



Content and Timeline for Mathematics

Grade 7



West Virginia DEPARTMENT OF
EDUCATION



**West Virginia Board of Education
2018-2019**

David G. Perry, President

Miller L. Hall, Vice President

Thomas W. Campbell, CPA, Financial Officer

F. Scott Rotruck, Member

Debra K. Sullivan, Member

Frank S. Vitale, Member

Joseph A. Wallace, J.D., Member

Nancy J. White, Member

James S. Wilson, D.D.S., Member

Carolyn Long, Ex Officio

Interim Chancellor

West Virginia Higher Education Policy Commission

Sarah Armstrong Tucker, Ed.D., Ex Officio

Chancellor

West Virginia Council for Community and Technical College Education

Steven L. Paine, Ed.D., Ex Officio

State Superintendent of Schools

West Virginia Department of Education

Grade 7

The West Virginia College- and Career-Readiness Standards for mathematics emphasize key content, skills, and mathematical habits of mind at each grade level. The focus of instruction is placed on grade-level standards. Instruction should be attentive to learning across all early and elementary learning grades and link major topics within grades. Instruction should develop conceptual understanding, procedural skill and fluency, and application.

In grade seven, instructional time should focus on four critical areas: (1) developing understanding of and applying proportional relationships, including percentages; (2) developing understanding of operations with rational numbers and working with expressions and linear equations; (3) solving problems that involve scale drawings and informal geometric constructions and working with two- and three-dimensional shapes to solve problems involving area, surface area, and volume; and (4) drawing inferences about populations based on samples (National Governors Association Center for Best Practices, Council of Chief State School Officers 2010n). Students also work toward fluently solving equations of the form $px + q = r$ and $p(x + q) = r$.

In middle grades, multiplication and division develop into powerful forms of ratio and proportional reasoning. The properties of operations take on prominence as arithmetic matures into algebra. The theme of quantitative relationships also becomes explicit in grades six through eight, developing into the formal notion of a function by grade eight. Meanwhile, the foundations of deductive geometry are laid in the middle grades. The gradual development of data representations in kindergarten through grade five leads to statistics in middle school: the study of shape, center, and spread of data distributions; possible associations between two variables; and the use of sampling in making statistical decisions.

Connections to the Next Grade

To be prepared for grade-eight mathematics, students should be able to demonstrate mastery of particular mathematical concepts and procedural skills by the end of grade seven and that they have met the fluency expectations for grade seven. The expected fluencies for students in grade seven are to solve equations of the form $px + q = r$ and $p(x + q) = r$ which also requires fluency with rational-number arithmetic, and to apply (to some extent) properties of operations to rewrite linear expressions with rational coefficients. Also, adding, subtracting, multiplying, and dividing rational numbers is the culmination of numerical work with the four basic operations. The number system continues to develop in grade eight, expanding to become the real numbers with the introduction of irrational numbers, and develops further in high school, expanding again to become the complex numbers with the introduction of imaginary numbers. These fluencies and the conceptual understandings that support them are foundational for work in grade eight.

It is particularly important for students in grade seven to develop skills and understandings to analyze proportional relationships and use them to solve real-world and mathematical problems; apply and extend previous understanding of



operations with fractions to add, subtract, multiply, and divide rational numbers; use properties of operations to generate equivalent expressions; and solve real-life and mathematical problems using numerical and algebraic expressions and equations (Adapted from the California Math Framework).

The following table highlights the content at the cluster level for seventh grade standards. The bulk of instructional time should be given to the clusters and the standards within them. Standards should not be neglected; to do so would result in gaps in students' learning, including skills and understandings they may need in later grades. Instruction should reinforce standards within the clusters by including problems and activities that support natural connections between clusters. **Teachers and administrators alike should note that the standards are not topics to be checked off after being covered in isolated units of instruction;** rather, they provide content to be developed throughout the school year through rich instructional experiences presented in a coherent manner.



