Math
Graduation Proficiencies
(Performance Indicators/Scoring Criteria)

Proficiency-Based Graduation Requirements (PBGRs) are the locally-delineated set of content knowledge and skills connected to state standards that, when supplemented with any additional locally-developed requirements, have been determined to qualify a student for earning a high school diploma. Vermont's Education Quality Standards (EQS) require that schools' graduation requirements be rooted in demonstrations of Students proficiency, as opposed to time spent in classrooms. This requirement will take effect in Vermont beginning with the graduating class of 2020.

*Red 9-12 performance indicators indicate they are required for graduation

**Modeling Standards

Graduation Proficiency #1- **Number and Quantity**
Reason, describe, and analyze quantitatively using units and number systems to solve problems.

Elementary K-2

Performance Indicators:
k1. Know number names and the count sequence. Know how to write the numbers from 0-20. (K.CC.1)
k2. Count to tell the number of objects. (K.CC.5)
k3. Compare numbers. (K.CC.6)
k4. Work with numbers 11-19 to gain foundations for place value. (K.NBT.1)
1.1. Use models, place value, and properties of operations to add and subtract within 100.
1.2. Demonstrate understanding of two-digit numbers as being composed of tens and ones.
1.3.Extend the counting sequence
2.1. Understand place value. (2.NBT.1)
2.2. Use place value understanding and properties of operations to add and subtract within 1000. (2.NBT.2)

Kindergarten Scoring Criteria- Proficiency 1

Performance Indicator	*Getting Started*	*Making Progress*	*Proficient*	*Going Beyond*
K1. Know number names and the count sequence. Know how to write numbers from 0-20. (K.CC.1)	Students (I) know some of the number names and can almost count a sequence starting at 0. Students (I) can write some numbers.	Students (I) know number names and can correctly count the sequence 0-10. Students (I) can write some numbers 0-10.	I know number names and can correctly count a sequence starting from any number 0 - 20. Students (I) can write all the numbers from 0-20.	I know number names and can correctly count a sequence starting from any number. Students (I) can write numbers beyond 20.
K2. Count to tell the number of objects. (K.CC.5)	With support, Students (I) can count to tell the number of objects.Students (I) can count to tell the number of objects with errors.	Students (I) can correctly count to tell the number of objects. Sometimes students (I) can represent that number of objects with a numeral.	Students (I) can correctly count to tell the number of objects. Students (I) can represent that number of objects with a numeral. Students (I) can give some explanation about how I	Students (I) can count to tell the number of objects up to 100 objects and beyond.

		Students (I) can explain my thinking but it may be unclear.	know there are a given number of objects	
K3. Compare numbers. (K.CC.6)	With support, students (I) can tell whether the number of objects in one group is greater than, less than, or equal to the number of objects in another group.	Students (I) can compare numbers by identifying whether the number of objects in one group is greater than, less than, or equal to the number of objects in another group **or** Students (I) can compare two numbers between 1 and 10 presented as written numerals.	Students (I) can compare numbers by identifying whether the number of objects in one group is greater than, less than, or equal to the number of objects in another group (up to 10) and Students (I) can compare the value of two written numerals between 1 and 10.	Students (I) can compare numbers by identifying whether the number of objects in one group is greater than, less than, or equal to the number of objects in other groups (up to 10) and Students (I) can compare the value of two written numbers greater than 10.
k4. Work with numbers 11-19 to gain foundations for place value. (K.NBT.1)	With support, students (I) work with numbers 11-19.	With support, students (I) work with numbers 11-19 to gain foundations for place value.	Students (I) work with numbers 11-19 to gain foundations for place value.	Students (I) work with numbers beyond 11-19 to represent my understanding of place value.
Grade 1 Scoring Criteria-Proficiency 1				
1.1. Uses models, place value, and properties of operations to add and subtract within 100.	With an example, students (I) can use a copy of a model to add and subtract within 100.	Students (I) can use models to add and subtract within 100	Students (I) can use models, place value, and properties of operations to add and subtract within 100	Students (I) can use models, place value, and properties of operations to add and subtract within 100, including numbers that are not multiples of 10.
1.2. Demonstrates understanding of two-digit numbers as	Using manipulatives, students (I) can demonstrate understanding of two-digit numbers.	Students (I) can demonstrate understanding of two-digit	Students (I) can demonstrate understanding of two numbers as being	Students (I) can demonstrate understanding of two-digit numbers being composed of tens and ones

being composed of tens and ones.		numbers using a place value chart.	composed of tens and ones.	by talking about the value of either digit in any two digit number.
1.3.Extend the counting sequence	Students (I) can extend the counting sequence by counting from 1 - 100 from any number less than 100.	Students (I) can extend the counting sequence by counting to 120 from any number less than 120, or Students (I) can read and write numerals in this range.	Students (I) can extend the counting sequence by counting to 120, starting from any number less than 120. In this range, Students (I) can read and write numerals and represent a number of objects with a written numeral.	Students (I) can extend the counting sequence to 1000.
Grade 2 Scoring Criteria- Proficiency 1				
2.1. Understands place value. (2.NBT.1)	Students (I) understand place value by naming the value of a digit in a number within 1000.	Students (I) understand place value because Students can count within 1000; skip-count by 5s, 10s, and 100s, **or** Students (I) can read and write numbers to 1000 using base-ten numerals, number names, and expanded form **or** compare two three-digit numbers based on meanings of the hundreds, tens, and ones digits, using >, =, and < symbols to record the results of comparisons.	Students (I) understand place value because Students can count within 1000; skip-count by 5s, 10s, and 100s, **and** Students (I) can read and write numbers to 1000 using base-ten numerals, number names, and expanded form **and** compare two three-digit numbers based on meanings of the hundreds, tens, and ones digits, using >, =, and < symbols to record the results of comparisons.	Students (I) understand place value because Students can compare any two whole numbers, round whole numbers to the nearest 10 or 100; fluently add and subtract within 1000 using strategies and algorithms based on place value.

2.2. Use place value understanding and properties of operations to add and subtract within 1000. (2NBT.2)	Students (I) can use place value understanding or properties of operations to add and subtract within 100.	Students (I) can use place value understanding or properties of operations to add and subtract within 1000.	Students (I) can use place value understanding and properties of operations to add and subtract within 1000.	Students (I) can use place value understanding and properties of operations to add and subtract with numbers larger than 1000.

Graduation Proficiency #1- **Number and Quantity**
Reason, describe, and analyze quantitatively using units and number systems to solve problems.

Elementary 3-5

Performance Indicators:
3.1. Develop understanding of fractions as numbers. (3.NF.A.1)
3.2. Use place value understanding and properties of operations to perform multi-digit arithmetic. (3.NBT.1)
4.1. Generalize place value understanding for multi-digit whole numbers. (4.NBT.1)
4.2. Use place value understanding and properties of operations to perform multi-digit arithmetic. (4.NBT.6)
4.3. Extend understanding of fraction equivalence and ordering.(4.NF.2.)
4.4. Solve word problems involving addition and subtraction of fractions referring to the same whole and having like denominators, e.g., by using visual fraction models and equations to represent the problem. (4.NF.3d)
4.5. Understand decimal notation for fractions, and compare decimal fractions (4.NF.6)
5.1. Understand the place value system. (5.NBT.1)
5.2. Perform operations with multi-digit whole numbers and with decimals to hundredths. (5.NBT.2)
5.3. Use equivalent fractions as a strategy to add and subtract fractions. (5.NF.1)
5.4.Solve real world problems involving multiplication of fractions and mixed numbers, e.g., by using visual fraction models or equations to represent the problem.(5.NF.7)

Grade 3 Scoring Criteria- Proficiency 1

Performance Indicator	*Getting Started*	*Making Progress*	*Proficient*	*Going Beyond*
3.1. Develop understanding of	Students (I) can understand fractions as	Students (I) can understand a fraction 1/b as the quantity formed by	Students (I) can understand a fraction 1/b as the quantity formed by	Students (I) can talk about fractions as they relate to a real life scenario, and

fractions as numbers. (3NF.A.1)	numbers using concrete models.	1 part when a whole is partitioned into b equal parts OR Students (I) can identify fractions as numbers and can sometimes place them correctly on a number line diagram.	1 part when a whole is partitioned into b equal parts AND Students (I) can identify fractions as numbers and can sometimes place them correctly on a number line diagram	Students (I) can model how to solve problems that involve fractions
3.2. Use place value understanding and properties of operations to perform multi-digit arithmetic. (3.NBT.A)	With visual models, Students (I) can round whole numbers to the nearest 10. With support, students (I) can add or subtract numbers, and multiply one digit whole numbers by multiples of 10.	Students (I) can round whole numbers to the nearest 10 or 100 AND/OR Students (I) can add or subtract numbers within 1000 AND/OR Students (I) can multiply one digit whole numbers by multiples of 10 (between 10 & 90).	Students (I) can round whole numbers to the nearest 10 or 100 AND Students (I) can add or subtract numbers within 1000 AND Students (I) can multiply one digit whole numbers by multiples of 10 (between 10 & 90).	Students (I) can extend place value understanding and properties of operations to perform multi-digit arithmetic beyond the 3rd grade range.
Grade 4 Scoring Criteria-Proficiency 1				
4.1. Generalize place value understanding for multi-digit whole numbers. (4NBT.A)	With support, Students (I) can identify the place value in multi-digit whole numbers.	Students (I) can recognize that there are patterns in the place value system in multi-digit whole numbers.	Students (I) can explain and generalize place value understanding for multi-digit whole numbers.	Students (I) can extend knowledge of place value to make sense of and solve problems involving decimal numbers.
4.2. Use place value understanding and properties of operations to perform multi-digit arithmetic. (4NBT.B)	With support, students (I) can perform single and double-digit arithmetic.	With support, students (I) can apply understanding of place value when performing multi-digit arithmetic.	Students (I) can use place value understanding and properties of operations to perform multi-digit arithmetic.	Students (I) can use place value understanding and properties of operations to perform multi-digit arithmetic involving decimal numbers.

