Ratio & Proportional Relationships *and* Functions

The introduction of the Ratio & Proportional Relationships domain in 6th and 7th grades signals a shift in student thinking from additive reasoning in elementary grades to multiplicative reasoning. This domain builds from pattern work in the elementary domain of Operations & Algebraic Thinking. The understandings from the Ratio & Proportional Relationships build naturally into the Functions domain in 8th grade.

Throughout the Ratio & Proportional Relationships and Functions Domains, many of the standards with multiple parts were rewritten using bullets to make the expectations clear and concise. All examples were removed from the standards. The removed examples will be placed in the instructional support documents.

Remember when reviewing this section:
1) Expectations expressed in a grade level are not repeated in other grade levels.
2) Further explanation of standards, such as "What types of ratio and percent problems are solved?" will be found in the instructional support documents.

6th Grade	7th Grade	8th Grade
Most revisions in 6th grade are the result of clarifying the intention of the standards.	Most revisions in 7th grade are the result of clarifying the intention of the standards.	Most revisions in 8th grade are the result of clarifying the intention of the standards.
There are **no** additional concepts in the Ratio & Proportion Standards for 6th grade.	There is **1** additional concept in the Ratio & Proportion Standards for 7th grade. ● In **7.RP.2a**, the concept of comparing two different proportional relationship using tables, graph, equations, and verbal descriptions was added.	There are **no** additional concepts in the Function Standards for 8th grade.
There are **no** removed concepts for the Ratio & Proportion Standards for 6th grade.		There are **no** removed concepts for the Function Standards for 8th grade.
Clarity for expectations of understanding unit ratios was provided for **6.RP.2**.	This comparison was originally in **8.EE.5**. Since students compared ratios using tables in **6.RP.3**, and 7th grade emphasized graphs and equations of proportional relationships, adding a comparison of proportional relationships in 7th grade was a natural progression.	
	Comparisons continue in 8th grade with linear functions in **8.F.2**.	
	There are **no** removed concepts for the Ratio & Proportion Standards for 7th grade.	

The Number System

The Number System domain naturally builds from the elementary domains Operations & Algebraic Thinking, Number and Operations - Base Ten and Number and Operations - Fractions.

Throughout the Number System Domain, many of the standards with multiple parts were rewritten using bullets to make the expectation clear and concise. All examples were removed from the standards. The removed examples will be placed in the instructional support documents.

Remember when reviewing this section:
1) Expectations expressed in a grade level are not repeated in other grade levels. For example: Adding, subtracting, and multiplying fractions are part of the elementary standards. This means that even though these skills are necessary for problem solving in middle school, these skills will not be mentioned in the middle school standards.
2) Further explanation of standards, such as "What is the standard algorithm?" will be found in the instructional support documents.

6th Grade	7th Grade	8th Grade
Most revisions in 6th grade are the result of clarifying the intention of the standards.	Most revisions in 7th grade are the result of clarifying the intention of the standards.	Most revisions in 8th grade are the result of clarifying the intention of the standards.
There are **two** additional concepts in the Number System Standards for 6th grade. ● **6.NS.4** - *Finding the unique prime factorization for a whole number.* Most use a form of prime factorization to find unknown GCFs and LCMs. These methods depend on the unique prime factorization of whole numbers. ● **6.NS.9** *(New standard) - Adding and subtracting integers from -20 to 20 using models.* Adding this standard is to allow for more time for conceptual development. The limitation means that students should not memorize rules, but should start with physical models and move to visual models, such as number lines. There is an added focus on creating zero pairs using additive inverses. This will assist in using physical models and building conceptual	There are **no** additional concepts in the Number System Standards for 7th grade. There are **no** removed concepts for the Number System Standards for 7th grade. While adding and subtracting integers with models was placed into 6th grade, no concepts were removed as the 7th grade standards cover adding and subtracting with rational numbers.	There are **no** additional concepts in the Number System Standards for 8th grade. There are **no** removed concepts for the Number System Standards for 8th grade. Some limitations were added into **8.NS.2**. In the original standard, students would work with all irrational numbers. The revision would limit students to working with square roots, cube roots and pi.

understanding. This concept should also support the use of absolute value and equations in other 6th grade standards. There are **no** removed concepts for the Number System Standards for 6th grade.		

