Algebra II**	**Geometry**	**Algebra I**
	population parameters based on a random sample rom that population. **MGSE.HS.S.IC2.** Decide if a specified model is consistent with results from a given data-generating process, e.g., using simulation. **MGSE.HS.S.IC3.** Recognize the purposes of and differences among sample surveys, experiments, and observational studies; explain how randomization relates to each. **MGSE.HS.S.IC4.** Use data from a sample survey to estimate a population mean or proportion; develop a margin of error through the use of simulation models for random sampling. **MGSE.HS.S.IC5.** Use data from a randomized	change of a function (presented symbolically or as a table) over a specified interval. Estimate the rate of change from a graph. **MGSE.HS.F.IF7.** Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases. a. Graph linear and quadratic function and show intercepts, maxima and minima. c. Graph polynomial functions, identifying zeros when suitable factorizations are available, and showing end behavior. e. Graph exponential and logarithmic functions, showing intercepts and end behavior. **MGSE.HS.F.IF8**. Write a		scale drawings of geometric figures, including computing actual lengths and areas from a scale drawing and reproducing a scale drawing at a different scale **MGSE7.G.2**.Master drawing (freehand, with ruler and **protractor**, and **with technology**) geometric shapes with given conditions. Focus on constructing triangles from three measures of angles or sides, noticing when the conditions determine a unique triangle, more than one triangle, or no triangle. **MGSE7.G.3** Master describing the two-dimensional figures that result from slicing three dimensional figures, as in plane sections of right rectangular prisms and right rectangular pyramids.

Grade 12	Grade 11	Grade 10	Grade 9	Grade 9
Calculus, AP Calc, AP Stats	**Trig and Honor's Pre-Calc**	**Algebra II**	**Geometry**	**Algebra I**
	experiment to compare two treatments; use simulations to decide if differences between parameters are significant. **MGSE.HS.S.IC6.** Evaluate reports based on data. **MGSE.HS.S.MD1.** Define a random variable for a quantity of interest by assigning a numerical value to each event in a sample space; graph the corresponding probability distribution using the same graphical displays as for data distributions. **MGSE.HS.S.MD2.** Calculate the expected value of a random variable; interpret it as the mean of the probability distribution. **MGSE HS.S.MD3.** Develop a probability distribution for a random variable defined for a sample space in which theoretical	function defined by an expression in different but equivalent forms to reveal and explain different properties of the function. a. Use the process of factoring and completing the square in a quadratic function to show zeros, extreme values, and symmetry of the graph, and interpret these in terms of a context. b. Use the properties of exponents to interpret expressions for exponential functions. **MGSE.HS.F.IF9**. Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions). For example, given a graph of one		**MGSE7.G.4** Master the knowledge of the formulas for the area and circumference of a circle and use them to solve problems; given an informal deviation of the relationship between the circumference and area of a circle. **MGSE7.G.5** Develop the usage of facts about supplementary, complementary, vertical, and adjacent angles in a multi-step problem to write and solve simple equations for an unknown angle in a figure. **MGSE7.G.6** Develop the ability to solve real-world and mathematical problems involving area, volume and surface area of two- and three dimensional objects composed of triangles, quadrilaterals, polygons,