4.3. Extend understanding of fraction equivalence and ordering.(4.NF.A.)	Students (I) can understand why two fractions are equivalent using a visual model.	Students (I) can recognize equivalent fractions as being the same size, or being the same point on the number line.	Students (I) can extend my understanding of fraction equivalence and ordering by recognizing and generating equivalent fractions, and placing fractions on the number line.	Students (I) can extend understanding of fraction equivalence to make sense of and solve problems and defend a mathematical model in an authentic context and/or problems that exist across disciplines.
4.4 Solve word problems involving addition and subtraction of fractions referring to the same whole and having like denominators. (4.NF.3d)	Students (I) can represent addition and subtraction of fractions with like denominators.	Students (I) can solve addition and subtraction of fractions with like denominators.	Students (I) can solve word problems involving addition and subtraction of fractions referring to the same whole and having like denominators.	Students (I) can add and subtract fractions with unlike denominators.
4.5. Understand decimal notation for fractions and compare decimal fractions (4.NF.C.5)	Students (I) can understand decimal notation to the tenths.	Students (I) can use decimal notation for fractions with denominators of 10 or 100.	Students (I) can compare decimal fractions to the hundredths by reasoning about their size.	Students (I) can apply concepts of decimal notation for fractions beyond hundredths.
Grade 5 Scoring Criteria- Proficiency 1				
5.1. Understand the place value system. (5NBT.A)	Students (I) can identify place value.	Students (I) can recognize that there are patterns in the place value system and that there are properties of operations.	Students (I) can explain the value of digits, based on their placement.	Students (I) can create and defend a different base system that exhibits the same properties as the base 10 system.
5.2. Perform operations with multi-digit whole numbers and with decimals to hundredths. (5NBT.B)	Students (I) can perform single and multi-digit arithmetic, including whole numbers.	Students (I) can perform single and multidigit arithmetic, including whole numbers and/or decimals.	Students (I) can perform operations with multi-digit whole numbers and with decimals to hundredths.	Students (I) can perform operations with multi-digit whole numbers and with decimals beyond hundredths.

5.3. Use equivalent fractions as a strategy to add and subtract fractions. (5NF.A)	Students (I) can identify fractions as numbers and can build fractions from unit fractions.	Students (I) can recognize and calculate equivalent fractions.	Students (I) can use equivalent fractions as a strategy to add and subtract fractions.	Students (I) can use equivalent fractions to add three or more fractions with unlike denominators.
5.4. Solve real world problems involving multiplication of fractions and mixed numbers. (5.NF.7)	Using a visual model, students (I) can multiply fractions.	Students (I) can apply and extend previous understanding of multiplication to multiply a fraction or whole number by a fraction AND Using a visual model Students (I) can divide unit fractions by whole numbers and whole numbers by unit fractions.	Students (I) can solve real world problems involving multiplication of fractions and mixed numbers, e.g., by using visual fraction models or equations to represent the problem.	Students (I) can apply and extend previous understandings of fractions to divide fractions by fractions.

Graduation Proficiency #1- **Number and Quantity** Reason, describe, and analyze quantitatively using units and number systems to solve problems.				
Middle School 6-8				
Performance Indicators: 6. 1. Compute fluently with multi-digit numbers and find common factors and multiples. (6NS.A) 6.2. Apply and extend previous understandings of numbers to the system of rational numbers. (6NS.B) 7.1. Apply and extend previous understandings of operations with fractions. (7NS.A) 8.1.Know that there are numbers that are not rational, and approximate them by rational numbers. (8NS.A)				
Grade 6 Scoring Criteria- Proficiency 1				
Performance Indicator	*Getting Started*	*Making Progress*	*Proficient*	*Going Beyond*

6. 1. Compute fluently with multi-digit numbers and find common factors and multiples. (6NS.A)	Students (I) can compute fluently with one-digit numbers, and explain the difference between a factor and a multiple.	Students (I) can use appropriate models to compute the sum, difference, product and quotient with multi-digit numbers and find common factors or multiples.	Students (I) can compute fluently (accurately, flexibly, and efficiently) with multi-digit numbers and can find common factors and multiples.	Students (I) can use multi-digit arithmetic to solve real world problems and can clearly explain mathematical reasoning.
6.2. Apply and extend previous understandings of numbers to the system of rational numbers. (6NS.B)	Students (I) can define a rational number and locate it on a number line.	Students (I) can recognize rational numbers and situations in which they are used.	Students (I) can apply and extend previous understandings of numbers to the system of rational numbers.	Students (I) can apply efficient strategies to solve real world problems involving operations on rational numbers*.
Grade 7 Scoring Criteria-Proficiency 1				
7.1. Apply and extend previous understandings of operations with fractions. (7NS.A)	Students (I) can use rational numbers* to represent quantities in real-world contexts	Students (I) can construct a concrete and/or visual model to solve a problem involving operations on rational numbers*.	Students (I) can apply efficient strategies to solve real world problems involving operations on rational numbers*.	Students (I) can explain the underlying concepts of operations on rational numbers* by connecting multiple representations and/or by creating a real world model.
	* “rational numbers” to explicitly include negative values			
Grade 8 Scoring Criteria- Proficiency 1				
8.1.Know that there are numbers that are not rational, and approximate them by rational numbers. (8NS.A)	Students (I) can define irrational numbers.	Students (I) can give examples and non-examples of irrational numbers.	Students (I) knows that there are numbers that are not rational, and students (I) can approximate them by rational numbers.	Students (I) can find precise approximations of irrational numbers and students (I) can explain the patterns that exist when writing rational numbers as fractions.

Graduation Proficiency #1- **Number and Quantity**
Reason, describe, and analyze quantitatively using units and number systems to solve problems.
The student reasons, describes and analyzes quantitatively using units and number systems to make sense of and solve problems.
Number sense provides Students with a firm foundation in mathematics. Students build a deep understanding of quantity, ways of representing numbers, relationships among numbers, and number systems. Students learn that numbers are governed by properties and understand that these properties lead to fluency with operations.

High School 9-12

Performance Indicators:

1. Reason quantitatively and use units to solve problems. (N.Q)
2. Extend the properties of exponents to rational exponents. (HSN.RN.1 and 2)
3. Solve problems with radicals and integer exponents. (HSN.RN.2, 3)
4. Perform arithmetic operations with complex numbers and use complex numbers in polynomial identities and equations. (N-CN 1,2,7)
5. Represent and model vector quantities and perform operations on vectors and matrices. (N-VM 1-8)

9-12 Scoring Criteria- Proficiency #1

Performance Indicator	*Getting Started*	*Making Progress*	*Proficient*	*Going Beyond*
1. Reason quantitatively and use units to solve problems.(N.Q)	Students (I) can identify the appropriate units in a given context.	Students (I) can convert between common units of length, volume, weight, and time.	Students (I) can reason quantitatively and use units to solve problems, converting as appropriate.	Students (I) can critically analyze quantitatively in a context requiring multiple conversions.
2. Extend the properties of exponents to rational exponents.	Students (I) can identify the properties of exponents.	Students (I) can perform operations applying the properties of exponents.	Students (I) can extend the properties of exponents by rewriting expressions using rational exponents	Students (I) can analyze and defend a mathematical model using the properties of exponents in context.

(HSN.RN.1 and 2)			and solve problems using the properties of exponents.	
3. Solve problems with radicals and integer exponents. **HSN.RN.2, 3**	Students (I) can use rote procedures to solve algebraic problems involving radicals and integer exponents with limited understanding.	Students (I) can use appropriate strategies to solve algebraic problems involving radicals and integer exponents.	Students (I) can solve problems with radicals and integer exponents in real world problem situations.	Students (I) can use algebraic patterns, structures, and proportional relationships to defend a mathematical model and/or problem that exists across disciplines.
4. Perform arithmetic operations with complex numbers, and use complex numbers in polynomial identities and equations. (N-CN 1,2,7)	Students (I) can determine a complex number and know that the number has the form a + bi with a and b being real numbers.	Students (I) can Use real number properties to add, subtract, and multiply complex numbers.	Students (I) can solve quadratic equations with real coefficients that have complex solutions.	Students (I) can extend polynomial identities to the complex numbers, and show that the Fundamental Theorem of Algebra is true for quadratic polynomials.
5. Represent and model vector quantities, and perform operations on vectors and matrices. (N-VM 1-8)	Students (I) recognize vector quantities as having both magnitude and direction, can add vectors, and can multiply matrices by scalars.	Students (I) can subtract vectors and multiply vectors by scalars, and can add and subtract matrices of appropriate dimensions.	Students (I) can solve problems involving velocity and other quantities that can be represented by vectors, and work with matrices as transformations of vectors.	Students (I) can compute the magnitude and the direction of a scalar multiple, and can understand that the determinant of a square matrix is nonzero if and only if the matrix has a multiplicative inverse.

