

**MOORESTOWN TOWNSHIP PUBLIC SCHOOLS
MOORESTOWN, NEW JERSEY**

**William Allen Middle School
Mathematics**

**Mathematics (On-Level)
*Grade 7***

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[Course Description and Fundamental Concepts](#)

This course, which is aligned to the NJ Student Learning Standards, is focused on the following major concepts or Big Ideas: Ratio and Proportional Relationships, the Number System, Expressions and Equations, Geometry, Statistics and Probability. Students will enhance their analytical, reasoning and problem-solving skills throughout the curriculum.

Math 7 OnLevel Overview

1. Ratios and Proportional Relationships

- Analyze proportional relationships and use them to solve real-world and mathematical problems.

2. The Number System

- Apply and extend previous understandings of operations with fractions to add, subtract, multiply, and divide rational numbers.

3. Expressions and Equations

- Use properties of operations to generate equivalent expressions.
- Solve real-life and mathematical problems using numerical and algebraic expressions and equations.

4. Geometry

- 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.

5. Statistics and Probability

- 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.

Mathematical Practice Standards

1. Make sense of problems and persevere in solving them.
2. Reason abstractly and quantitatively.
3. Construct viable arguments and critique the reasoning of others.
4. Model with mathematics.
5. Use appropriate tools strategically.
6. Attend to precision.
7. Look for and make use of structure.
8. Look for and express regularity in repeated reasoning.

New Jersey Student Learning Standards (NJSLS)

Subject/Content Standards

Include grade appropriate subject/content standards that will be addressed

7.RP Ratios and Proportional Relationships

- A. Analyze proportional relationships and use them to solve real-world and mathematical problems.
1. Compute unit rates associated with ratios of fractions, including ratios of lengths, areas and other quantities measured in like or different units. For example, if a person walks $\frac{1}{2}$ mile in each $\frac{1}{4}$ hour, compute the unit rate as the complex fraction $\frac{1/2}{1/4}$ miles per hour, equivalently 2 miles per hour.
 2. Recognize and represent proportional relationships between quantities.
 - a. Decide whether two quantities are in a proportional relationship, e.g., by testing for equivalent ratios in a table or graphing on a coordinate plane and observing whether the graph is a straight line through the origin.
 - b. Identify the constant of proportionality (unit rate) in tables, graphs, equations, diagrams, and verbal descriptions of proportional relationships.
 - c. Represent proportional relationships by equations. For example, if total cost t is proportional to the number n of items purchased at a constant price p , the relationship between the total cost and the number of items can be expressed as $t = pn$.
 - d. Explain what a point (x, y) on the graph of a proportional relationship means in terms of the situation, with special attention to the points $(0, 0)$ and $(1, r)$ where r is the unit rate.
 3. Use proportional relationships to solve multistep ratio and percent problems. Examples: simple interest, tax, markups and markdowns, gratuities and commissions, fees, percent increase and decrease, percent error.

7.NS The Number System

- A. Apply and extend previous understandings of operations with fractions to add, subtract, multiply, and divide rational numbers.
1. Apply and extend previous understandings of addition and subtraction to add and subtract rational numbers; represent addition and subtraction on a horizontal or vertical number line diagram.
 - a. Describe situations in which opposite quantities combine to make 0. For example, in the first round of a game, Maria scored 20 points. In the second round of the same game, she lost 20 points. What is her score at the end of the second round?
 - b. Understand $p + q$ as the number located a distance $|q|$ from p , in the positive or negative direction depending on whether q is positive or negative. Show that a number and its opposite have a sum of 0 (are additive inverses). Interpret sums of rational numbers by describing real-world contexts.
 - c. Understand subtraction of rational numbers as adding the additive inverse, $p - q = p + (-q)$. Show that the distance between two rational numbers on the number line is the absolute value of their difference, and apply this principle in real-world contexts.
 - d. Apply properties of operations as strategies to add and subtract rational numbers.
 2. Apply and extend previous understandings of multiplication and division and of fractions to multiply and divide rational numbers.