Grade 12	Grade 11	Grade 10	Grade 9	Grade 9
Calculus, AP Calc, AP Stats	**Trig and Honor's Pre-Calc**	**Algebra II**	**Geometry**	**Algebra I**
	probabilities can be calculated; find the expected value. **MGSE.HS.S.MD4.** Develop a probability distribution for a random variable defined for a sample space in which probabilities are assigned empirically; find the expected value. **MGSE.HS.S.MD5.** Weigh the possible outcomes of a decision by assigning probabilities to payoff values and finding expected values. a. Find the expected payoff for a game of chance. For example, find the expected winnings from a state lottery ticket or a game at a fast food restaurant. b. Evaluate and compare strategies on the basis of expected values. **MGSE.HS.S.MD6.** Use probabilities to make fair	quadratic function and an algebraic expression for another, say which has the larger maximum. **MGSE.HS.F.BF1.** Write a function that describes a relationship between two quantities. a. Determine an explicit expression, a recursive process, or steps for calculation from a context. b. Combine standard function types using arithmetic operations. c. Compose functions. **MGSE.HS.F.BF2.** Write arithmetic and geometric sequences both recursively and with an explicit formula, use them to model situations, and translate between the two forms. **MGSE.HS.F.BF3**. Identify the effect on the graph of multiplying, adding, or subtracting constants.		cubes, and right prisms. **MGSE8.G.1** Develop the ability to verify experimentally the properties of rotations, reflections, and translations: a. Lines are taken to lines, and line segments to line segments of the same length. b. Angles are taken to angles of the same measure. c. Parallel lines are taken to parallel lines. **MGSE8.G.2** Introduce how to understand that a two-dimensional figure is congruent to another if the second can be obtained from the first by a sequence of rotations, reflections, and translations; given two congruent figures, describe a sequence that exhibits the congruence between them. **MGSE8.G.3** Introduce how to describe the effect

Grade 12	Grade 11	Grade 10	Grade 9	Grade 9
Calculus, AP Calc, AP Stats	**Trig and Honor's Pre-Calc**	**Algebra II**	**Geometry**	**Algebra I**
	decisions (e.g., drawing by lots, using a random number generator). **MGSE.HS.S.MD7.** Analyze decisions and strategies using probability concepts (e.g., product testing, medical testing, pulling a hockey goalie at the end of a game).	Experiment with the transformations of these functions. **MGSE.HS.F.LE1**. Distinguish between situations that can be modeled with linear functions and with exponential functions. a. Prove that linear functions grow by equal differences over equal intervals, and that exponential functions grow by equal factors over equal intervals. b. Recognize situations in which one quantity changes at a constant rate per unit interval relative to another. c. Recognize situations in which a quantity grows or decays by a constant percent rate per unit interval relative to another. **MGSE.HS.F.LE2.** Construct		of dilations, translations, rotations and reflections on two-dimensional figures using coordinate. **MGSE8.G.4** Introduce how to understand that a two-dimensional figure is similar to another if the second can be obtained from the first by a sequence of rotations, reflections, translations, and dilations; given two similar two-dimensional figures, describe a sequence that exhibits the similarity between them. **MGSE8.G.5** Introduce using informal arguments to establish facts about the angle sum and exterior angle of triangles, about the angles created when parallel lines are cut by a transversal, and the angle-angle criterion for similarity of triangles. For example, arrange three

Grade 12	Grade 11	Grade 10	Grade 9	Grade 9
Calculus, AP Calc, AP Stats	**Trig and Honor's Pre-Calc**	**Algebra II**	**Geometry**	**Algebra I**
		linear and exponential functions, including arithmetic and geometric sequences, given a graph, a descriptions of a relationship, or tow input-output pairs (include reading these from a table). **MGSE.HS.F.LE3.** Observe using graphs and tables that a quantity increasing exponentially eventually exceeds a quantity increasing linearly, quadratically, or (more generally) as a polynomial function. **MGSE.HS.F.LE4.** For exponential models, express as a logarithm the solution to $ab^{ct}=d$ where a, c, and d are numbers and the base b is 2, 10, or e; evaluate the logarithm using technology. **MGSE.HS.F.LE5.** Interpret the parameters in a linear or exponential function in		copies of the same triangle so that the three angles appear to form a line, and give an argument in terms of transversals why this is so. **MGSE8.G.6** Develop explaining a proof of the Pythagorean Theorem and its converse. **MGSE8.G.7** Develop the application of the Pythagorean Theorem to determine unknown side lengths in right triangles in real-world and mathematical problems in two and three dimensions. **MGSE8.G.8** Introduce the application of the Pythagorean Theorem to find the distance between two points in the coordinate system. **MGSE8.G.9** Develop the formulas for the volume of

