

## Section: Mathematics - Seventh Grade

**Rationale:** A practical and theoretical knowledge of mathematics should be an integral part of every child's education. Mathematics is a basic part of everyday living. Children must be given the opportunity to acquire the knowledge, mathematical skills and technological expertise necessary to prepare for their future in a 21st century workplace and or post-secondary education. The Columbia Public School District is responsible for ensuring that all students have the opportunity to acquire this mathematical foundation.

A mathematics program must maintain a balance of both practical and theoretical mathematical concepts and provide for individual differences. Instruction within the mathematics program should maintain a balanced development of conceptual understanding (CU), procedural fluency (PF), strategic competence (SC), adaptive reasoning (AR) and productive disposition (PD).

A mathematics program must include a variety of tools in order to meet the instructional needs of students. These may include textbooks, manipulatives, computers, and calculators as well as other technology. These tools should be readily available in reasonable numbers and complement the development of problem-solving skills and the understanding of mathematics. Materials should enhance a child's perspective of mathematics and assist teachers in measuring a student's understanding, strengths and deficiencies.

The measurement of a student's progress in a mathematics program is a continuous process that should utilize assessment information about the student from standardized tests at the national and state level as well as a variety of local measures. Through continuous interpretation and evaluation of all data a profile of the student's growth in the area of mathematics is created.

Teachers are the essential component of a successful mathematics program. It is essential that teachers have a positive attitude toward children as well as toward the teaching of mathematics. Teachers must attend and participate in in-service activities and encouraged to be actively involved in professional organizations, to attend professional meetings, to read professional literature and seek ways of improving their knowledge of mathematics and strategies of instruction. The Columbia School District shall provide in-service opportunities for teachers and administrators focusing on the teaching and learning of mathematics and current research.

It is critically important that Columbia Public Schools work with parents as partners in providing a successful experience in the study of mathematics. To this end, the district shall provide opportunities for parents to actively participate in their children's learning through various resources.

**Course Description:** The major focus for 7th grade mathematics is to develop an understanding and a capacity to be able to solve problems dealing with ratios and proportional reasoning. Students will extend their knowledge of algebraic thinking by connecting their understanding of proportional reasoning to graphing and solving simple linear equations. They will continue to work in geometry to understand surface area and volume. This is the second of three courses designed to prepare students for high school mathematics.

**Strand I:** Number and Algebra

**Content A:** Develop an understanding of and applying proportionality, including similarity

**Learning Goal 1:** Understand and apply proportionality, including similarity

Measurable Learner Objectives:

<b>Recall</b> Level 1 <b>(Basic Knowledge)</b>	<b>Application</b> Level 2 <b>(Skills)</b>	<b>Strategic Thinking</b> Level 3 <b>(Reasoning)</b>	<b>Extended Thinking</b> Level 4 <b>(Products/Performance)</b>
	SMS MA1 3.2 GLE N3D CU, PF, AR, SC Use ratios to demonstrate an understanding of proportionality and be able to solve single and multi-step problems in numerous contexts.		
	CU, PF, AR, SC Use ratio and proportionality to solve a wide variety of percent problems, including problems involving discounts, interest, taxes, tips, and percent increase or decrease.		
	SMS MA1 3.2 GLE N3D CU, PF, AR, SC Solve problems about similar objects (including figures) by using scale factors that relate corresponding lengths of the objects or by using the fact that relationships of lengths within an object are preserved in similar objects, including being familiar with the relationship between similar triangles and the concept of slope.		
	SMS MA4 1.6, 3.6 GLE A1C, A3A PF, AR Graph proportional relationships and identify the unit rate as the slope of the related line.		

<b>Recall</b> Level 1 <b>(Basic Knowledge)</b>	<b>Application</b> Level 2 <b>(Skills)</b>	<b>Strategic Thinking</b> Level 3 <b>(Reasoning)</b>	<b>Extended Thinking</b> Level 4 <b>(Products/Performance)</b>
	SMS MA4 3.2, 3.6 GLE A2B, A3A CU, PF, AR Distinguish proportional relationships ( $y/x = k$ , or $y = kx$ ) from other relationships, such as inverse proportionality ( $xy = k$ , or $y = k/x$ ).		

**Content B:** Develop an understanding of operations on all rational numbers and solve linear equations

**Learning Goal 1:** Understand operations with all rational numbers and with solving linear equations

Measurable Learner Objectives:

<b>Recall</b> Level 1 <b>(Basic Knowledge)</b>	<b>Application</b> Level 2 <b>(Skills)</b>	<b>Strategic Thinking</b> Level 3 <b>(Reasoning)</b>	<b>Extended Thinking</b> Level 4 <b>(Products/Performance)</b>
	SMS MA1 1.10 GLE N2B CU, PF, AR Use and be able to explain the standard algorithm for the addition, subtraction, multiplication, and division of all rational numbers. Know and be able to apply the closure, associative, commutative, identity, inverse, and zero properties.		
	SMS MA5 1.10 GLE N1A CU, AR Compare ( $<$ , $>$ , $=$ ) and order rational numbers, locate integers on a number line; and recognize the absolute value as a rational number's distance from zero on a number line.		

