Middle School Mathematics Collaborative Instructional Framework

The following Collaborative Instructional Framework is meant to serve as a guide for teachers and districts as they organize the curriculum for the school year. Unlike traditional pacing guides, the instructional framework consists of clusters of standards that are meant to be adapted to various schools and contexts. The instructional framework used research on students' learning progression in mathematics to create and order clusters of standards that are taught together. While there is a strongly suggested order for teaching the clusters, we recognize that schools differ in their contexts and may wish to switch the order around. In those cases, we have given guidance regarding alternative clusterings; however, we note when certain clusters need to be taught in a certain order.

The Collaborative Instructional Framework was created over a five-month period, beginning in July. Twenty individuals from NC DPI, classroom teachers, district leaders, and university faculty worked together to a) read research about pacing guides, student learning progressions, and standards, b) determine the best clusterings per grade level based upon research, when possible, and c) wrote this draft of the framework. The members of this Middle School Framework Team include: Jen Arberg, Lisa Ashe, Stefanie Buckner, Caroline Butler, Chris Cline, Tara Costenoble, Dr. Deborah Crocker, Jill Hooley, Robert Leichner, Kim McCuiston, Dr. Katherine Mawhinney, Dr. Gemma Mojica, Nicolette Morgan, Joseph Reaper, Claudette Reep, Dr. Luke Reinke, Melanie Richey, Audrea Saunders, Patricia Shumaker, and Stacy Wozny. These mathematics professionals represent the four main regions of NC as well as urban, rural, and charter schools. Special thanks to Joseph Reaper and Lisa Ashe from NC DPI for providing guidance and checking for consistency among the framework and DPI resource documents.

CCSS.MATH.PRACTICE.MP1
Make sense of problems and persevere in solving them.

CCSS.MATH.PRACTICE.MP2
Reason abstractly and quantitatively.

CCSS.MATH.PRACTICE.MP3
Construct viable arguments and critique the reasoning of others.

CCSS.MATH.PRACTICE.MP4
Model with mathematics.

CCSS.MATH.PRACTICE.MP5
Use appropriate tools strategically.

CCSS.MATH.PRACTICE.MP6
Attend to precision.

CCSS.MATH.PRACTICE.MP7
Look for and make use of structure.

CCSS.MATH.PRACTICE.MP8
Look for and express regularity in repeated reasoning.

Standards for Mathematical Practice

The Standards for Mathematical Practice are critical ways of acting and communicating in classrooms that should be instilled in students throughout the school year. Whether students are learning to reason proportionally or statistically, they should be obliged to make sense of the problems posed (MP1) and create a mathematical solution that can contribute to their peers' and their own learning. When solving a problem, such as which company is the cheapest when comparing the prices of t-shirts, students should be able to create a viable argument for their choice, with mathematical evidence to defend their solution (MP3). Students should be able to move among various representations, reasoning quantitatively with symbols (MP2) and creat models of both everyday and mathematical situations they encounter (MP4). Teachers should provide opportunities for students to reason with a variety of tools (MP5), including technologies that are specific to mathematics (e.g., calculators, Desmos, GeoGebra, etc.). Attending to precision (MP6) is a practice in which students attempt to present clear arguments, definitions, and meanings for symbols as they explain their reasoning to others. Finding patterns and structure is crucial throughout the standards as students attempt to mathematize complex problem situations (MP7). Finally, students should attempt to find regularity in reasoning, such as recognizing that the slope is the coefficient of the x term in a linear equation.

6th Grade Mathematics Clusters

The clusters are recommended using the progression below, but this is not the only possible progression teachers may use. Please look to the "Connections & Rationale" for notes about when one cluster must follow another, if another progression is desired. Also, continue to focus on how the Standards for Mathematical Practice can be incorporated with these content clusters.

A significant emphasis should be placed on building number sense related to the field of rational numbers, including decimals, fractions, ratios and integers and the interconnections among them. While it appears that much of 6th grade can be interpreted as learning several operations, we underscore that the procedures should follow students' deep exploration of the quantities first.

