Rockford Public Schools Framework

6-8 Math

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Philosophy & Research

There is a great need expressed by teachers everywhere to effectively organize their limited time for the planning and delivery of the challenging Common Core State Standards of Mathematics (CCSSM). Most of us would agree with Achieve the Core, which tells us that "we need to significantly narrow and deepen how time and energy is spent in the mathematics classroom."

How do we best structure these fundamental shifts in instruction and implement them across a large school district to ensure maximum effect for our students? This challenge was the genesis of each grade's Curriculum Leadership Team (CLT), charged with the task of creating guiding documents and tools to assist all of our district's math educators in comprehending, processing, and delivering our content in a meaningful way. Each CLT is comprised entirely of teachers, and is part of a 5-year commitment and strategic process by the district. To date, we have utilized specific trainings to build an understanding of how to best apply the CCSSM and fill the curricular deficits of our district. We have researched and studied curriculum sequencing and maps, Webb's Depth of Knowledge (DOK), and assessment design. We have investigated a variety of online and print resources and textbooks that could be used in conjunction with our foundational curriculum.

As a result of these critical steps, each CLT created individual learning targets that aligned with each grade level's content standards. These were then grouped and sequenced, and then embedded the Standards of Mathematical Practice (SMP) to form essential learning objectives for each instructional unit. Our intent is that each of these essential learning objectives can be readily delivered by every teacher and readily digested by every student.

It does not require much research or debate to quickly realize that some standards must be elevated over others throughout the curriculum. We have given the ELOs a priority; however, lower priority is not meant to imply exclusion. These priorities help guide the focus of teachers as they distribute their limited time for planning and instruction. Teachers should always use their best judgment for what works for them and their students.

The units are sequenced in a way that we believe best develops and connects content. Some standards may be revisited several times during the course, while others may be only partially addressed across different units.

In some ways, the eight SMP are what we want our students to take away from our classes in the long run. The SMP should become the natural way students come to understand and do mathematics. Highlighting certain practices within a given unit should not be interpreted to mean that other practices should be neglected, but that the highlighted practices should particularly bring instruction to life through sensemaking, reasoning, arguing, critiquing, and modeling.

Standards at a Glance

Grade 6

Prior to Grade 6, students should have acquired a strong foundation in numbers and operations, geometry, measurement, and data. Students should have a strong fluency in multiplication of multidigit whole numbers and have a conceptual understanding of all four mathematical operations with positive decimals. Students should understand measurement concepts (e.g. length, area, volume, angles), as well as an emerging representation and interpretation of data.

The 6th grade content outlined in this curriculum map begins by building on student's understanding of multiplication and division and equivalent fractions as a basis for understanding ratios and proportional reasoning. Students will continue to work with positive rational numbers to build fluency with standard algorithms for fraction and multi-digit decimal operations. Students begin formal work with expressions and equations and will use variables to represent relationships and solve problems. Student will extend their understanding of numbers to include negative rational numbers, absolute value as a distance, and coordinates of points in all quadrants or the coordinate plane. Students will then broaden their understanding of length, area, and volume as they solve problems involving the areas of triangles, special quadrilaterals, and polygons, and volume of rectangular prisms. The final unit of study includes statistics and begins at 6^{th} grade. Students will represent data in various ways and build their understanding of statistical variation.

The Curriculum Map reflects the current thinking related to the Common Core State Standards for mathematical content described in the CCSSM, and assumes 160 days for instruction divided among the units. The units are sequence in a way that we believe develops and connects the mathematical content described in the CCSSM; however, the order of the standards included in any unit does not

imply a sequence of content within that unit.

▮ major content ⊡ supporting content 🌕 additional content

▮ 6.RP.A Understand ratio concepts and use ratio reasoning to solve problems.
▮ 6.NS.A Apply and extend previous understandings of multiplication and division to divide fractions by fractions.
🌕 6.NS.B Compute fluently with multi-digit numbers and find common factors and multiples.
▮ 6.NS. C Apply and extend previous understandings of numbers to the system of rational numbers.
▮ 6.EE.A Apply and extend previous understandings of arithmetic to algebraic expressions.
▮ 6.EE.B Reason about and solve one-variable equations and inequalities.
▮ 6.EE.C Represent and analyze quantitative relationships between dependent and independent variables.
⊡ 6.G.A Solve real-world and mathematical problems involving area, surface area, and volume.
🌕 6.SP.A Develop understanding of statistical variability.
🌕 6.SP.B Summarize and describe distributions.

Grade 7

While in 6th grade, students should have developed an understanding of variables from two perspectives—as placeholders for specific values and as representing sets of values represented in algebraic relationships. They used properties of operations to write and solve simple one-step equations. By the end of Grade 6, students should be fluent in all positive number operations, and should have developed a solid foundation for understanding area, surface area, and volume of geometric figures.