Expressions and Equations

The Expressions and Equations domain naturally builds from the elementary domain Operations & Algebraic Thinking.

Throughout the Expressions and Equations domain, many of the standards with multiple parts were rewritten using bullets to make the expectation clear and concise. All examples were removed from the standards. The removed examples will be placed in the instructional support documents.

Remember when reviewing this section:
1) Expectations expressed in a grade level are not repeated in other grade levels. For example: Order of operations (except for exponents) are part of the elementary standards. This means that even though these skills are necessary for rewriting expressions in middle school, these skills will not be mentioned in the middle school standards.
2) Further explanation of standards, such as "What does it mean to view a part of an expression as a single entity?" will be found in the instructional support documents.

6th Grade	7th Grade	8th Grade
Most revisions in 6th grade are the result of clarifying the intention of the standards. There are **no** additional concepts in the Expressions and Equations Standards for 6th grade. There are **no** removed concepts for the Expressions and Equations Standards for 6th grade. While the **6.EE.9** was heavily revised for clarity, the focus on the vocabulary of dependent and independent variables has been removed. In 6th grade, students should understand equations as showing a relationship between quantities and that as one quantity changes, the other changes in a particular manner. This is an introduction to the concept of covariation.	Most revisions in 7th grade are the result of clarifying the intention of the standards. There are **no** additional concepts in the Expressions and Equations Standards for 7th grade. There are **no** removed concepts for the Expressions and Equations Standards for 7th grade. Clarity was provided in **7.EE.4** to define the expectations for solving equations and inequalities. In 7th grade the expectation is multi-step equations and inequalities with the variable on one side, including those generated from word problems.	Most revisions in 8th grade are the result of clarifying the intention of the standards. There is **1** additional concept in the Expressions and Equations for 8th grade. ● Solving multi-step linear inequalities, with variables on both sides is now expected. There are **3** removed concepts for the Expressions and Equations Standards for 8th grade. ● **8.EE.4** - Adding and subtracting numbers in scientific notation has been removed. (Multiplying and dividing remains in 8th grade.) ● **8.EE.5** - Comparing different proportional relationships was moved to 7th grade, **7.RP.2a**. (Interpreting the unit rate as slope remains in 8th grade.) ● **8.EE.8** - Solving a system of equations using substitution was removed, as it is

		part of the standards for NC Math 1. (Solving a system by graphing remains in 8th grade.) Clarity was added to **8.EE.8**, stating that the linear equations for a system are to be in slope-intercept form. Limitations are now included **8.EE.2**.

Geometry

Geometry is the one domain that is found K-12 in the standards. Geometry becomes a part of the major work of the grade in 7th grade. The 6th grade standards continue the Geometry from elementary school with reasoning about relationships among shapes to determine area, surface area, and volume of figures created from polygons. The focus in 6th grade is on the development of formulas based on student experience with partitioning and composition in elementary school. This same work expands in 7th grade to work with figures that include circles. It is also where students begin to explore relationships between lines and angles laying the foundation for 8th grade work with transformations.

Throughout the Geometry domain, many of the standards with multiple parts were rewritten using bullets to make the expectation clear and concise. All examples were removed from the standards. The removed examples will be placed in the instructional support documents.

Remember when reviewing this section:
1) Expectations expressed in a grade level are not repeated in other grade levels.
2) Further explanation of standards will be found in the instructional support documents.