Please pay attention to the "Supporting Standards" and "Connections & Rationale" portions of this recommendation. These tools should help to connect mathematical concepts across the units, and to highlight potential opportunities for revisiting previous units' main ideas.

Recommended Order
Reasoning with Area and Surface Area Cluster
Reasoning with Factors and Multiples Cluster
Ratio Reasoning Cluster
Division of Fractions Conceptions Cluster
Making Sense of Decimal Computations Cluster
Integer and Rational Number Reasoning Cluster
Making Sense of Coordinate Planes Cluster
Reasoning with Algebraic Expressions Cluster
Reasoning with Algebraic Equations Cluster
Making Sense of Volume Cluster
Statistical Reasoning Cluster

6^{th} Grade Mathematics Clusters

Standards/Cluster	Recommended Timeframe	Supporting Standards	Important Notes
Jo Boaler's Week of Inspirational Math - Week 1 **-Or-** **Other problem solving and environment-building activities**	**1 week**		The intention of the first week(s) of class is to establish the mindset that math involves searching for interesting patterns and that the associated "struggle" can be productive and enjoyable. Also, use this time to establish norms of participating in a discussion-oriented classroom. These norms should be reinforced throughout the year. Day 1's activity, 4 Fours, has students reviewing basic addition, subtraction, multiplication, and division, and exploring order of operations. Day 2's activities explore factors and multiples. Day 3's activities explore basic knowledge of area, squares, triangles, and fractional understanding, Day 4's activities explore patterns in Pascal's Triangle and triangular numbers.

			Day 5's activity explores a visual pattern that can lead to building a table.
Reasoning with Area and Surface Area Cluster **NC.6.G.1** Create geometric models to solve real-world and mathematical problems to: • Find the area of triangles by composing into rectangles and decomposing into right triangles. • Find the area of special quadrilaterals and polygons by decomposing into triangles or rectangles. **NC.6.G.4** Represent right prisms and right pyramids using nets made up of rectangles and triangles, and use the nets to find the surface area of these figures. Apply these techniques in the context of solving real-world and mathematical problems.	**2 weeks**	**This cluster is a supporting standard for:** **NC.6.NS.1** **NC.6.NS.2** **NC.6.NS.3** **NC.6.EE.7** **Geometric models provide contexts that can be used in the later clusters that contain these standards.**	In this cluster**,** students explore area of parallelograms and triangles to explain why the formulas work, then compose and decompose composite polygons to find their area. Students also explore nets of right prisms and right pyramids to find the surface area of 3-dimensional figures. **Connections:** Within this cluster, the two standards are related because work with surface area in **NC.6.G.4** builds from area work in **NC.6.G.1**. We recommend this cluster as a possible beginning point for 6th grade because students can review 5th grade computational standards and 4th grade geometry standards (NC.4.MD.3) while composing and decomposing polygons. Tasks requiring students to calculate the

			area of rectangles and triangles provide the opportunity to review multiplication of multi-digit whole numbers (NC.5.NBT.5), multiplication of decimals using models, drawings or place value strategies (NC.5.NBT.7), and multiplication of fractions using area models (NC.5.NF.4). Tasks where the areas are given and particular lengths are missing provide the opportunity to review division of whole numbers using various strategies (NC.5.NBT.6) and division of unit fractions by whole numbers and vice versa using area models (NC.5.NF7) . Many 6th graders struggle with multiplication and division of multidigit numbers, decimals and fractions, so reviewing these concepts at the beginning of the year using the context of area allows them to practice using visual and place value strategies before moving toward mastery of the more abstract, formal algorithms. Also, the mathematical practices related to problem solving can be reinforced through problems in this standard which involve visual decomposition.