The 7th grade content outlined in this Curriculum Map builds on Grade 6 work by extending students' understanding of ratio to a more formal understanding of rate and its application with percents. Students extend their understanding of operations with rational numbers to include negative rational numbers. Students then continue the work they started in Grade 6 in writing expressions and equations, laying the groundwork for their Grade 8 work with functions. The course then turns to more formal methods for writing and solving multi-step equations and inequalities. Students also build on the Grade 6 work with proportional reasoning as they learn to scale 2-dimensional figures and to apply proportional reasoning to probability and statistical situations. Students gain fluency with area, surface area, and volume of 2- and 3-dimensional shapes composed of polygons, including right prisms and pyramids. They use the formulas for area and circumference of a circle to solve problems and understand the relationships among the components of a circle. The final unit of study lays the groundwork for high school Geometry as students investigate informal proofs of key geometric relationships among triangles.

The Curriculum Map reflects the current thinking related to the intent of the Common Core State Standards for Mathematics (CCSSM) and assumes 160 days for instruction, divided among the units. The units are sequenced in a way that we believe best believe best develops and connects the mathematical content described in the CCSSM; however, the order of the standards included in any unit does not imply a sequence of content within that unit.

▮ major content ⊡ supporting content 🌕 additional content

▮ 7.RP.A Analyze proportional relationships and use them to solve real-world and mathematical problems.
▮ 7.NS.A Apply and extend previous understandings of operations with fractions to add, subtract, multiply, and divide rational numbers.
▮ 7.EE.A Use properties of operations to generate equivalent expressions.
▮ 7.EE.B Solve real-life and mathematical problems using numerical and algebraic expressions and equations.
🌕 7.G.A Draw, construct and describe geometrical figures and describe the relationships between them.
🌕 7.G.B Solve real-life and mathematical problems involving angle measure, area, surface area, and volume.
⊡ 7.SP.A Use random sampling to draw inferences about a population.
🌕 7.SP.B Draw informal comparative inferences about two populations.
⊡ 7.SP.C Investigate chance processes and develop, use, and evaluate probability models.

Grade 8

Prior to Grade 8, students have written and interpreted expressions, solved equations and inequalities, explored quantitative relationships between dependent and independent variables, and solved problems involving area, surface area, and volume. Students have also begun to develop an understanding of statistical thinking.

We have outlined in our map the Grade 8 course standards and priorities. It begins with an exploration of irrational and rational numbers, roots and integer exponent properties. This unit also includes understanding and applying scientific notation. Moving forward, students apply previous knowledge of graphing, unit rate and ratios to engage in representing, comparing and then solving linear functions. During this process they will build an in-depth understanding of slope. Students then work with representations of different types of functions to compare their qualities. Utilizing the concepts of functions and linear relationships they will explore patterns of association in bivariate data. They will deepen their understanding of geometric concepts by investigating and applying the Pythagorean Theorem. Students study the effects and identify properties of various types of transformations, and explore congruence and similarity using various tools including coordinate planes. Finally, students expand their geometric knowledge by finding volumes of cones, cylinders and spheres.

▮ major content ⊡ supporting content 🌕 additional content

8.NS.A Know that there are numbers that are not rational, and approximate them by rational numbers.
8.EE.A Work with radicals and integer exponents.
8.EE.B Understand the connections between proportional relationships, lines, and linear equations.
8.EE.C Analyze and solve linear equations and pairs of simultaneous linear equations.
8.F.A Define, evaluate, and compare functions.
8.F.B Use functions to model relationships between quantities.
8.G.A Understand congruence and similarity using physical models, transparencies, or geometry software.
8.G.B Understand and apply the Pythagorean Theorem.
8.G.C Solve real-world and mathematical problems involving volume of cylinders, cones and spheres.
8.SP.A Investigate patterns of association in bivariate data.

Philosophy and Research References

The Rockford Public School's Middle School Curriculum Maps' authorship is original and parallels work that has begun and continues throughout states that have adopted and nurtured the Common Core State Standards for Mathematics. Ideas and synthesis of our Philosophy and Framework were aided by the Charles A. Dana Center Common Core Toolbox and The Kansas State Department of Education Flip Books.

Curriculum Maps

6th Grade Curriculum Map

7th Grade Curriculum Map

7th Grade Honors Map

8th Grade Curriculum Map

Appendices

Common Core Standards of Mathematics

Webb's Depth of Knowledge: Key Words and Activities

Standards of Mathematical Practice: Question Suggestions

Feedback

Please provide the CLTs with your feedback about the curriculum maps:

Click here to provide Feedback