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Graduation Proficiency #2: **Algebra**

Create, interpret, use and analyze expressions, equations and inequalities.
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Elementary K-2				
Performance Indicators: K.1. Understand addition as putting together and adding to, and understand subtraction as taking apart and taking from. (KOA.1) 1.1. Understand and apply properties of operations and the relationship between addition and subtraction. (1.OA.2.) 1.2. Represent and solve problems involving addition and subtraction. (OA.A.) 1.3. Add and subtract within 20. (1.OA.6) 2.1. Represent and solve problems involving addition and subtraction. (2.OA.1) 2.3. Work with equal groups of objects to gain foundations for multiplication. (2.OA.2)				
Kindergarten Scoring Criteria- Proficiency 2				
Performance Indicator	*Getting Started*	*Making Progress*	*Proficient*	*Going Beyond*
K.1. Understand addition as putting together and adding to, and understand subtraction as taking apart and taking from. (KOA.A)	With support and by using objects, I am beginning to understand how adding to makes more of something and how taking from makes less of something.	With support, Students (I) understand how adding to makes more of something and how taking from makes less of something	Students (I) understand that addition is putting together and adding to and that subtraction is taking apart and taking from.	Students (I) can demonstrate and explain that addition is putting together and adding to and that subtraction is taking apart and taking from.
Grade 1 Scoring Criteria-Proficiency 2				
1.1. Understand and apply properties of operations and the relationship between addition and subtraction. (1.OA.B.)	Students (I) can, with support and modeling, understand and apply some of the properties of operations and the relationship between addition and subtraction by explaining the difference between them.	With support, Students (I) can understand and apply some of the properties of operations and the relationship between addition and subtraction.	Students (I) can understand and apply properties of operations and the relationship between addition and subtraction	Students (I) can use the properties of operations to perform multi-digit addition and subtraction

1.3. Represent and solve problems involving addition and subtraction. (OA.A.)	With support, Students (I) can represent and solve single digit addition and subtraction problems within 10.	Students (I) can sometimes represent and solve addition and subtraction to solve one- step problems involving situations of adding to, taking from, putting together, taking apart, and comparing with the unknown as the sum	Students (I) can represent and solve problems involving addition and subtraction within to solve one-step word problems involving situations of adding to, taking from, putting together, taking apart, and comparing, with unknown as the sum	Students (I) can use addition and subtraction within 100 to solve one- and two-step word problems involving situations of adding to, taking from, putting together, taking apart, and comparing, with unknowns in all positions, e.g., by using drawings and equations with a symbol for the unknown number to represent the problem
1.4. Add and subtract within 20. (1.OA.C)	With support and including manipulatives, Students (I) can add and subtract within 10.	Students (I) can add and subtract within 10 using mental strategies.	Students (I) can add and subtract within 20 using mental strategies and know from memory most sums of two one-digit numbers.	Students (I) can fluently add and subtract within 20 using mental strategies and know from memory all sums of two one-digit numbers.
Grade 2 Scoring Criteria- Proficiency 2				
2.1. Represent and solve problems involving addition and subtraction. (2OA.A)	Students (I) can represent and solve problems by matching addition and subtraction problems with a word problem	Students (I) can represent and solve problems use addition and subtraction within 100 with support to solve one- and two-step word problems.	Students (I) can represent and solve problems use addition and subtraction within 100 to solve one- and two-step word problems involving situations of adding to, taking from, putting together, taking apart, and comparing, with unknowns in all positions, e.g., by using drawings and equations with a symbol for the unknown number to represent the problem.	Students (I) can represent and solve problems by using addition,subtraction, multiplication and division within 1000 to solve one- and two-step word problems involving situations of adding to, taking from, putting together, taking apart, and comparing, with unknowns in all positions, e.g., by using drawings and equations with a symbol for the unknown number to represent the problem

2.3. Work with equal groups of objects to gain foundations for multiplication. (2OA.2)	Students (I) can work with equal groups of objects to determine whether a group of objects (up to 20) has an odd or even number of members.	Students (I) can work with equal groups of objects to determine whether a group of objects (up to 20) has an odd or even number of members, and can write an equation to express an even number as a sum of two equal addends. **OR** Students (I) can use addition to find the total number of objects arranged in rectangular arrays with up to 5 rows and up to 5 columns; write an equation to express the total as a sum of equal addends.	Students (I) can work with equal groups of objects to determine whether a group of objects (up to 20) has an odd or even number of members, and can write an equation to express an even number as a sum of two equal addends. Students (I) can also use addition to find the total number of objects arranged in rectangular arrays with up to 5 rows and up to 5 columns; write an equation to express the total as a sum of equal addends.	Students (I) can work with equal groups of objects by interpreting a products of whole numbers. Students (I) can also use multiplications to find the total number of objects arranged in rectangular arrays with up to 5 rows and up to 5 columns; write an equation to express the total as a sum of equal addends.

Graduation Proficiency #2: **Algebra**

Create, interpret, use and analyze expressions, equations and inequalities.

Elementary 3-5

Performance Indicators:

3.1 Solve problems involving the four operations, and identify and explain patterns in arithmetic. (3.OA.D)
3.2 Represent and solve problems involving multiplication and division. (3.OA.1)
3.3 Multiply and divide within 100. (3.OA.7)
3.4 Understand properties of multiplication and the relationship between multiplication and division. (3.OA.B)
4.1 Gain familiarity with factors and multiples. (4.OA.4)
4.2 Use the four operations with whole numbers to solve problems. (4.OA.1)

5.1 Write and interpret numerical expressions. (5.OA.1)				
Grade 3 Scoring Criteria- Proficiency 2				
Performance Indicator	*Getting Started*	*Making Progress*	*Proficient*	*Going Beyond*
3.1 Solve problems involving the four operations, and identify and explain patterns in arithmetic. (3.OA.D)	Students (I) can find patterns and solve simple one-step word problems correctly.	Students (I) can solve two-step word problems using some of the four operations and Students (I) can identify patterns in arithmetic.	Students (I) can solve problems involving the four operations and use a variable to represent an unknown quantity and identify and explain patterns in arithmetic.	Students (I) can write and solve two-step word problems using the four operations using a variable to represent an unknown quantity. and Students (I) can assess and explain the reasonableness of answers by using mental computation and estimation strategies including rounding. Students (I) can write arithmetic patterns and explain them using properties of operations.
3.2 Represent and solve problems involving multiplication and division. (3.OA.A)	Students (I) know that products are repeated addition and that quotients are repeated subtraction and use this strategy to solve multiplication and division word problems.	Students (I) can use multiplication and division within 100 to solve word problems in situations involving equal groups, arrays, and measurement quantities, AND Students (I) can sometimes interpret the	Students (I) can represent and solve problems involving multiplication and division.	Students (I) can write and solve multiplication and division word problems within 100, AND Students (I) can interpret these products and quotients of whole numbers and explain what they mean in the situation, AND

		products and quotients in the problems.		Students (I) can write and solve multiplication and division equations with one number missing.
3.3 Multiply and divide within 100. (3.OA.C.7)	Students (I) can explain that products are repeated addition and that quotients are repeated subtraction. Students (I) use the multiplication table to multiply and divide within 100.	Students (I) can multiply and divide numbers using strategies within 100 most of the time.	Students (I) can fluently multiply and divide within 100 from memory.	Students (I) can extend understanding of multiplication and division strategies to numbers greater than 10.
3.4 Understand properties of multiplication and the relationship between multiplication and division. (3.OA.B)	Students (I) can name the properties of multiplication that will help me compute different kinds of problems.	Students (I) can identify the different properties of multiplication and Students (I) can sometimes use them to solve multiplication problems.	Students (I) can understand and use the properties of multiplication (commutative, associative, distributive properties) and the relationship between multiplication and division; Students (I) can explain and show that division is an unknown factor problem.	Students (I) can use the properties of multiplication and division to find factors and multiples.
Grade 4 Scoring Criteria-Proficiency 2				
4.1 Gain familiarity with factors and multiples. (4OA.B4)	With support, Students (I) can identify factors and multiples	Students (I) can define factors and multiples.	Students (I) can find factors and multiples for whole numbers in the 1-100 range. Students (I) can	Students (I) can find factors and multiples of any number.

			determine if a number is prime or composite.	
4.2 Use the four operations with whole numbers to solve problems. (4OA.A.1)	With support, Students (I) can use the four operations to solve problems.	Sometimes, Students (I) can determine which of the four operations to use to solve problems.	Students (I) can use the four operations with whole numbers to solve multi-step problems and use estimation to determine the reasonableness of solutions.	Students (I) can use the four operations to solve problems with multi-digit decimal numbers.
Grade 5 Scoring Criteria- Proficiency 2				
5.1 Write and interpret numerical expressions. (5.OA.A)	Students (I) can identify numerical expressions.	With support, Students (I) can interpret numerical expressions	Students (I) can write and interpret numerical expressions.	Students (I) can Identify parts of an expression using mathematical terms (sum, term, product, factor, quotient, coefficient).

Graduation Proficiency #2: **Algebra** Create, interpret, use and analyze expressions, equations and inequalities.
Middle School 6-8
Performance Indicators: 6.1. Apply and extend previous understandings of arithmetic to algebraic expressions. (6EE.A) 6.2. Reason about and solve one-variable equations and inequalities. (6EE.B) 6.3. Represent and analyze quantitative relationships between dependent and independent variables. (6EE.C) 7.1 Use properties of operations to generate equivalent expressions. (7EE.A) 7.2 Solve real-life and mathematical problems using numerical and algebraic expressions and equations. (7EE.B)

8.1 Work with radicals and integer exponents. (8EE.A)
8.2 Understand the connections between proportional relationships, lines, and linear equations. (8EE.B)
8.3 Analyze and solve linear equations and pairs of simultaneous linear equations. (8EE.C)