Grade 12	Grade 11	Grade 10	Grade 9	Grade 9
Calculus, AP Calc, AP Stats	**Trig and Honor's Pre-Calc**	**Algebra II**	**Geometry**	**Algebra I**
		terms of a context. **Geometry** **MGSE.HS.G.GPE1**. Derive the equation of a circle of given center and radius using the Pythagorean Theorem; complete the square to find the center and radius of a circle given by an equation. **MGSE.HS.G.GPE2**. Derive the equation of a parabola given a focus and directrix. **MGSE.HS.G.GPE3**. Derive the equations of ellipses and hyperbolas given the foci, using the fact that the sum or difference of distances from the foci is constant. **Statistics and**		cones, cylinders, and spheres and use them to solve real-world and mathematical problems. **Statistics and Probability** **MGSE8.SP.2** Introduce constructing and interpreting scatter plots for bivariate measurement data to investigate patterns of association between two quantities. Describe patterns such as clustering, outliers, positive or negative association, linear association, and nonlinear association. **MGSE8.SP.2** Introduce knowing that straight lines are widely used to model relationships between two quantitative variables. For scatter plots that suggest a linear association,

Grade 12	Grade 11	Grade 10	Grade 9	Grade 9
Calculus, AP Calc, AP Stats	**Trig and Honor's Pre-Calc**	**Algebra II**	**Geometry**	**Algebra I**
		Probability **MGSE.HS.S.ID7**. Interpret the slope (rate of change) and the intercept (constant term) of a linear model in the context of the data. **MGSE.HS.S.ID8.** Compute (using technology) and interpret the correlation coefficient of a linear fit. **MGSE.HS.S.ID9.** Distinguish between correlation and causation.		informally fit a straight line, and informally assess the model fit by judging the closeness of the data points to the line. **MGSE8.SP.3** Introduce using the equation of a linear model to solve problems in the context of bivariate measurement data, interpreting the slope and intercept. **MGSE8.SP.4** Introduce understanding that patterns of association can also be seen in bivariate categorical data by displaying frequencies and relative frequencies in a two-way table. Construct and interpret a two-way table summarizing data on two categorical variables

Grade 12	Grade 11	Grade 10	Grade 9	Grade 9
Calculus, AP Calc, AP Stats	**Trig and Honor's Pre-Calc**	**Algebra II**	**Geometry**	**Algebra I**
				collected from the same subjects. Use relative frequencies calculated for rows and columns to describe possible association between the two variables. **MGSE8.SP.5** Introduce developing a probability model and use it to find probabilities of events. Compare probabilities from a model to observed frequencies; if the agreement is not good, explain possible sources of the discrepancy. **MGSE7.SP.7a.** Develop a uniform probability model by assigning equal probability to all outcomes, and use the model to determine probabilities of events. **MGSE7.SP.7b** Introduce the development of a probability model (which

Grade 12	Grade 11	Grade 10	Grade 9	Grade 9
Calculus, AP Calc, AP Stats	**Trig and Honor's Pre-Calc**	**Algebra II**	**Geometry**	**Algebra I**
				may not be uniform) by observing frequencies in data generated from a chance process. **MGSE7.SP.8** Find probabilities of compound events using organized lists, tables, tree diagrams, and simulation. **MGSE7.SP.8a** Introduce understanding that, just as with simple events, the probability of a compound event is the fraction of outcomes in the sample space for which the compound event occurs. **MGSE7.SP.8b** Introduce representing sample spaces for compound events using methods such as organized lists, tables and tree diagrams. For an event described in everyday language, identify the outcomes in the sample space which compose the

Grade 12	Grade 11	Grade 10	Grade 9	Grade 9
Calculus, AP Calc, AP Stats	**Trig and Honor's Pre-Calc**	**Algebra II**	**Geometry**	**Algebra I**
				event. **MGSE7.SP.8c** Introduce designing and using a simulation to generate frequencies for compound events.

Eagles Landing Christian Academy
Mathematics Standards of Excellence

Eagles Landing Christian Academy
Mathematics Standards of Excellence