<b>Recall</b> Level 1 <b>(Basic Knowledge)</b>	<b>Application</b> Level 2 <b>(Skills)</b>	<b>Strategic Thinking</b> Level 3 <b>(Reasoning)</b>	<b>Extended Thinking</b> Level 4 <b>(Products/Performance)</b>
	SMS MA1 1.10, 3.5 GLE N2C, N3C PF, AR Consider negative numbers in everyday contexts (e.g., situations of owing money or measuring elevations above and below sea level), know and be able to use the rules for adding, subtracting, multiplying, and dividing with negative numbers.		
	SMS MA4 3.2 GLE A2B CU, PF, AR Formulate and solve linear equations with one variable and use these equations to solve problems with rational numbers.		
	SMS MA4 1.6 GLE A1C CU, PF, AR Solve linear equations in one variable and implement them efficiently. Know that when the properties of equality are used to express an equation in a new way, solutions obtained for the new equation also solve the original equation.		

**Strand II:** Geometry and Measurement

**Content C:** Develop an understanding of and use formulas to determine surface areas and volumes of three-dimensional shapes

**Learning Goal 1:** Understand and use formulas to determine surface areas and volumes of three-dimensional shapes

**Learning Goal 2:** Use square roots and cube roots to solve problems involving area and volume.

Measurable Learner Objectives:

<b>Recall</b> Level 1 <b>(Basic Knowledge)</b>	<b>Application</b> Level 2 <b>(Skills)</b>	<b>Strategic Thinking</b> Level 3 <b>(Reasoning)</b>	<b>Extended Thinking</b> Level 4 <b>(Products/Performance)</b>
	SMS MA2 1.10 GLE G1A, M2C CU, PF, AR Know and be able to use formulas (built on conceptual understanding) for the surface areas of prisms and cylinders.		
	SMS MA2 1.10 GLE M2C CU, PF, AR Know and be able to use the formulas (built on conceptual understanding) for volumes of prisms, right circular cones, cylinders, and spheres.		
	SMS MA2 1.10 GLE M2C CU, SC Apply surface area and volume formulas in problem solving to determine volumes of prisms and cylinders.		

Recall Level 1 (Basic Knowledge)	Application Level 2 (Skills)	Strategic Thinking Level 3 (Reasoning)	Extended Thinking Level 4 (Products/Performance)
	<p>SMS MA2 1.6 GLE G1B CU, PF, AR, SC Select appropriate two- and three-dimensional shapes to model real-world situations and solve a variety of problems (including multi-step problems) involving area (two-dimensional shapes), circumference of circles, surface area (prisms and cylinders), and volume (prisms, cylinders, right circular cones, and spheres).</p>		
	<p>CU, PF Know the square roots of the perfect squares from 1 through 225. Estimate the value of the square root of any other positive integer (e.g. determine between which two consecutive integers the square root lies). Including being able to locate estimate on a number line.</p>		
	<p>CU, PF Know the cubes of the integers 1 to 10 and how to apply this knowledge to the estimation of cube roots of positive integers up to 1000.</p>		
	<p>CU, PF Solve area and volume problems using square roots or cube roots as appropriate.</p>		

**Strand III:** Data Analysis and Probability

**Content D:** Estimate probabilities in experiments, comparing experimental and theoretical probabilities.

**Learning Goal 1:** Conduct one-stage experiments to estimate the likelihood of a simple event, compare the experimental probability with an easily identifiable theoretical probability, describe and compare the likelihood of events.

Measurable Learner Objectives

Recall Level 1 (Basic Knowledge)	Application Level 2 (Skills)	Strategic Thinking Level 3 (Reasoning)	Extended Thinking Level 4 (Products/Performance)
	AR Define the sample space by conducting a simple experiment, illustrating all of the possible outcomes of the experiment, and presenting the set of outcomes in a variety of ways.		
	SMS MA3 3.8 GLE D4A CU, PF, AR Define an event and its theoretical probability. Determine the probability of the complement of the event.		
	SMA MA3 3.8 GLE D4A CU, SC Compare the similarities and differences between experimental and theoretical probabilities.		
	SMS MA3 3.8 GLE D4A CU, PF Use experimental data to estimate the probability of an event when the theoretical probability is unknown.		