			Problems in which the area is known and students are asked to find a missing dimension should be limited to the types of values students have engaged with in 5th grade (see above). However, those problems can provide a relevant context in the Division of Fractions and Decimal Computation Clusters to explore division computation.
Reasoning with Factors and Multiples Cluster **NC.6.NS.4** Understand and use prime factorization and the relationships between factors to: • Find the unique prime factorization for a whole number. • Find the greatest common factor of two whole numbers less than or equal to 100. • Use the greatest common factor and the distributive property to rewrite the sum of two whole numbers, each less than or equal to 100. • Find the least common multiple of two whole numbers less than or	**1 week**	**This cluster is a supporting standard for:** **NC.6.EE.1** **NC.6.EE.3** **NC.6.EE.4** **NC.6.RP.3** **NC.6.NS.1** **Use the later clusters containing these standards to review the ideas in this cluster.**	Students explore multiplication, factors, and multiples to extend their number sense in preparation for building proportional reasoning, operating with fractions, and understanding the distributive property in later clusters. **Connections:** The content in this cluster offers the opportunity to introduce exponents, which appear for the first time in **NC.6.EE.1,** because exponential expressions can be used in writing prime factorizations. There are two possible approaches to consider: exponents can be introduced here as a way of denoting whole number powers within prime factorizations, or prime factorizations can be written without

equal to 12 to add and subtract fractions with unlike denominators.			exponents here, then revisited after introducing exponents in the Algebraic Expressions cluster later. Either way, **NC.6.EE.1** should be introduced using connections between **NC.3.MD.7** and **NC.5.MD.5**. so that students make the geometric connections between an exponent of 2 and "squares" and an exponent of 3 and "cubes". For example, the area of a square with a side length of 4 is 4^2 or 16 square units and the volume of a cube with a side length of 4 is 4^3 or 64 cubic units. Connections could also be explored between base-10 place value (**NC.3.NBT.7**). Using base ten blocks is a simple way to demonstrate geometric patterns and magnitude in "exponential growth." Students should have familiarity with using the distributive property to write equivalent numerical expressions from earlier grades (**NC.5.OA.2**). The idea can be revisited in the Algebraic Expressions cluster through the use of the distributive property to rewrite sums (**NC.6.EE.3** and **NC.6.EE.4**).

			Work with finding common factors and multiples is recommended here, before the Ratios cluster and the Division of Fractions cluster, because finding common factors and common multiples is a skill used in identifying equivalent ratios **(NC.6.RP.3)** and common denominators **(NC.6.NS.1)**.
Ratio Reasoning Cluster **NC.6.RP.1** Understand the concept of a ratio and use ratio language to: • Describe a ratio as a multiplicative relationship between two quantities. • Model a ratio relationship using a variety of representations. **NC.6.RP.2** Understand that ratios can be expressed as equivalent unit ratios by finding and interpreting both unit ratios in context. **NC.6.RP.3** Use ratio reasoning with equivalent whole-number ratios to solve real-world and mathematical problems by • Creating and using a table to compare ratios. • Finding missing values in the tables. • Using a unit ratio.	**5 weeks**	**NC.6.NS.4** **This cluster is a supporting standard for: NC.6.EE.9** **Use the later clusters containing these standards to review the ideas in this cluster.**	In this cluster, through standards **NC.6.RP.1, 2, and 3,** students explore and solve problems using ratios, ratio tables, unit ratios, and proportional reasoning. They should explore tape diagrams and double number lines to help them understand the multiplicative relationships involved in ratio reasoning. They should explore the vertical and horizontal multiplicative relationships of ratio tables. They should connect the multiplicative relationships of double number lines and ratio tables. They should take double number lines and see how they can turn them into graphs on the coordinate grid. They should also contrast multiplicative reasoning with additive reasoning to help them develop proportional

• Converting and manipulating measurements using given ratios. • Plotting the pairs of values on the coordinate plane. **NC.6.RP.4** Use ratio reasoning to solve real-world and mathematical problems with percents by: • Understanding and finding a percent of a quantity as a ratio per 100. • Using equivalent ratios, such as benchmark percents (50%, 25%, 10%, 5%, 1%), to determine a part of any given quantity. • Finding the whole, given a part and the percent.			reasoning, which is very important in being successful in algebra. **Connections:** **NC.6.RP.4** gives relevance to proportions by providing opportunities to explore percents as a ratio per 100. This context still allows practice and relevance for computations skill practice. Division of decimals and fractions could be addressed here using strategies learned in previous grades. Connections are made to **NC.6.NS.4,** as students multiply and divide both quantities by common factors to find equivalent ratios. Students should have familiarity with graphing in the first quadrant of the coordinate plane (**NC.5.G.1**), and this should be reviewed through **NC.6.RP.3**. Plotting related quantities on the coordinate plane is also addressed in **NC.6.EE.9**, which states that students use tables and graphs to analyze the relationship between two variables that change in relationship to one another.