- a. Understand that multiplication is extended from fractions to rational numbers by requiring that operations continue to satisfy the properties of operations, particularly the distributive property, leading to products such as $(-1)(-1) = 1$ and the rules for multiplying signed numbers. Interpret products of rational numbers by describing real-world contexts.
 - b. Understand that integers can be divided, provided that the divisor is not zero, and every quotient of integers (with non-zero divisor) is a rational number. If p and q are integers, then $-(p/q) = (-p)/q = p/(-q)$. Interpret quotients of rational numbers by describing real world contexts.
 - c. Apply properties of operations as strategies to multiply and divide rational numbers.
 - d. Convert a rational number to a decimal using long division; know that the decimal form of a rational number terminates in 0s or eventually repeats.
3. Solve real-world and mathematical problems involving the four operations with rational numbers.

7.EE Expressions and Equations

- A. Use properties of operations to generate equivalent expressions.
 1. Apply properties of operations as strategies to add, subtract, factor, and expand linear expressions with rational coefficients.
 2. Understand that rewriting an expression in different forms in a problem context can shed light on the problem and how the quantities in it are related. For example, $a + 0.05a = 1.05a$ means that “increase by 5%” is the same as “multiply by 1.05.”
- B. Solve real-life and mathematical problems using numerical and algebraic expressions and equations.
 3. Solve multi-step real-life and mathematical problems posed with positive and negative rational numbers in any form (whole numbers, fractions, and decimals), using tools strategically. Apply properties of operations to calculate with numbers in any form; convert between forms as appropriate; and assess the reasonableness of answers using mental computation and estimation strategies. For example: If a woman making \$25 an hour gets a 10% raise, she will make an additional $1/10$ of her salary an hour, or \$2.50, for a new salary of \$27.50. If you want to place a towel bar $9 \frac{3}{4}$ inches long in the center of a door that is $27 \frac{1}{2}$ inches wide, you will need to place the bar about 9 inches from each edge; this estimate can be used as a check on the exact computation.
 4. Use variables to represent quantities in a real-world or mathematical problem, and construct simple equations and inequalities to solve problems by reasoning about the quantities.
 - a. Solve word problems leading to equations of the form $px + q = r$ and $p(x + q) = r$, where p , q , and r are specific rational numbers. Solve equations of these forms fluently. Compare an algebraic solution to an arithmetic solution, identifying the sequence of the operations used in each approach. For example, the perimeter of a rectangle is 54 cm. Its length is 6 cm. What is its width?
 - b. Solve word problems leading to inequalities of the form $px + q > r$ or $px + q < r$, where p , q , and r are specific rational numbers. Graph the solution set of the inequality and interpret it in the context of the problem. For example: As a salesperson, you are paid \$50 per week plus \$3 per sale. This week you want your pay to be at least \$100. Write an inequality for the number of sales you need to make, and describe the solutions.

7.G Geometry

- A. Draw, construct, and describe geometrical figures and describe the relationships between them.

1. Solve problems involving scale drawings of geometric figures, including computing actual lengths and areas from a scale drawing and reproducing a scale drawing at a different scale.
 2. Draw (with technology, with ruler and protractor, as well as freehand) geometric shapes with given conditions. Focus on constructing triangles from three measures of angles or sides, noticing when the conditions determine a unique triangle, more than one triangle, or no triangle.
 3. Describe the two-dimensional figures that result from slicing three-dimensional figures, as in plane sections of right rectangular prisms and right rectangular pyramids.
- B. Solve real-life and mathematical problems involving angle measure, area, surface area, and volume.
4. Know the formulas for the area and circumference of a circle and use them to solve problems; give an informal derivation of the relationship between the circumference and area of a circle.
 5. Use facts about supplementary, complementary, vertical, and adjacent angles in a multi-step problem to write and solve simple equations for an unknown angle in a figure.
 6. Solve real-world and mathematical problems involving area, volume and surface area of two- and three-dimensional objects composed of triangles, quadrilaterals, polygons, cubes, and right prisms.