Grade 6 Scoring Criteria- Proficiency 2				
Performance Indicator	*Getting Started*	*Making Progress*	*Proficient*	*Going Beyond*
6.1. Apply and extend previous understandings of arithmetic to algebraic expressions. (6EE.A)	Students (I) can identify algebraic expressions.	Students (I) can identify and interpret algebraic expressions.	Students (I) can apply and extend previous understandings of arithmetic to algebraic expressions.	Students (I) can apply and extend previous understandings of arithmetic to algebraic expressions to solve real-life and mathematical problems
6.2. Reason about and solve one-variable equations and inequalities. (6EE.B)	Students (I) can solve one-variable equations with support.	Students (I) can solve one-variable equations and inequalities.	Students (I) can explain and solve one-variable equations and inequalities.	Students (I) can speak about and apply one-variable equations and inequalities in real-life situations.
6.3. Represent and analyze quantitative relationships between dependent and independent variables. (6EE.C)	Students (I) can represent relationships between dependent and independent variables with support.	Students (I) can represent quantitative relationships between dependent and independent variables.	Students (I) can represent and analyze quantitative relationships between dependent and independent variables.	Students (I) can represent and analyze quantitative relationships between dependent and independent variable across disciplines and in real world situations.
Grade 7 Scoring Criteria-Proficiency 2				
7.1 Use properties of operations to generate equivalent expressions. (7EE.A)	Students (I) can define equivalent expressions.	Students (I) can generate equivalent linear expressions or Students (I) can evaluate expressions	Students (I) can generate equivalent linear expressions with rational coefficients and	Students (I) can create a situation in which equivalent expressions can be used to find important information

		for equivalence.	develop a mathematical justification for the equivalence within a problem situation.	about a situation OR Students (I) can analyze a variety of equivalent expressions and justify the correctness of each solution.
7.2 Solve real-life and mathematical problems using numerical and algebraic expressions and equations. (7EE.B)	Students (I) can identify the variable and important information from the problem.	Students (I) can solve the problem by using non-algebraic strategies.	Students (I) can solve real-life and mathematical problems using numerical and algebraic expressions and equations	Students (I) can analyze my process and solution. OR Students (I) can show evidence that Students (I) can use algebraic expressions and equations to apply my thinking to other situations. OR Students (I) can represent my thinking using a different mathematical model and connecting to the algebraic expression and equation.
Grade 8 Scoring Criteria- Proficiency 2				
8.1 Work with radicals and integer exponents. (8EE.A)	Students (I) can write simple numerical expressions involving whole number exponents and evaluate expressions with exponents and identify numbers written in scientific notation.	Students (I) can evaluate simple numerical expressions using properties of integer exponents, use scientific notation to estimate very large and very small quantities, and perform multiplication	Students (I) can evaluate numerical expressions, and generate simple equivalent numerical expressions by using properties of integer exponents, use scientific notation to estimate very large and	Students (I) can apply the properties of integer exponents and operations with numbers expressed in scientific notation to solve real world problems.

		and division with numbers expressed in scientific notation, without technology.	very small quantities, and add, subtract, multiply and divide numbers expressed in scientific and decimal notation, without technology.	
8.2 Understand the connections between proportional relationships, lines, and linear equations. (8EE.B)	Students (I) can identify proportional relationships, lines, *or* linear equations.	Students (I) can identify proportional relationships, lines, *and* linear equations.	Students (I) can explain the connections between proportional relationships, lines, and linear equations using multiple representations.	Students (I) can apply the connection between proportional relationships, lines, and linear equations using multiple representations to solve real world problems.
8.3 Analyze and solve linear equations and pairs of simultaneous linear equations. (8EE.C)	Students (I) can use rote procedures to solve linear equations with limited understanding.	Students (I) can solve linear equations and pairs of simultaneous linear equations.	Students (I) can analyze and solve linear equations and pairs of simultaneous linear equations using multiple strategies.	Students (I) can apply solutions of linear equations and pairs of simultaneous equations to solve real world problems.

Graduation Proficiency #2: **Algebra**

Create, interpret, use and analyze expressions, equations and inequalities.

The student creates, interprets, uses, and analyzes patterns of algebraic structures to make sense of problems. *Pattern sense gives Students a lens with which to understand trends and commonalities. Students recognize and represent mathematical relationships and analyze change. Students learn that the structures of algebra allow complex ideas to be expressed succinctly.*

High School 9-12

Performance Indicators:

1. Interpret the structure of expressions and write expressions in equivalent forms to solve problems. (HSA.SSE.1-3)
2. Understand, represent and solve equations and inequalities in one variable both algebraically and graphically. (HSA.REI.1, 3, 10, 12; HSA.CED.1; HSA.REI.2,4,4a,4b,11)
3. **Create equations that describe numbers or relationships. (HSA.CED.2,4)
4. **Understand, represent and solve systems of equations and inequalities both algebraically and graphically. (HSA.REI.5, 6, 7)
5. Perform arithmetic operations on polynomials, understand the relationship between zeros and factors of polynomials, use polynomial identities to solve problems and rewrite rational expressions. (HSA.APR.1 - 7)

Performance Indicator	*Getting Started*	*Making Progress*	*Proficient*	*Going Beyond*
1. Interpret the structure of expressions and write expressions in equivalent forms to solve problems. **HSA.SSE.1-3**	Students (I) can define and identify parts of an expression.	Students (I) can explain the meanings of the different parts of an expression according to the context of the problem.	Students (I) can interpret the structure of expressions and write expressions in equivalent forms to solve problems.	Students (I) can create an expression to model a given context.
2. Understand, represent and solve equations and inequalities in one variable both algebraically and graphically. **HSA.REI.1, 3, 10, 12** **HSA.CED.1,** **HSA.REI.2,4,4a,4b,7,11**	Students (I) can identify an equation or inequality, and build a table of values.	Students (I) can identify the independent and dependent variables in equations and inequalities and label the axes, and solve basic equations and inequalities in one variable.	Students (I) can understand, represent and solve equations and inequalities in one variable both algebraically and graphically.	Students (I) can draw conclusions about problems using the graphs of equations and inequalities and justify my reasoning.
3. **Create equations that describe numbers or relationships. **HSA.CED.2,4**	Students (I) can choose a variable to represent a number.	Students (I) can describe a relationship between numbers.	Students (I) can create equations that describe numbers or relationships.	Students (I) can create an equation in order to predict an outcome in a given context.
4.Understand, represent and solve systems of equations and inequalities**	Students (I) can list the methods of solving systems of equations.	Students (I) can explain the difference in the methods of solving	Students (I) can understand, represent and solve systems of	Students (I) can distinguish the most efficient way to solve a

both algebraically and graphically. **HSA.REI.5, 6**		systems and can solve using one of the methods.	equations and inequalities both algebraically and graphically.	system of equations and justify my reasoning.
5. Perform arithmetic operations on polynomials, understand the relationship between zeros and factors of polynomials, use polynomial identities to solve problems and rewrite rational expressions. **HSA.APR.1,2,3,4,5,6,7**	Students (I) can identify polynomials and rational expressions.	Students (I) can recognize polynomial identities and identify zeros and factors of polynomials, and define rational expressions.	Students (I) can perform arithmetic operations on polynomials, understand the relationship between zeros and factors of polynomials, use polynomial identities to solve problems and rewrite rational expressions.	Students (I) can model a given situation using polynomials and/or rational expressions and analyze and defend my solution in context

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Graduation Proficiency #3: **Functions** Use functions including, linear quadratic, trigonometric, and exponential, to interpret and analyze a variety of contexts.
Elementary K-2 Not addressed in this proficiency

Graduation Proficiency #3: **Functions** Use functions including linear quadratic, trigonometric, and exponential, to interpret and analyse a variety of contexts.
Elementary 3-5
Performance Indicators: 3.1 Identify arithmetic patterns (including patterns in the addition table or multiplication table), and explain them using properties of
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operations.(3.OA.9) 4.1 Generate and analyze patterns. (4.OA.5) 5.1 Analyze patterns and relationships (5.OA.3)				
Grade 3 Scoring Criteria- Proficiency 3				
Performance Indicator	*Getting Started*	*Making Progress*	*Proficient*	*Going Beyond*
3.1 Identify arithmetic patterns (including patterns in the addition table or multiplication table), and explain them using properties of operations.(3.OA.D.9)	Students (I) can recognize numerical patterns.	Students (I) can describe numerical patterns.	Students (I) can identify arithmetic patterns (including patterns in the addition table or multiplication table), and explain them using the properties of operations.	Students (I) can generate and explain a number pattern that follows a given rule.
Grade 4 Scoring Criteria-Proficiency 3				
4.1 Generate and analyze patterns. (4OA.C5)	Students (I) can identify numerical patterns.	Students (I) can identify and explain numerical patterns.	Students (I) can generate and analyze numerical patterns.	Students (I) can generate, analyze, and justify numerical patterns and relationships.
Grade 5 Scoring Criteria- Proficiency 3				
5.1 Analyze patterns and relationships (5OA.B)	With support, students (I) can generate a numerical pattern using a given rule and graph the ordered pairs on a coordinate plane.	With support, students (I) can generate two numerical patterns using two given rules, identify apparent relationships between corresponding terms form ordered pairs consisting of corresponding terms from the two patterns, and graph the ordered pairs on a coordinate plane.	Students (I) can generate two numerical patterns using two given rules, identify apparent relationships between corresponding terms, form ordered pairs consisting of corresponding terms from the two patterns, and graph the ordered pairs on a coordinate plane.	Students (I) can generate two numerical patterns using two given rules, identify apparent relationships between corresponding terms, form ordered pairs consisting of corresponding terms from the two patterns, and graph the ordered pairs

				on all 4 quadrants of the coordinate plane.