			Here, in this Ratio cluster, the relationship between the quantities is always multiplicative, and plotting pairs of values is limited to Quadrant I of the coordinate plane. We recommend introducing the idea of using a coordinate plane to visualize the relationship between two variable quantities within this cluster, then connecting back to this idea later in the Algebraic Expressions cluster. Also, note that the double number line can be introduced here as a representation used for modeling ratio relationships (**NC.6.RP.1**) and then plotting on the coordinate plane can build directly from the double number line. Connecting the proportional relationships modeled with double number lines to the same proportional relationships graphed on the coordinate plane helps students understand the that the line connecting the points on the coordinate plane represents the "relationship" between the two quantities and that the coordinate

			plane is a more mature diagram to analyze the steepness (slope) of the relationships. This double number line can also be revisited within the Division of Fractions cluster (**NC.6.NS.1**).
Division of Fractions Conceptions Cluster **NC.6.NS.1** Use visual models and common denominators to: • Interpret and compute quotients of fractions. • Solve real-world and mathematical problems involving division of fractions.	**2 weeks**	**NC.6.NS.4** **NC.6.RP.3** **NC.6.G.1**	This cluster provides the opportunity to review two interpretations of division: partitive division (equal sharing) which answers the question, "how many in each group?" and measurement division (repeated subtraction), which answers the question, "how many groups?" Students should explore division of fractions through concrete and visual models to help them make connections between division of whole numbers and division of fractions.

			Connections: Visual models used to address division involving unit fractions in fifth grade (**NC.5.NF.7)** are emphasized in this cluster. This cluster also presents the opportunity to revisit **NC.6.G.1** using tasks that ask students to find the unknown dimensions of figures with fractional areas and side lengths. The use of common multiples to find common denominators connects to **NC.6.NS.4**. This cluster is also connected to **NC.6.RP.3** through the use of a common visual model, the double number line.

Making Sense of Decimal Computations Cluster **NC.6.NS.2** Fluently divide using long division with a minimum of a four-digit dividend and interpret the quotient and remainder in context. **NC.6.NS.3** Apply and extend previous understandings of decimals to develop and fluently use the standard algorithms for addition, subtraction, multiplication and division of decimals.	**3 weeks**	**NC.6.G.1**	To address **NC.6.NS.2,** students should have the opportunity to divide whole numbers using strategies from 5th grade but now with larger numbers; these strategies should form the conceptual foundation for understanding the standard division algorithm. Students should also explore the meaning of remainders in different contexts, including examples when determining the remainder is sufficient, examples when it makes sense to round down or up to the nearest whole number, and examples when it makes sense to represent the remainder as a fraction. When addressing **NC.6.NS.3**, students should make connections between previously developed strategies and standard algorithms, and can compare the various methods, identifying which are "easiest to understand", "most efficient" and "easiest to connect to the math of the context". **Connections:** **NC.6.NS.2** connects division done in 5th grade with arrays, area models, repeated subtraction and partial

			quotients (**NC.5.NBT.6**) to the standard division algorithm, which supports fluency with decimals in **NC.6.NS.3**. Connections to prior work with **NC6.G.1** can be made using problems which provide the area of rectangles, triangles, or other polygons and asking students to find the length of particular unknown sides. This cluster was placed here, rather than at the beginning of the year, to avoid a focus on procedures and computational fluency early on and to provide the opportunity to review or possibly develop further those strategies that were the focus fifth grade before transitioning to a focus on the more abstract standard algorithms. Also, having covered quite a bit of geometry concepts and proportional reasoning allows for the use of geometric models and conversions as relevant contexts for practice in this cluster. Any modifications to the recommended order should carefully preserve the following principle: students' initial

			experiences with multi-digit division and decimal computation in the 6th grade should draw on more informal methods of computation that were developed in 5th grade (see **NC.5.NBT.6** and **NC.5.NBT.7)**, because these models provide a conceptual foundation for the algorithms. Then, in this cluster, the focus should shift toward fluency with the standard algorithms, with connections made to the more informal, conceptually transparent strategies as much as is needed. The goal is for procedural fluency to be grounded in conceptual understanding.