6th Grade	7th Grade	8th Grade
Most revisions in 6th grade are the result of clarifying the intention of the standards.	Most revisions in 7th grade are the result of clarifying the intention of the standards.	Most revisions in 8th grade are the result of clarifying the intention of the standards.
There are **no** additional concepts in the Geometry Standards for 6th grade.	There are **no** additional concepts in the Geometry Standards for 7th grade.	There are **no** additional concepts in the Geometry Standards for 8th grade.
There are **no** removed concepts for the Geometry Standards for 6th grade.	**7.G.3** was removed from the 7th grade math standards because there were no connections to cross sections within the middle grades standards and it doesn't appear in the high school standards until NC Math 3.	There are **no** removed concepts for the Geometry Standards for 8th grade.
There are no substantial revisions to the 6th grade standards.		The only significant revision in 8th grade was the adaptation of **8.G.1** to incorporate the development of similarity based on the properties of dilations. The original standard only examined congruence in terms of lines and angles, but there was no standard that addressed how the properties of dilations defined similarity.

Statistics and Probability

The statistics and probability domain build on the Measurement and Data domain from elementary school. Middle school is where students develop the notion of **statistical thinking** making note of its distinction from **mathematical thinking**. Students begin to explore data and examine the information that it conveys through multiple representations.

Throughout the Statistics and Probability domain, many of the standards with multiple parts were rewritten using bullets to make the expectation clear and concise. All examples were removed from the standards. The removed examples will be placed in the instructional support documents.

Additionally each grade level in middle school addresses some portion of the statistical process shown below.
A statistical process is a problem-solving process consisting of four steps:
1. Formulating a statistical question that anticipates variability and can be answered by data. (6th grade - determining a statistical question)
2. Designing and implementing a plan that collects appropriate data. (7th grade - randomization addressed)
3. Analyzing the data by graphical and/or numerical methods. (6th, 7th and 8th grade)
4. Interpreting the analysis in the context of the original question. (6th, 7th and 8th grade)

The examination of statistics is from the lens of exploratory data analysis vs. an inferential perspective. This means that students make sense of the data and start to make meaning of variability in relationship to a statistical question. Sixth grade is primarily an introduction to statistics and 7th grade is where probability is first introduced. Both statistics and probability are continued in the high school standards.

Remember when reviewing this section:
1) Generally, expectations expressed in a grade level are not repeated in other grade levels as middle school is where the Statistics and Probability domain begins.
2) Further explanation of standards, definitions and understandings, such as understanding that the probability of a chance event occurring is between 0 and 1, will be found in the instructional support documents.

6th Grade	7th Grade	8th Grade
Most revisions in 6th grade are the result of clarifying the intention of the standards.	Most revisions in 7th grade are the result of clarifying the intention of the standards.	Most revisions in 8th grade are the result of clarifying the intention of the standards.
There are **no** additional concepts in the Statistics and Probability Standards for 6th grade.	There are **no** additional concepts in the Statistics and Probability Standards for 7th grade.	There was 1 additional statistics standard in 8th grade which came from 7th grade (7.SP.3). **8.SP.5** was added as a capstone standard in middle school. It quantifies the meaningfulness of the difference between the measures of center of 2 data sets. This is students first introduction to formal inference and it bridges
The *calculation* of MAD was removed from 6th grade; however the discussion of variability remains an important concept in the standards	The concept of using variability to express the difference in centers as a multiple of a measure of variability was removed and placed	

as it was left to be *described visually based on graphical representations* of the data. With 6th grade's focus on examining data quantitatively and visually, **6.SP.3** was rewritten into two separate standards **6.SP.3a** and **6.SP.3b** emphasizing the need to look at multiple quantitative measures and representations when describing distributions. 6.SP.3b has been rewritten to only address visually examining variability of data sets with similar centers and describing it in terms of gaps, clusters and the general shape of the distribution.	in the 8th grade to continue the work of univariate data through the middle grades. **7.SP.3** was split into two standards **7.SP.3a,** which is the calculation of MAD, and **7.SP.3b** to address comparing the measures of center and spread both visually *and* numerically of two data sets. **7.SP.5** was edited removing instructional guidance and definitions that would be more appropriate for the instructional support document. **7.SP.7** was rearranged adding a **7.SP.7c** to explicitly note comparing theoretical and experimental probability models noting possible explanations for discrepancies between the two.	the gap between MAD in 7th grade and the concept of SD in NC Math 1. There are **no** removed concepts for the Statistics and Probability Standards for 8th grade.