7.SP Statistics and Probability

- A. Use random sampling to draw inferences about a population.
1. Understand that statistics can be used to gain information about a population by examining a sample of the population; generalizations about a population from a sample are valid only if the sample is representative of that population. Understand that random sampling tends to produce representative samples and support valid inferences.
 2. Use data from a random sample to draw inferences about a population with an unknown characteristic of interest. Generate multiple samples (or simulated samples) of the same size to gauge the variation in estimates or predictions. For example, estimate the mean word length in a book by randomly sampling words from the book; predict the winner of a school election based on randomly sampled survey data. Gauge how far off the estimate or prediction might be.
- B. Draw informal comparative inferences about two populations.
3. Informally assess the degree of visual overlap of two numerical data distributions with similar variabilities, measuring the difference between the centers by expressing it as a multiple of a measure of variability. For example, the mean height of players on the basketball team is 10 cm greater than the mean height of players on the soccer team, about twice the variability (mean absolute deviation) on either team; on a dot plot, the separation between the two distributions of heights is noticeable.
 4. Use measures of center and measures of variability for numerical data from random samples to draw informal comparative inferences about two populations. For example, decide whether the words in a chapter of a seventh-grade science book are generally longer than the words in a chapter of a fourth-grade science book.
- C. Investigate chance processes and develop, use, and evaluate probability models.
5. Understand that the probability of a chance event is a number between 0 and 1 that expresses the likelihood of the event occurring. Larger numbers indicate greater likelihood. A probability near 0 indicates an unlikely event, a probability around $1/2$ indicates an event that is neither unlikely nor likely, and a probability near 1 indicates a likely event.
 6. Approximate the probability of a chance event by collecting data on the chance process that produces it and observing its long-run relative frequency, and predict the approximate relative frequency given the probability. For example, when rolling a number cube 600 times, predict that a 3 or 6 would be rolled roughly 200 times, but probably not exactly 200 times.

7. Develop a probability model and use it to find probabilities of events. Compare probabilities from a model to observed frequencies; if the agreement is not good, explain possible sources of the discrepancy.
 - a. Develop a uniform probability model by assigning equal probability to all outcomes, and use the model to determine probabilities of events. For example, if a student is selected at random from a class, find the probability that Jane will be selected and the probability that a girl will be selected.
 - b. Develop a probability model (which may not be uniform) by observing frequencies in data generated from a chance process. For example, find the approximate probability that a spinning penny will land heads up or that a tossed paper cup will land open-end down. Do the outcomes for the spinning penny appear to be equally likely based on the observed frequencies?
8. Find probabilities of compound events using organized lists, tables, tree diagrams, and simulation.
 - a. Understand that, just as with simple events, the probability of a compound event is the fraction of outcomes in the sample space for which the compound event occurs.
 - b. Represent sample spaces for compound events using methods such as organized lists, tables and tree diagrams. For an event described in everyday language (e.g., “rolling double sixes”), identify the outcomes in the sample space which compose the event.
 - c. Design and use a simulation to generate frequencies for compound events. For example, use random digits as a simulation tool to approximate the answer to the question: If 40% of donors have type A blood, what is the probability that it will take at least 4 donors to find one with type A blood?

Mathematical Practice Standards

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21st-Century Skills and Technology Integration (Standard 8)

List appropriate units below for which strands (A through F) will be addressed

Standard 8.1 (K-12)		Educational Technology: <i>All students will use digital tools to access, manage, evaluate, and synthesize information in order to solve problems individually and collaborate and to create and communicate knowledge.</i>
Unit Addressed	Strand Letter	Standard Description

Units 4 and 9	Strand A	Technology Operations and Concepts: <i>Students demonstrate a sound understanding of technology concepts, systems, and operations.</i>
Units 2, 3, 6, 7 and 8	Strand B	Creativity and Innovation: <i>Students demonstrate creative thinking, construct knowledge and develop innovative products and process using technology.</i>
Units 4, 5, 8 and 9	Strand C	Communication and Collaboration: <i>Students use digital media and environments to communicate and work collaboratively, including at a distance, to support individual learning and contribute to the learning of others.</i>
Units 1, 4, 5, 8 and 9	Strand D	Digital Citizenship: <i>Students understand human, cultural, and societal issues related to technology and practice legal and ethical behavior.</i>
Units 4, 5 and 9	Strand E	Research and Information Fluency: <i>Students apply digital tools to gather, evaluate, and use information.</i>
Units 4, 5, 6, 7, 8 and 9	Strand F	Critical thinking, problem-solving, and decision making: <i>Students use critical thinking skills to plan and conduct research, manage projects, solve problems, and make informed decisions using appropriate digital tools and resources.</i>