Integer and Rational Number Reasoning Cluster
 	
NC.6.NS.5 Understand and use rational numbers to:
• Describe quantities having opposite directions or values.
• Represent quantities in real-world contexts, explaining the meaning of 0 in each situation.
• Understand the absolute value of a rational number as its distance from 0 on the number line to:
  • Interpret absolute value as magnitude for a positive or negative quantity in a real-world context.
  • Distinguish comparisons of absolute value from statements about order.
 	
NC.6.NS.6 Understand rational numbers as points on the number line and as ordered pairs on a coordinate plane.
a. On a number line:
  • Recognize opposite signs of numbers as indicating locations on opposite sides of 0 and that
	3 weeks	**This cluster is a supporting standard for:**
		NC.6.EE.7
		NC.6.EE.8
		
		Use the later clusters containing these standards to review the ideas in this cluster.
			In this cluster, students extend their understanding of the number line to include numbers that are below zero. They need ample time to explore, experience, and understand the location and relationships between rational numbers. A variety of real-world contexts can be used to help students make sense of negative numbers, including, for example, finance (assets, debts and net worth), altitude, and temperature.
			
			Connections
			The unifying representation in this entire cluster is the number line.
			
			We recommended that the idea of additive inverses (**NC.6.NS.9)** should be introduced in this unit using the number line as a conceptual aid then reinforced when additive inverses are used to solve equations (**NC.6.EE.7).**

the opposite of the opposite of a number is the number itself. • Find and position rational numbers on a horizontal or vertical number line. **NC.6.NS.7** Understand ordering of rational numbers. a. Interpret statements of inequality as statements about the relative position of two numbers on a number line diagram. b. Write, interpret, and explain statements of order for rational numbers in real-world contexts. **NC.6.NS.9** Understand additive inverses when adding and subtracting integers. • Describe situations in which opposite quantities combine to make 0. • Understand $p + q$ as the number located a distance q from p, in the positive or negative direction depending on the sign of q. Show that a number and its additive inverse create a zero pair. • Understand subtraction of integers as adding the additive inverse, $p - q = p + (-q)$. Show that the distance between two			

integers on the number line is the absolute value of their difference. • Use models to add and subtract integers from -20 to 20 and describe real-world contexts using sums and differences.			
Making Sense of Coordinate Planes Cluster **NC.6.NS.6** Understand rational numbers as points on the number line and as ordered pairs on a coordinate plane. b. On a coordinate plane: • Understand signs of numbers in ordered pairs as indicating locations in quadrants. • Recognize that when two ordered pairs differ only by signs, the locations of the points are related by reflections across one or both axes. • Find and position pairs of rational numbers on a coordinate plane. **NC.6.NS.8** Solve real-world and mathematical problems by graphing points in all four quadrants of the coordinate plane. Include use of coordinates and	**2 weeks**	**NC.6.NS.5** **NC.6.NS.6a** **NC.6.NS.9**	The core ideas of this cluster involve graphing points on the coordinate plane and finding the distance between points. **Connections:** The standards in this cluster connect to work done with a single number line in the Integers and Number Line cluster (**NC.6.NS.5, NC.6.NS.6a, NC.6.NS.9),** which students need to encounter prior to this cluster**.** Work with the coordinate plane involves simultaneously considering position on a horizontal number line and a separate vertical number line.