Graduation Proficiency #3 **Functions** Use functions including, linear quadratic, trigonometric, and exponential, to interpret and analyze a variety of contexts.				
Middle School 6-8				
Performance Indicators: 6.1. Understand ratio concepts and use ratio reasoning to solve problems (6RP.A) 7.1 Analyze proportional relationships and use them to solve real-world and mathematical problems. (7RP.A) 8.1 Define, evaluate, and compare functions. (8F.A) 8.2 Use functions to model relationships between quantities. (8F.B)				
Grade 6 Scoring Criteria- Proficiency 3				
Performance Indicator	*Getting Started*	*Making Progress*	*Proficient*	*Going Beyond*
6.1 Understand ratio concepts and use ratio reasoning to solve problems (6RP.A)	Students (I) can identify and write ratios.	Students (I) can identify ratio concepts and use ratio models to solve problems.	Students (I) can understand ratio concepts and use ratio reasoning to solve problems.	Students (I) can apply ratio concepts and use ratio reasoning to solve problems in unfamiliar situations.
Grade 7 Scoring Criteria-Proficiency 3				
7.1 Analyze proportional relationships and use them to solve real-world and mathematical problems. (7RP.A)	Students (I) can construct a model to compare quantities with equivalent whole number ratios using appropriate units.	Students (I) can explain why a situation is proportional or is not proportional. Students (I) can identify whole number constants of proportionality represented in multiple	Students (I) can solve problems and draw conclusions about proportionality (including those with rational numbers) based on constants of proportionality represented in multiple	Students (I) can use algebraic patterns, structures, and proportional relationships to defend a mathematical model or problem.

		forms.	forms.	
Grade 8 Scoring Criteria- Proficiency 3				
8.1 Define, evaluate, and compare functions. (8F.A)	Students (I) can define functions.	Students (I) can define and evaluate functions.	Students (I) can define, evaluate, and compare functions.	Students (I) can create functions in various forms to model real world problems.
8.2 Use functions to model relationships between quantities. (8F.B)	Students (I) can identify the inputs and outputs of a function.	Students (I) can use functions to model relationships between quantities, using a graph *or* equation.	Students (I) can use functions to model relationships between quantities, using a graph *and* an equation.	Students (I) can defend a mathematical model in an authentic context and apply existing knowledge to a situation involving functions and relationships between functions that solves a problem in the community or across multiple disciplines.

Graduation Proficiency #3: **Functions**

Use functions including linear quadratic, trigonometric, and exponential, to interpret and analyse a variety of contexts.
The Students uses functions to interpret and analyze a variety of contexts. Functions describe situations where one quantity determines another. Functions describe situations where one quantity determines another.

In school mathematics, functions usually have numerical inputs and outputs and are often defined by an algebraic expression. Functions presented as expressions can model many important phenomena.

High School 9-12

Performance Indicators:

1. Understand and use different representations to interpret and analyze functions by examining their key features, including function notation and rate of change. (HSF.IF1-3; HSF.IF.7-9)

2. **Builds a function that models a relationship between two quantities and builds new functions from existing functions.(HSF.IF.3,4; HSF.BF.1b,1c,3, 4, 4a, 4b, 4c, 4d, 5)
3. **Construct and compare linear, quadratic and exponential models and solve problems and interpret expressions for functions, drawing conclusions about their meaning in terms of the situation.(HSF.LE.1-3; HSF.LE.1-3; HSF.LE.6; HSF.IF.4-6)
4. **Extend the domain of trigonometric functions using the unit circle, model periodic phenomena with trigonometric functions, and prove and apply trigonometric identities. (HSF.TF.1,2,3,4,5,6,7,8)

Performance Indicator	*Getting Started*	*Making Progress*	*Proficient*	*Going Beyond*
1. Understand and use different representations to interpret and analyze functions by examining their key features, including function notation and rate of change. HSF.IF.1,2,5,6 HSF.LE.1a,b,c, 5	Students (I) can define a relation and a function, identify dependent and independent variables, and recognize different representations of a function.	Students (I) can identify the domain and range, explain the different parts of a function, and compare multiple representations of functions.	Students (I) can understand and use different representations to interpret and analyze functions by examining their key features, including function notation and rate of change.	Students (I) can create a function rule to model a given situation or choose which representation best models a problem and defends my choice.
2. **Build a function that models a relationship between two quantities and build new functions from existing functions. HSF.IF.3,4 HSF.BF.1b,1c,3, 4, 4a, 4b, 4c, 4d, 5	Students (I) can describe the relationship between two quantities.	Students (I) can model the relationship between two quantities with a function.	Students (I) can build a function that models a relationship between two quantities and build new functions from existing functions.	Students (I) can create multiple functions to model a given situation, or compose two functions and use that to determine if functions are inverses.
3. **Construct and compare linear, quadratic and exponential models and solve problems and interpret expressions for functions, drawing conclusions about their meaning in terms of the	Students (I) can identify the different forms of linear, quadratic, and exponential equations and their transformations.	Students (I) can distinguish between situations that can be represented with linear, quadratic, and exponential functions and describe how a function	Students (I) can construct and compare linear, quadratic and exponential models and solve problems and interpret expressions for functions, drawing conclusions about their meaning in	Students (I) can construct linear, quadratic, and exponential functions given a graph or description of the situation and defend my conclusions about

situation. **HSF.LE.1-3** **HSF.LE.6** **HSF.IF.4-6**		changes when its parameters are changed.	terms of the situation they model.	the parameters of the function.
4. **Extend the domain of trigonometric functions using the unit circle, model periodic phenomena with trigonometric functions, and prove and apply trigonometric identities.	Students (I) can recall the Pythagorean Theorem and trigonometric ratios and define periodic.	Students (I) can convert between radian and degree measures, match a trigonometric equation to its graph, and use the Pythagorean Theorem to complete the unit circle.	Students (I) can extend the domain of trigonometric functions using the unit circle, model periodic phenomena with trigonometric functions, and prove and apply trigonometric identities.	Students (I) can explain the graphs of trigonometric functions using the unit circle, solve trigonometric equations using inverse functions, and prove trigonometric identities to solve problems.

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Graduation Proficiency #4: **Geometry**

Understand geometric concepts and constructions, prove theorems, and apply appropriate results to solve problems.

Elementary K-2

Performance Indicators:
k.1 Identify and describe shapes. (K.G.1)
k.2 Analyze, compare, create, and compose shapes (K.G.2)
1.1 Reason with shapes and their attributes. (1.1.G)
2.1 Reason with shapes and their attributes. (2.1.G)

Kindergarten Scoring Criteria- Proficiency 4

Performance Indicator	*Getting Started*	*Making Progress*	*Proficient*	*Going Beyond*
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k.1 Identify and describe shapes. (KG.1)	Students (I) can identify some shapes.	Students (I) can name of some shapes and can identify them in the environment.	Students (I) can identify and describe objects in the environment using names of shapes, and the words above, below, beside, in front, behind	Students (I) can identify and describe shapes in the environment, and explain their attributes.
k.2 Analyze, compare, create, and compose shapes (KG.2)	Students (I) can create some shapes.	Students (I) can compare shapes and use language to describe similarities and differences.	Students (I) can analyze, compare and create 2D and 3D shapes in different sizes and orientations. Students (I) can describe their similarities, differences, and attributes.	Students (I) can analyze, compare, create and compose 2D and 3D complex shapes in different sizes and orientations. Students (I) can describe their similarities, differences, and attributes
Grade 1 Scoring Criteria-Proficiency 4				
1.1 Reason with shapes and their attributes. (1G)	Students (I) can reason with some shapes and their attributes.	With support, students (I) can reason with most shapes and their attributes	Students (I) can reason with shapes and their attributes	Students (I) can recognize and draw shapes having specified attributes, such as a given number of angles or a given number of equal faces. Students (I) can identify triangles, quadrilaterals, pentagons, hexagons, and cubes. Students (I) can also partition circles and rectangles into two, three, or four equal shares, and 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. I recognize that equal shares of identical wholes need not have the same shape.
Grade 2 Scoring Criteria- Proficiency 4				
2.1 Reason with shapes and their attributes. (1G)	Students (I) can recognize shapes having specified attributes, such as a given number of angles or a given number of equal faces. Students (I) can identify triangles, quadrilaterals, pentagons, hexagons, and cubes.	Students (I) can recognize and draw shapes having specified attributes, such as a given number of angles or a given number of equal faces. Students (I) can identify triangles, quadrilaterals, pentagons, hexagons, and cubes. Students (I) can also partition a rectangle into rows and columns of same-size. squares and count to find the total number of them.	Students (I) can recognize and draw shapes having specified attributes, such as a given number of angles or a given number of equal faces. Students (I) can identify triangles, quadrilaterals, pentagons, hexagons, and cubes. Students (I) can also partition circles and rectangles into two, three, or four equal shares, and 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. I recognize that equal shares of identical wholes need not have the same shape.	Students (I) can recognize and draw shapes having specified attributes, such as a given number of angles or a given number of equal faces. Students (I) can identify triangles, quadrilaterals, pentagons, hexagons, cubes, and other polygons . Students (I) can also partition circles and polygons 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. I recognize that equal shares of identical wholes need not have the same shape.

Graduation Proficiency #4: **Geometry**

Understand geometric concepts and constructions, prove theorems, and apply appropriate results to solve problems.