Career Ready Practices ([Standard 9](#))

List appropriate units below for which CRPs will be addressed

Unit Addressed	Standard #	Standard Description
Units 4, 5 and 8	CRP1	<i>Act as a responsible and contributing citizen and employee.</i>
Units 1, 2, 3, 4, 5, 6, 7, 8 and 9	CRP2	<i>Apply appropriate academic and technical skills.</i>
Unit 5	CRP3	<i>Attend to personal health and financial well-being.</i>
Units 1, 2, 3, 4, 5, 6, 7, 8 and 9	CRP4	<i>Communicate clearly and effectively and with reason.</i>
Units 4, 8 and 9	CRP5	<i>Consider the environmental, social and economic impacts of decisions.</i>
Units 5, 7, 8 and 9	CRP6	<i>Demonstrate creativity and innovation.</i>

Units 5 and 9	CRP7	<i>Employ valid and reliable research strategies.</i>
Units 1, 2, 3, 4, 5, 6, 7, 8 and 9	CRP8	<i>Utilize critical thinking to make sense of problems and persevere in solving them.</i>
Units 3 and 7	CRP9	<i>Model integrity, ethical leadership, and effective management.</i>
Units 4, 5, 8 and 9	CRP10	<i>Plan education and career paths aligned to personal goals.</i>
Units 4, 5, 6, 7, 8 and 9	CRP11	<i>Use technology to enhance productivity.</i>
Units 1, 2, 3, 4, 5, 6, 7, 8 and 9	CRP12	<i>Work productively in teams while using cultural global competence</i>

Interdisciplinary Connections

List any other content standards addressed as well as appropriate units

Visual & Performing Arts Integration ([Standard 1](#))

List appropriate units below for which standards (1.1 through 1.4) may be addressed

Unit Addressed	Standard #	Standard Description
Units 4, 6 and 7	Standard 1.1	The Creative Process: <i>All students will demonstrate an understanding of the elements and principles that govern the creation of works of art in dance, music, theatre, and/or visual art.</i>
Units 4, 6 and 7	Standard 1.2	History of the Arts and Culture: <i>All students will understand the role, development, and influence of the arts throughout history and across cultures.</i>
Units 4 and 6	Standard 1.3	Performing/Presenting/Producing: <i>All students will synthesize those skills, media, methods, and technologies appropriate to creating, performing, and/or presenting works of art in dance, music, theatre, and/or visual art.</i>
Unit 4	Standard 1.4	Aesthetic Responses & Critique Methodologies: <i>All students will demonstrate and apply an understanding of arts philosophies, judgment, and analysis to works of art in dance, music, theatre, and/or visual art.</i>

Other Interdisciplinary Content Standards

List appropriate units below for any other content/standards that *may be addressed*

Unit Addressed	Content / Standard #	Standard Description
Units 4 & 5	L/A: NJSLSA.W7	Conduct short as well as more sustained research projects, utilizing an inquiry-based research process, based on focused questions, demonstrating understanding of the subject under investigation.
Units 4, 5 & 9	L/A: NJSLSA.W8	Gather relevant information from multiple print and digital sources, assess the credibility and accuracy of each source, and integrate the information while avoiding plagiarism.
Units 1 - 9	L/A: NJSLSA.W10	Write routinely over extended time frames (time for research, reflection, and revision) and shorter time frames (a single sitting or a day or two) for a range of tasks, purposes, and audiences.
Units 4 & 5	L/A: W.7.6	Use technology, including the Internet, to produce and publish writing and link to and cite sources as well as to interact and collaborate with others, including linking to and citing sources.
Units 4 & 5	L/A: W.7.7	Conduct short research projects to answer a question, drawing on several sources and generating additional related, focused questions for further research and investigation.
Units 4 & 5	L/A: W.7.8	Gather relevant information from multiple print and digital sources, using search terms effectively; assess the credibility and accuracy of each source; and quote or paraphrase the data and conclusions of others while avoiding plagiarism and following a standard format for citation.
Units 1 - 9	L/A: NJSLSA.SL1	Prepare for and participate effectively in a range of conversations and collaborations with diverse partners, building on others' ideas and expressing their own clearly and persuasively.
Units 4, 5, & 9	L/A: NJSLSA.SL2	Integrate and evaluate information presented in diverse media and formats, including visually, quantitatively, and orally.
Units 1 - 9	L/A: NJSLSA.SL4	Present information, findings, and supporting evidence such that listeners can follow the line of reasoning and the organization, development, and style are appropriate to task, purpose, and audience.