absolute value to find distances between points with the same first coordinate or the same second coordinate. **NC.6.G.3** Use the coordinate plane to solve real-world and mathematical problems by: • Drawing polygons in the coordinate plane given coordinates for the vertices. • Using coordinates to find the length of a side joining points with the same first coordinate or the same second coordinate.			
Reasoning with Algebraic Expressions Cluster **NC.6.EE.1** Write and evaluate numerical expressions, with and without grouping symbols, involving whole-number exponents. **NC.6.EE.2** Write, read, and evaluate algebraic expressions. • Write expressions that record operations with numbers and with letters standing for numbers. • Identify parts of an expression using mathematical terms and view one or	**3 weeks**	**NC.6.NS.4**	**In this cluster,** building students' understandings of algebraic expressions (**NC.6.EE.2)** from their work with numerical expressions (**NC.6.EE.1)** is of utmost importance. Algebraic expressions are used to generalize numerical expressions when one or more of the quantities varies. To emphasize this idea, algebraic expressions can be introduced at the conclusion of tasks that prompt students first to write numerical expressions to represent a particular situation, then repeatedly

more of those parts as a single entity. • Evaluate expressions at specific values of their variables using expressions that arise from formulas used in real-world problems. **NC.6.EE.3** Apply the properties of operations to generate equivalent expressions without exponents. **NC.6.EE.4** Identify when two expressions are equivalent and justify with mathematical reasoning. **NC.6.EE.6** Use variables to represent numbers and write expressions when solving a real-world or mathematical problem.			adjust their expressions as one of the quantities varies. Clustering these standards together (and omitting work with solving equations in this cluster) allows for students to develop understanding of variables as symbols used to represent quantities that vary, as opposed to a more limited understanding of a variable only as a single unknown. Students need ample opportunity to read, write and evaluate numerical and algebraic expressions before solving equations relating two different expressions, so this cluster should come before the Algebraic Equations cluster. **Connections:** If exponents were introduced earlier as a way of notating repeated multiplication within prime factorizations (**NC.6.NS.4)** in the Factors and Multiples cluster, then instruction involving exponents in this cluster can build from that work. If exponents were not introduced previously, the opportunity to use

			exponents to express the prime factorization of numbers should be provided here, connecting to **NC.6.NS.4.** Either way, **NC.6.EE.1** should be introduced using connections between **NC.3.MD.7** and **NC.5.MD.5**. so that students make the geometric connections between an exponent of 2 and "squares" and an exponent of 3 and "cubes". Work with the distributive property involving variables in **NC.6.EE.3** should be connected to prior work with numerical expressions described in **NC.6.NS.4.**
Reasoning with Algebraic Equations Cluster **NC.6.EE.5** Use substitution to determine whether a given number in a specified set makes an equation true. **NC.6.EE.7** Solve real-world and mathematical problems by writing and solving equations of the form: • $x + p = q$ in which p, q and x are all nonnegative rational numbers; and,	**5 weeks**	**NC.6.EE.2** **NC.6.NS.9** **NC.6.NS.1-3** **NC.6.NS.6** **NC.6.RP.3**	In this cluster, students learn that finding solutions to both equations and inequalities involves finding values of the variable that make the relation true. Combining equations and inequalities in a single cluster allows a single context to be used to describe both equations and inequalities, which can help students see how the two types of relationships are related. **Connections:**

• $p \cdot x = q$ for cases in which p, q and x are all nonnegative rational numbers. **NC.6.EE.8** Reason about inequalities by: • Using substitution to determine whether a given number in a specified set makes an inequality true. • Writing an inequality of the form $x > c$ or $x < c$ to represent a constraint or condition in a real-world or mathematical problem. • Recognizing that inequalities of the form $x > c$ or $x < c$ have infinitely many solutions. • Representing solutions of inequalities on number line diagrams **NC.6.EE.9** Represent and analyze quantitative relationships by: • Using variables to represent two quantities in a real-world or mathematical context that change in relationship to one another. • Analyze the relationship between quantities in different representations (context, equations, tables, and graphs).			A strong connection to **NC.6.EE.2** is important so that students understand equations as statements of equality between the values of two expressions. Connections to **NC.6.NS.9** involve the use of additive inverses to solve equations. Connections to **NC.6.NS.1-3** can be made as students compute with fractions and decimals to solve equations. Connections should be made to **NC.6.NS.6** when using the number line to represent solutions of inequalities **(NC.6.EE.8**). Tasks and lessons aligned to **NC.6.EE.9** should connect proportional relationships represented by tables and graphs number lines (**NC.6.RP.3)** to equations (**NC.6.EE.7**). Understanding the connections supports concepts of direct variation that is learned in 7th grade.