Elementary 3-5

Performance Indicators:

3.1 Reason with shapes and their attributes. (3.G.1)
4.1 Draw and identify lines and angles, and classify shapes by properties of their lines and angles. (4.G.1)
5.1 Graph points in the coordinate plane to solve real-world and mathematical problems. (5.G.1)
5.2 Classify two-dimensional figures into categories based on their properties. (5.G.4)

Grade 3 Scoring Criteria- Proficiency 4

Performance Indicator	*Getting Started*	*Making Progress*	*Proficient*	*Going Beyond*
3.1 Reason with shapes and their attributes. (1G)	Students (I) can recognize shapes having specified attributes With support, Students (I) can also partition shapes into parts with equal areas	Students (I) can recognize and draw shapes having specified attributes With support, Students (I) can also partition shapes into parts with equal areas and express the area of each part as a unit fraction of the whole.	Students (I) can recognize and draw shapes having specified attributes Students (I) can also partition shapes into parts with equal areas and express the area of each part as a unit fraction of the whole.	Students (I) can recognize and create shapes having specified attributes, such as a given number of angles or a given number of sides and identify triangles, quadrilaterals, pentagons, hexagons, and other polygons. Students (I) can also partition circles and complex polygons 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 and I recognize that equal shares of identical

				wholes need not have the same shape.
Grade 4 Scoring Criteria-Proficiency 4				
4.1 Draw and identify lines and angles, and classify shapes by properties of their lines and angles. (4G)	With support, students (I) can identify lines and angles, and name shapes.	Students (I) can identify lines and angles, and name some shapes and their properties.	Students (I) can draw and identify lines and angles, and classify shapes by properties of their lines and angles.	Students (I) can construct and explain geometric figures that include specific properties.
Grade 5 Scoring Criteria- Proficiency 4				
5.1 Graph points in the coordinate plane to solve real-world and mathematical problems. (5G.A)	Students (I) can identify the origin, the x-axis and the y-axis.	With support, students (I) can graph points in the coordinate plane (1st quadrant) to solve simple real world and mathematical problems.	Students (I) can graph points in the coordinate plane (1st quadrant) to solve real-world and mathematical problems.	Students (I) can graph points in the coordinate plane (all 4 quadrants) to solve multi-step real-world and mathematical problems and create models of solutions.
5.2 Classify two-dimensional figures into categories based on their properties. (5G.B)	Students (I) can identify the properties of two dimensional figures	With support, students (I) can classify simple two dimensional figures into categories based on their properties.	Students (I) can classify two-dimensional figures into categories based on their properties,	Students (I) can represent three-dimensional figures using nets made up of rectangles and triangles, and use the nets to find the surface area of these figures. Students (I) can apply these techniques in the context of solving real-world and mathematical problems.

Graduation Proficiency #4: **Geometry**

Understand geometric concepts and constructions, prove theorems, and apply appropriate results to solve problems.				
Middle School 6-8				
Performance Indicators: 6.1 Solve real-world and mathematical problems involving area, surface area, and volume. (6G.A) 7.1 Draw construct, and describe geometrical figures and describe the relationships between them. (7G.A) 7.2 Solve real-life and mathematical problems involving angle measure, area, surface area, and volume. (7G.B) 8.1 Understand congruence and similarity using physical models, transparencies, or geometry software. (8G.A) 8.2 Understand and apply the Pythagorean Theorem. (8G.B) 8.3 Solve real-world and mathematical problems involving volume of cylinders, cones, and spheres. (8G.C)				
Grade 6 Scoring Criteria- Proficiency 4				
Performance Indicator	*Getting Started*	*Making Progress*	*Proficient*	*Going Beyond*
6.1 Solve real-world and mathematical problems involving area, surface area, and volume. (6G.A)	Students (I) can solve mathematical problems involving area of rectangles .	Students (I) can solve mathematical problems using a formula or equation for area, surface area, and volume.	Students (I) can solve real- world and mathematical problems involving area, surface area, and volume.	Students (I) can solve real-life and mathematical problems involving angle measure, area, surface area, and volume.
Grade 7 Scoring Criteria-Proficiency 4				
7.1 Draw construct, and describe geometrical figures and describe the relationships between them. (7G.A)	Students (I) can draw and describe geometric figures.	Students (I) can draw,construct and describe geometrical figures.	Students (I) can draw, construct and describe geometrical figures and describe the relationships between them.	Students (I) can defend a mathematical model by drawing, constructing and describing geometric figures in an authentic context that exists across disciplines.

7.2 Solve real-life and mathematical problems involving angle measure, area, surface area, and volume. (7G.B)	Students (I) can define the terms related to angle measure, area, surface area, and volume.	Students (I) can solve mathematical problems involving angle measure, area, surface area, and volume.	Students (I) can solve real-life and mathematical problems involving angle measure, area, surface area, and volume.	Students (I) can create geometric figures and analyze and compare their general properties and solve complex multi-step problems involving angle measure, area, surface area, and volume of composite polygons and solids.
Grade 8 Scoring Criteria- Proficiency 4				
8.1 Understand congruence and similarity using physical models, transparencies, or geometry software. (8G.A)	Students (I) can identify congruent *or* similar figures.	Students (I) can identify congruent AND similar figures.	Students (I) can understand congruence and similarity using physical models, transparencies, or geometry software.	Students (I) can prove congruence and similarity using physical models, transparencies, or geometry software.
8.2 Understand and apply the Pythagorean Theorem. (8G.B)	Students (I) can identify the parts of a right triangle.	Students (I) can use the Pythagorean Theorem to solve a right triangle for a missing side.	Students (I) can analyze a problem situation to determine when Students (I) can use the Pythagorean Theorem. AND Students (I) can apply the Pythagorean Theorem correctly within a complex context.	Students (I) can create a complex situation in which the Pythagorean Theorem could be used to find new and important information about the situation. *OR* Students (I) can use a visual representation to explain a proof of the Pythagorean Theorem.

8.3 Solve real-world and mathematical problems involving volume of cylinders, cones, and spheres. (8G.C)	Students (I) can identify the formulas for the volume of cylinders, cones, and spheres.	Students (I) can solve mathematical problems involving volume of cylinders, cones or spheres, using a formula.	Students (I) can solve real-world and mathematical problems involving volume of cylinders, cones and spheres.	Students (I) can design real-world problems involving volume of cylinders, cones and spheres that exist across disciplines.

Graduation Proficiency #4: **Geometry**

Understand geometric concepts and constructions, prove theorems, and apply appropriate results to solve problems.

The Students proves, understands, and models geometric concepts using appropriate tools, theorems and constructions to solve problems and apply logical reasoning.

Geometric sense allows Students to comprehend space and shape. Students analyze the characteristics and relationships of shapes and structures, engage in logical reasoning, and use tools and techniques to determine measurement. Students learn that geometry and measurement are useful in representing and solving problems in the real world as well as in mathematics.

High School 9-12

Performance Indicators:

1. Define and understand congruence in terms of transformations and rigid motions and use these transformations and geometric constructions to prove geometric theorems. (HSG.CO.1, 2, 3, 4, 5, 6 , 7, 8, 9, 10)
2. Understand similarity in terms of transformations and prove theorems involving similarity. (HSG.SRT.1,2,3,4,5)
3. **Define trigonometric ratios and solve problems involving right triangles and apply trigonometry to general triangles (HSG.SRT.6, 7, 8, 9, 10, 11; HSF.TF.9)
4. Understand and apply theorems about circles and find arc lengths and areas of sectors of circles. (HSG.C.1, 2, 3, 4, 5) (PreCal #5)
5. **Translate between the geometric description and the equation for a conic section and use coordinates to prove simple geometric theorems algebraically. (HSG.GPE.1,2,3)
6. **Visualize relationships between two-dimensional and three-dimensional objects and explain volume formulas and use them to solve problems. (HSG.GMD.1, 2, 3, 4)
7. Apply geometric concepts such as properties of figures, distance and midpoint formulas, and slope, to prove geometric shapes. (HSG.CO.11, 12,13; HSG.GPE.4,5,6,7)
8. **Apply geometric concepts such as density and volume to describe objects and solve design problems. (HSG.MG.1, 2, 3)

Performance Indicator	*Getting Started*	*Making Progress*	*Proficient*		*Going Beyond*
1.Define and understand congruence in terms of transformations and rigid motions and use these transformations and geometric constructions to prove geometric theorems. HSG.CO.6 , 7, 8, 9, 10 , HSG.CO.1, 2,3,4,5	Students (I) can define congruence and identify geometric transformations.	Students (I) can classify geometric figures as being congruent, understand the difference between rigid motion and dilations, and know essential theorems and properties needed for geometric proofs.	Students (I) can define and understand congruence in terms of transformations and rigid motions and use these transformations and geometric constructions to prove geometric theorems.		Students (I) can create and justify a congruence statement using geometric constructions and proofs.
2. Understand similarity in terms of transformations and prove theorems involving similarity. HSG.SRT.1,2,3,4,5	Students (I) can define similarity.	Students (I) can classify geometric figures as being similar using the appropriate theorem.	Students (I) can understand similarity in terms of transformations and prove theorems involving similarity.		Students (I) can create and justify a similarity statement.
3. **Define trigonometric ratios and solve problems involving right triangles and apply trigonometry to general triangles HSG.SRT.6, 7, 8, 9, 10, 11 HSF.TF.9	Students (I) can list the trigonometric ratios.	Students (I) can solve problems involving right triangles when given the appropriate trigonometric ratio to use.	Students (I) can define trigonometric ratios and solve problems involving right triangles and apply trigonometry to general triangles.		Students (I) can apply multiple trigonometric ratios in order to solve a problem in context.
4. Understand and apply theorems about circles and find arc	Students (I) can recognize theorems about circles	Students (I) can distinguish between the various theorems	Students (I) can understand and apply theorems		Students (I) can apply theorems about circles, arc

lengths and areas of sectors of circles. HSG.C.1, 2, 3, 4, 5	and identify arc length and area of a sector.	about circles and use given formulas to solve for arc length and area of a sector.	about circles and find arc lengths and areas of sectors of circles.		length, and area of a sector in order to solve problems in context.
5. **Translate between the geometric description and the equation for a conic section and use coordinates to prove simple geometric theorems algebraically. **HSG.GPE.1,2,3**	Students (I) can identify the graphs of conic sections.	Students (I) can recognize the equations of conic sections and can match them to the graphs.	Students (I) can translate between the geometric description and the equation for a conic section and use coordinates to prove simple geometric theorems algebraically.		Students (I) can connect the geometric description, equation, and graph of conic sections to a given situation.
6. **Visualize relationships between two-dimensional and three-dimensional objects and explain volume formulas and use them to solve problems. **HSG.GMD.1, 2, 3, 4**	Students (I) can recall the parts of a formula for different shapes in two- and three-dimensions.	Students (I) can label the parts of a formula for different shapes in two- and three-dimensions and explain the relationship between the two- and three-dimensional objects.	Students (I) can visualize relationships between two-dimensional and three-dimensional objects and explain volume formulas and use them to solve problems.		Students (I) can develop a formula for different shapes in two- and three-dimensions and modify it to solve problems.
7. Apply geometric concepts such as properties of figures, distance and midpoint formulas, and slope, to prove geometric shapes. HSG.CO.11, 12,13 HSG.GPE.4,5,6,7	Students (I) can identify quadrilaterals by their properties.	Students (I) can use the formulas to find the distance and midpoint when given two points.	Students (I) can apply geometric concepts such as properties of figures, distance and midpoint formulas, and slope, to prove geometric shapes.		Students (I) can synthesize information precisely in order to create figures which meet specific criteria.