Grade 7	West Virginia College- and Career-Readiness Standards
Ratios and Proportional Reasoning	
Clusters <ul style="list-style-type: none"> Analyze proportional relationships and use them to solve real-world and mathematical problems. 	<ul style="list-style-type: none"> M.7.1-3
The Number System	
Clusters <ul style="list-style-type: none"> Apply and extend previous understandings of operations with fractions to add, subtract, multiply, and divide rational numbers. 	<ul style="list-style-type: none"> M.7.4-6
Expressions and Equations	
Clusters <ul style="list-style-type: none"> Use properties of operations to generate equivalent expressions. Solve real-life and mathematical problems using numerical and algebraic expressions and equations. 	<ul style="list-style-type: none"> M.7.7-8 M.7.9-10
Geometry	
Clusters <ul style="list-style-type: none"> Draw, construct and describe geometrical figures and describe the relationships between them. Solve real-life and mathematical problems involving angle measure, area, surface area, and volume. 	<ul style="list-style-type: none"> M.7.11-13 M.7.14-16
Statistics and Probability	
Clusters <ul style="list-style-type: none"> Use random sampling to draw inferences about a population. Draw informal comparative inferences about two populations. Investigate chance processes and develop, use, and evaluate probability models. 	<ul style="list-style-type: none"> M.7.17-18 M.7.19-22 M.7.23-26

Explanations

- Domains** are broad components that make up a content area. Domains in mathematics vary by grade-level and by course. For example, the five domains for mathematics in Grade 7 are Ratios and Proportional Reasoning, the Number System, Expressions and Equations, Geometry, and Statistics and Probability.
- Clusters** are groups of standards that define the expectations students must demonstrate to be college- and career-ready.
- Standards** are expectations for what students should know, understand and be able to do; standards represent educational goals.

Note of Caution: Neglecting material will leave gaps in students' skills and understandings and will leave students unprepared for the challenges they face in later grades.



Grade 7 Content Plan

Teachers must provide students the opportunity to master each of the grade-level content standards. **It is important to understand that neglecting grade-level content standards, will leave gaps in students' skills and understandings and will leave students unprepared for the challenges they face in later grades.** Any content plan must demonstrate a means by which students can be provided the opportunity to address all grade-level content standards and to revisit and practice skills and strengthen understandings throughout the school year. The information below is an example of how to address all Grade 7 standards in a school year.

DOMAIN TOPIC	Geometry	Ratios and Proportional Reasoning	Geometry	Ratios and Proportional Reasoning	The Number System	Expressions and Equations	Geometry	Statistics and Probability
	<i>Scale Drawings</i>	<i>Introducing Proportional Relationships</i>	<i>Measuring Circles</i>	<i>Proportional Relationships and Percentages</i>	<i>Rational Number Arithmetic</i>	<i>Expressions, Equations, and Inequalities</i>	<i>Angles, Triangles, and Prisms</i>	<i>Probability and Sampling</i>
SAMPLE TIMELINE	August/September	September/October	November	December	January	February/March	April	May/June
CONTENT STANDARDS	M.7.11	M.7.1 M.7.2	M.7.14	M.7.3	M.7.4 M.7.5 M.7.6	M.7.7 M.7.8 M.7.9 M.7.10	M.7.12 M.7.13 M.7.15 M.7.16	M.7.17 M.7.18 M.7.19 M.7.20 M.7.21 M.7.22 M.7.23 M.7.24 M.7.25 M.7.26
RATIONALE	In the sample above, Grade 7 Mathematics has students begin at Geometry and has Geometry dispersed throughout the course of the school year. Students in Grade 7 start by studying Scale Drawings which supports introductory grade level proportional skills. The understanding developed with early Grade 7 Ratio work promotes the reasoning of Circles and Proportional Relationships. By the time the Number System Domain is introduced, students have had time to refresh Grade 6 computation skills to prepare for the arithmetic needed to achieve standards addressed. The work done with rational numbers is then used in the Expressions and Equations domain. Students then culminate the year by applying concepts learned throughout the year with the last portion of Geometry and Statistics and Probability.							





Steven L. Paine, Ed.D.
West Virginia Superintendent of Schools