Making Sense of Volume Cluster **NC.6.G.2** Apply and extend previous understandings of the volume of a right rectangular prism to find the volume of right rectangular prisms with fractional edge lengths. Apply this understanding to the context of solving real-world and mathematical problems.	**2 week**	**NC.6.NS.1** **NC.6.NS.3** **NC.6.EE.1** **NC.6.G.1** **NC.6.G.4**	In 5th grade, students should have explored the volume with physical or visual models of three dimensional figures packed with unit cubes. Instruction on the topic in 6th grade should begin with a review of this idea to provide the opportunity for students to connect the 6th grade work to their previous experiences. The 6th grade standard extends to figures with fractional edges. Physical or visual models can be used to help students understand that if the volume of a unit cube with sides measuring one unit is 1 cubic unit, then the volume of a cube with sides measuring ½ unit is $(½)^3$ or ⅛ cubic unit. This provides the opportunity to develop students' understanding of powers with fractional bases. **Connections:** This cluster provides the opportunity to review and reinforce multiplication and division with fractions and decimals (**NC.6.NS.1** and **NC.6.NS.3**)

			As students write expressions representing strategies for finding volume, connections can be made to **NC.6.EE.1** and **NC.6.EE.2.** Tasks that require them to find an unknown side length provide the opportunity to write and solve equations, reinforcing **NC.6.EE.7.** Work with 3-dimensional figures also provide a chance to review area, surface area, and nets (**NC.6.G.1** and **NC.6.G.4).**
Statistical Reasoning Cluster **NC.6.SP.1** Recognize a statistical question as one that anticipates variability in the data related to the question and accounts for it in the answers. **NC.6.SP.2** Understand that a set of data collected to answer a statistical question has a distribution which can be described by its center, spread, and overall shape. **NC.6.SP.3** Understand that both a measure of center and a description of variability	**2 weeks**	**NC.6.NS.3**	**NC.6.SP.1** is extremely important in building an understanding for statistics. Students need time to explore and discuss why questions are or are not statistical questions to help them understand what a statistical question is. Students need to explore statistics and statistical questions through gathering data and analyzing it thoroughly. The vocabulary "measures of center", "variability", and "distribution" are unfamiliar, so they need many

should be considered when describing a numerical data set. a. Determine the measure of center of a data set and understand that it is a single number that summarizes all the values of that data set. • Understand that a mean is a measure of center that represents a balance point or fair share of a data set and can be influenced by the presence of extreme values within the data set. • Understand the median as a measure of center that is the numerical middle of an ordered data set. b. Understand that describing the variability of a data set is needed to distinguish between data sets in the same scale, by comparing graphical representations of different data sets in the same scale that have similar measures of center, but different spreads. **NC.6.SP.4** Display numerical data in plots on a number line. • Use dot plots, histograms, and box plots to represent data.			opportunities to observe, compare, and contrast these ideas using data. To do so, students should make and explore characteristics of dot plots, histograms, and box plots and compare their attributes and information shown, discussing advantages and disadvantages of each. They need to analyze claims with supporting data and justify or disprove the claims using the various types of representations. Concrete and visual models should be used to help students understand conceptually why the mean can be found by summing the data then dividing by the number of data points. Students should also be given the opportunity to explore the variability of different sets of data with the same measures of center to understand what variability is as well as explore how outliers affect measures of center. **Connections:**

• Compare the attributes of different representations of the same data. **NC.6.SP.5** Summarize numerical data sets in relation to their context. a. Describe the collected data by: • Reporting the number of observations in dot plots and histograms. • Communicating the nature of the attribute under investigation, how it was measured, and the units of measurement. b. Analyze center and variability by: • Giving quantitative measures of center, describing variability, and any overall pattern, and noting any striking deviations. • Justifying the appropriate choice of measures of center using the shape of the data distribution.			This unit can be used to review and reinforce operations with decimals (**NC.6.NS.3**).