8. **Apply geometric concepts such as density and volume to describe objects and solve design problems. **HSG.MG.1, 2, 3**	Students (I) can describe objects using geometric shapes.	Students (I) can apply geometric concepts such as density and volume to describe objects.	Students (I) can apply geometric concepts such as density and volume to describe objects and solve design problems.		Students (I) can synthesize information precisely in order to design an object which meets specific criteria.

Graduation Proficiency #5: **Statistics and Probability**

Interpret and apply statistics and probability to analyze data, reach and justify conclusions, and make inferences.

Elementary K-2

Performance Indicators:

K.1 Describe and compare measurable attributes. (K.MD.1)
K.2 Classify objects and count the number of objects in each category. (K.MD.2)
1.1 Measure lengths indirectly and by iterating length units.(1.MD.1)
1.2 Tell and write time. (1.MD.3)
1.3 Represent and interpret data. (1.MD.4)
2.1 Measure and estimate lengths in standard units. (2.MD.3)
2.2 Relate addition and subtraction to length. (2.MD.6)
2.3 Work with time and money. (2.MD.8)

Kindergarten Scoring Criteria- Proficiency 5

Performance Indicator	*Getting Started*	*Making Progress*	*Proficient*	*Going Beyond*
K.1 Describe and compare measurable attributes. (K.MD.A)	Students (I) can describe an object based on a measurable attribute.	Students (I) can describe and compare objects to one another.	Students (I) Can describe and compare measurable attributes of a group of objects.	Students (I) I can describe and compare specific measurable attributes of a group of objects.

K.2 Classify objects and count the number of objects in each category. (K.MD.B)	With support, students (I) can classify some objects into categories.	With support, students (I) can classify some objects into categories and count the number of objects in each category up to 10	Students (I) can classify objects into given categories and count the number of objects in each category.	Students (I) can create three or more categories and classify objects into those categories. Students (I) can count the number of objects in each category.
Grade 1 Scoring Criteria-Proficiency 5				
1.1 Measure lengths indirectly and by iterating length units.(MD.A)	With support, students (I) can measure lengths indirectly	With support, students (I) can measure lengths indirectly and by iterating simple (to 10) units	Students (I) can measure lengths indirectly and by iterating length units	Students (I) can measure lengths indirectly and measure a single object in more than one unit
1.2 Tell and write time. (MD.B)	With modeling and support, students (I) can tell and write time.	With support, students (I) can tell and write time.	Students (I) can tell and write time .	Students (I) can tell and write time on an analog and digital clock
1.3 Represent and interpret data. (MD.C)	With significant support and modeling, students (I) can, represent and interpret data	With support,students (I) can represent and interpret data.	Students (I) can represent and interpret data	Students (I) can independently collect, represent and interpret data in a variety of contexts and in problems that exist across disciplines.
Grade 2 Scoring Criteria- Proficiency 5				
2.1 Measure and estimate lengths in standard units.	Students (I) can measure and estimate lengths by	Students (I) can measure and estimate the length of	Students (I) can estimate and measure the length	Students (I) can estimate and measure the length

(2MD)	measuring a single object in more than one unit.	an object by selecting and using appropriate tools such as rulers, yardsticks, meter sticks, and measuring tapes with support. Students (I) can estimate and measure the length of an object twice, using length units of different lengths for the two measurements; describe how the two measurements relate to the size of the unit chosen with support.	of an object by selecting and using appropriate tools such as rulers, yardsticks, meter sticks, and measuring tapes. Students (I) can also estimate and measure the length of an object twice, using length units of different lengths for the two measurements; describe how the two measurements relate to the size of the unit chosen. Students (I) can also estimate lengths using units of inches, feet, centimeters, and meters. Students (I) can also measure to determine how much longer one object is than another, expressing the length difference in terms of a standard length unit.	of an object by selecting and using appropriate tools such as rulers, yardsticks, meter sticks, and measuring tapes using halve and fourths or tenths of the unit (fractions or decimals) Students (I) can also estimate and measure the length of an object twice, using length units of different lengths for the two measurements using fractions or decimals.; describe how the two measurements relate to the size of the unit chosen. Students (I) can also estimate lengths using units of inches, feet, centimeters, and meters. Students (I) can also measure to determine how much longer one object is than another, expressing the length difference in terms of a standard length unit using fractions or decimals.
2.2 Relate addition and subtraction to length. (2MD)	Students (I) can use addition and subtraction within 100 to solve word	Students (I) can use addition and subtraction within 100 to solve word	Students (I) can use addition and subtraction within 100 to solve word	Students (I) can use addition and subtraction to determine perimeter

	problems involving lengths that are given in the same units, e.g., by using drawings (such as drawings of rulers).	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. OR Students (I) can 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.	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. Students (I) can also 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.	and area within 100 to solve word problems involving lengths that are given in units, e.g., by using drawings (such as drawings of rulers) and equations with a symbol for the unknown number to represent the problem. Students (I) can also 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.
2.3 Work with time and money. (2MD)	Students (I) can identify dollar denominations and coins and telling time to hour and half hour.	Students (I) can tell and write time from analog and digital clocks to the nearest five minutes, using a.m. and p.m. and Students (I) can solve word problems involving dollar bills, quarters, dimes, nickels, and pennies, using $ and ¢ symbols appropriately with support	Students (I) can tell and write time from analog and digital clocks to the nearest five minutes, using a.m. and p.m. and Students (I) can solve word problems involving dollar bills, quarters, dimes, nickels, and pennies, using $ and ¢ symbols appropriately.	Students (I) can tell and write time from analog and digital clocks to the nearest five minutes, using a.m. and p.m. and can solve word problems involving time and money.

Graduation Proficiency #5: **Statistics and Probability**

Interpret and apply statistics and probability to analyze data, reach and justify conclusions, and make inferences.

Elementary 3-5

Performance Indicators:

3.1 Solve problems involving measurement and estimation. (3.MD.2)
3.2 Represent and interpret data. (3.MD.3)
3.3 Geometric measurement: understand concepts of area and relate area to multiplication and to addition. (3.MD.5)
4.1 Solve problems involving measurement and conversion of measurements. (4MD.2)
4.2 Geometric measurement: understand concepts of angle and measure angles. (4.MD.3)
4.3 Represent and interpret data. (4.MD.4)
5.1 Convert like measurement units within a given measurement system. (5.MD.1)
5.2 Represent and interpret data. (5.MD.2)
5.3 Geometric measurement; understand concepts of volume. (5.MD.3)

Grade 3 Scoring Criteria- Proficiency 5

Performance Indicator	*Getting Started*	*Making Progress*	*Proficient*	*Going Beyond*
3.1 Solve problems involving measurement and estimation. (3MD)	Students (I) can tell and write time to the nearest hour and measure time intervals in hours. With support, students (I) can solve word problems involving addition and subtraction of time intervals in hours. Students (I) can measure liquid volumes and masses of objects (using grams, kilograms, liters) Students (I) can add or subtract to solve one-step word problems involving	With support, students (I) can tell and write time to the nearest minute and measure time intervals in minutes. Students (I) can solve word problems involving addition and subtraction of time intervals in hours. With support, students (I) can measure and estimate liquid volumes and masses of objects (using grams, kilograms, liters)	Students (I) can tell and write time to the nearest minute and measure time intervals in minutes. Students (I) can solve word problems involving addition and subtraction of time intervals in minutes. Students (I) can measure and estimate liquid volumes and masses of objects (using grams, kilograms, liters) Students (I) can add, subtract, multiply, or	Students (I) can tell and write time to the nearest second and measure time intervals in seconds. Students (I) can solve word problems involving addition and subtraction of time intervals in minutes and seconds. Students (I) can measure and estimate liquid volumes and masses of objects (using grams, kilograms, liters) Students (I) can add, subtract, multiply, or divide

	masses or volumes that are given in the same units.	Students (I) can add, subtract, or multiply to solve one-step word problems involving masses or volumes that are given in the same units.	divide to solve one-step word problems involving masses or volumes that are given in the same units.	to solve two-step word problems involving masses or volumes that are given in the different units.
3.2 Represent and interpret data. (3MD)	With a lot of support, students (I) can ask questions, gathers information, attempt to represent data.	Students (I) can ask a variety of questions, gather information, and represent data.	Students (I) can collect, represent, and interpret data with multiple categories.	Students (I) can 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. 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.

3.3 Geometric measurement: understand concepts of area and relate area to multiplication and to addition. (3MD)	With support, students (I) can define area	With support and a given formula, Students (I) can find the area of a square and a rectangle Or with support, students (I) can use addition and multiplication to find the area of a square and a rectangle. Measure areas by counting unit squares	Students (I) can use a given formula to find the area of a variety of two dimensional shapes	Students (I) can recognize area as an attribute of plane figures and understand concepts of area measurement Students (I) can relate area to the operations of multiplication and addition.
Grade 4 Scoring Criteria-Proficiency 5				
4.1 Solve problems involving measurement and conversion of measurements. (4MD.A)	Students (I) know relative size of measurement units, within one system of units.	Students (I) can solve simple problems involving measurement and conversion of measurement within the metric system.	Students (I) can solve problems involving measurement and conversion of measurements	Students (I) can solve complex and multi-step problems involving measurement and conversion of measurements.
4.2 Geometric measurement: understand concepts of angle and measure angles. (4MD.C)	Students (I) can measure benchmark angles and recognizes that angle measure is additive.	Students (I) understand that angles are measured in reference to a circle, and can measure angles in whole number degrees using a protractor and can solve addition and subtraction real-world mathematical problems to find unknown angles on a diagram with no more than two angles, within a 180-degree angle.	Students (I) understand that angles are measured in reference to a circle, and can measure angles in whole number degrees using a protractor. Students (I) can also sketch angles of specific measure and solve addition and subtraction real-world mathematical problems to find unknown angles on a diagram.	Students (I) can recognize how angles are formed, understand that angles are measured in reference to a circle, and can measure angles in whole number degrees using a protractor. Students (I) can sketch angles of specific measure and given angle parameters, decompose into multiple angles and gives the measure of each angle in relationship to the whole.