Unit 9	L/A: NJSLSA.SL5	Make strategic use of digital media and visual displays of data to express information and enhance understanding of presentations.
Unit 4	SS: 6.1.8.B.1.b	Analyze the world in spatial terms (e.g., longitude, latitude) using historical maps to determine what led to the exploration of new water and land routes.
Unit 4	SS:6.1.8.B.3.b	Determine the extent to which the geography of the United States influenced the debate on representation in Congress and federalism by examining the New Jersey and Virginia plans.
Unit 5	SS: 6.1.8.C.3.a	Explain how taxes and government regulation can affect economic opportunities, and assess the impact of these on relations between Britain and its North American colonies.Explain how taxes and government regulation can affect economic opportunities, and assess the impact of these on relations between Britain and its North American colonies.
Unit 1 & 5	SS: 6.1.8.C.3.b	Summarize the effect of inflation and debt on the American people and the response of state and national governments during this time.
Units 2, 3, & 9	Science: MS-LS4-6	Use mathematical representations to support explanations of how natural selection may lead to increases and decreases of specific traits in populations over time.
Unit 4	Science: MS-ESS3-4	Construct an argument supported by evidence for how increases in human population and per-capita consumption of natural resources impact Earth’s systems.
Units 4, 6 and 7	Science: MS-ESS1-3	Analyze and interpret data to determine scale properties of objects in the solar system.
Unit 5	Science: 9.1.8.A.1	Explain the meaning and purposes of taxes and tax deductions and why fees for various benefits (e.g., medical benefits) are taken out of pay.
Unit 2 & 5	Science: MS-LS3-2	Develop and use a model to describe why asexual reproduction results in offspring with identical genetic information and sexual reproduction results in offspring with genetic variation.
Units 4 and 8	Science: MS-LS4-4	Construct an explanation based on evidence that describes how genetic variations of traits in a population increase some individuals’ probability of surviving and reproducing in a specific environment.

Units 4 and 9	Science: MS-LS4-6	Use mathematical representations to support explanations of how natural selection may lead to increases and decreases of specific traits in populations over time.
Unit 9	Science: MS-LS2-1	Analyze and interpret data to provide evidence for the effects of resource availability on organisms and populations of organisms in an ecosystem.
Units 4, 6 and 7	Science: MS-LS1-2.	Develop and use a model to describe the function of a cell as a whole and ways parts of cells contribute to the function.
Unit 1, 2, 3	21st Century Skills: Personal Financial Literacy: 9.1.A	Income and Careers
Unit 1, 2, 3	21st Century Skills: Personal Financial Literacy: 9.1.B	Money Management
Units 2, 3 and 5	21st Century Skills: Personal Financial Literacy: 9.1.D	Planning, Saving and Investing
Units 1, 4, and 5	21st Century Skills: Personal Financial Literacy: 9.1.E	Becoming a critical consumer

Pacing Guide (All Dates are approximate based on the school calendar)

Unit/ Topic	Month (w/Approx number of Teaching Days)
Unit 1 The Number Systems	September (~19 days)
Unit 2 Expressions	October (~19 days)
Unit 3 Equations and Inequalities	November (~16 days)
Unit 3 Equations and Inequalities Unit 4 Proportional Reasoning	December (~15 days)
Unit 4 Proportional Reasoning Unit 5 Percents	January (~18 days)
Unit 5 Percents Unit 6 2D Geometry	February (~18 days)
Unit 6 2D Geometry	March (~15-20 days)
Unit 7 3D Geometry	April (~15-20 days)
Unit 8 Probability	May (~18 days)
Unit 9 Statistics	June (~15 days)

[Units](#)

Contact the Content Supervisor for unit details.