4.3 Represent and interpret data. (4MD.B)	Students (I) can make a line plot to display a data set of measurements in fractions of a unit (with like denominators of 2 or 4).	Students (I) can make a line plot to display a data set of measurements in fractions of a unit (with like denominators of 2 or 4), and uses addition and subtraction of fractions to solve problems involving information in the line plot.	Students (I) can make a line plot to display a data set of measurements in fractions of a unit (with like denominators limited to 2, 4 and 8), and uses addition and subtraction of fractions to solve problems involving information in the line plot.	Students (I) can use data in a line plot to solve a multi-step word problem.
Grade 5 Scoring Criteria- Proficiency 5				
5.1 Convert like measurement units within a given measurement system. (5MD.A)	With support, students (I) can recognize different kinds of units within a given measurement system	With support, students (I) can convert some like measurement units within a given measurement system	Students (I) can convert among different-sized standard measurement units within a given measurement system.	Students (I) can convert among different-sized standard measurement units within a given measurement system and use these conversions in solving multi-step, real-world problems.
5.2 Represent and interpret data. (5MD.B)	Students (I) can plot data on a given line plot using unit fractions	Students (I) can make a line plot to represent data using unit fractions	Students (I) can make a line plot to display a data set of measurements in fractions of a unit (1/2, 1/4, 1/8) and use operations on fractions to solve problems	Students (I) can make a line plot to display a data set of measurements in fractions of a unit (1/2, 1/4, 1/8) and can solve multistep word problems using the four operations and interpret the solution to the data.
5.3 Geometric measurement; understand concepts of	Students (I) can use unit cubes to find the volume of rectangular	Students (I) can use unit cubes(number of unit cubes, edge length,	Students (I) can use unit cubes (number of unit cubes, edge length,	Students (I) can compare the volumes of different prisms by

volume. (5MD.C)	prisms with whole number edges (limited to single digit dimensions) and solves volume problems of a right rectangular prism that would be solved by finding volume by using unit cubes..	height) to find the volume of rectangular prisms and use the information that the number of unit cubes is related to the edge length. Students (I) can also solve volume problems by relating the number of unit cubes in a prism to the multiplication of the edge lengths.	height) to find the volume of rectangular prisms and represent the volume of a solid figure as n cubic units. Students (I) can also solve real-world and mathematical problems by applying the formulas for volume and find the volume of two non-overlapping right rectangular prisms by adding the volumes of the two non-overlapping parts.	using unit cubes and create real-world mathematical problems that would be solved by finding volume.

Graduation Proficiency #5:**Statistics and Probability** Interpret and apply statistics and probability to analyze data, reach and justify conclusions, and make inferences.				
Middle School 6-8				
Performance Indicators: 6.1 Develop understanding of statistical variability. (6SP.A) 6.2 Summarize and describe distributions. (6SP.B) 7.1 Use random sampling to draw inferences about a population. (7SP.A) 7.2 Draw informal comparative inferences about two populations. (7SP.B) 7.3 Investigate chance processes and develop, use, and evaluate probability models. (7SP.C) 8.1 Investigate patterns of association in bivariate data. (8SP.A)				
Grade 6 Scoring Criteria- Proficiency 5				
Performance Indicator	*Getting Started*	*Making Progress*	*Proficient*	*Going Beyond*

6.1 Develop understanding of statistical variability. (6SP.A)	Students (I) can define variability.	Students (I) can calculate statistical variability.	Students (I) can demonstrate an understanding of statistical variability given a known set.	Students (I) apply the concept of statistical variability to make inferences
6.2 Summarize and describe distributions. (6SP.B)	Students (I) can recognize distributions.	Students (I) can summarize or describe distributions.	Students (I) can summarize and describe distributions.	Students (I) can analyze and synthesize distributions from multiple sources.
Grade 7 Scoring Criteria-Proficiency 5				
7.1 Use random sampling to draw inferences about a population. (7SP.A)	Students (I) can conduct a random sample of a population.	Students (I) can organize data from a random sample of a population.	Students (I) can use random sampling to draw inferences about a population.	Students (I) can analyze and synthesize information from multiple random samplings of a population.
7.2 Draw informal comparative inferences about two populations. (7SP.B)	Students (I) can compare information about two populations.	Students (I) can interpret comparative inferences about two populations.	Students (I) can draw informal comparative inferences about two populations.	Students (I) can design a situation in which Students (I) can draw informal comparative inferences about two populations.
7.3 Investigate chance processes and develop, use, and evaluate probability models. (7SP.C)	Students (I) can identify situations involving chance.	Students (I) can evaluate situations involving chance using probability models.	Students (I) can investigate chance processes and develop, use, and evaluate probability models.	Students (I) can analyze and synthesize information from multiple sources involving chance processes.

Grade 8 Scoring Criteria- Proficiency 5				
8.1 Investigate patterns of association in bivariate data. (8SP.A)	Students (I) can define bivariate data.	Students (I) can collect and display patterns of association in bivariate data.	Students (I) can investigate patterns of association in bivariate data.	Students (I) can analyze patterns of association in bivariate data.

Graduation Proficiency #5:**Statistics and Probability**

Interpret and apply statistics and probability to analyze data, reach and justify conclusions, and make inferences.

The Students uses a variety of data analysis and statistics strategies to analyze, develop and evaluate inferences based on data.

The use of data and probability provide Students with tools to understand information and uncertainty. Students ask questions and gather and use data to answer them. Probability provides the foundation for collecting, describing, and interpreting data.

High School 9-12

Performance Indicators:

1.**Summarize, represent, and interpret data in a single variable or two variables and interpret linear models. (HSS.ID.1,3,5,6,6a,c,7,8,9)

2.**Understand and evaluate random processes underlying statistical experiments and make inferences and justify conclusions from sample surveys, experiments and observational studies. (HSS.IC.1,2,3,4,5,6)

3. Understand independence and conditional probability, use them to interpret data, and use the rules of probability to compute probabilities of compound events in a uniform probability model.(HSS.CP.1,2,3,4,5,6,7,8,9)

4. Calculate expected values and use them to solve problems, and use probability to evaluate outcomes of decisions. (HSS.MD.1,2,3,4,5,5a,5b,6,7)

5. **Use the center and spread of two or more different data sets to fit it to a model and estimate population based on that model. (HSS.ID.2, 4)

Performance Indicator	*Getting Started*	*Making Progress*	*Proficient*	*Going Beyond*
1. **Summarize, represent, and interpret data in a single variable or two variables and interpret linear models.	Students (I) can identify a box plot, histogram, number line, or dot plot for a given data set in one variable. Further, the Students (I) can recognize	Students (I) can represent data with an appropriate model. Further, Students (I) can identify slope and	Students (I) can summarize, represent, and interpret data in a single variable or two	Students (I) can draw conclusions from a linear model, make contextual conclusions about trends in the

HSS.ID.1,3,5,6,6a,c,7,8,9	when two variables have a constant rate of change in a linear model.	y-intercept of a linear model.	variables and interpret linear models.	data. Students (I) can relate the correlation coefficient to causation in a contextual model.
2.Understand and evaluate random processes underlying statistical experiments and make inferences and justify conclusions from sample surveys, experiments and observational studies.** **HSS.IC.1,2,3,4,5,6**	Students (I) can define random process, sample, survey, experiment, and observational study.	Students (I) can explain the effect bias has on a sample and describe and compare sample surveys, experiments, and observations.	Students (I) can understand and evaluate random processes underlying statistical experiments and make inferences and justify conclusions from sample surveys, experiments and observational studies.	Students (I) can design an experiment that minimizes bias and make predictions from sample surveys, experiments, and observational studies.
3. Understand independence and conditional probability, use them to interpret data, and use the rules of probability to compute probabilities of compound events in a uniform probability model. **HSS.CP.1,2,3,4,5,6,7,8,9**	Students (I) can describe events as subsets of a sample space and state the addition rule for compound events.	Students (I) can explain what makes events independent and identify the probability of an event occurring.	Students (I) can understand independence and conditional probability, using them to interpret data, and use the rules of probability to compute probabilities of compound events in a uniform probability model.	Students (I) can justify my reasoning for why two events are independent and evaluate the probability of compound events in a non-uniform probability model.
4. Calculate expected values and use them to solve problems, and use probability to evaluate outcomes of decisions. **HSS.MD.1,2,3,4,5,5a,5b,6,7**	Students (I) can define expected value.	Students (I) can calculate expected value given the formula.	Students (I) can calculate expected values and use them to solve problems, and use probability to evaluate outcomes of decisions.	Students (I) can design a situation and make predictions based on probability and expected value.

5. **Use the center and spread of two or more different data sets to fit it to a model and estimate population based on that model. **HSS.ID.2, 4**	Students (I) can define the center and spread of data.	Students (I) can calculate the center and spread of data.	Students (I) can explain in context the center and spread of two or more different data sets..	Students (I) can use contextual data from two or more data sets and draw conclusions based on the distribution and spread.