

**New Jersey Core Curriculum Content Standards
for Mathematics, Grade 8, Correlated to
Glencoe Mathematics: Applications and Concepts, Course 3**

Lessons in which the Cumulative Progress Indicators are a primary focus are indicated in **bold**.

Strands and Cumulative Progress Indicators	Student Edition Lesson(s)
STANDARD 4.1: NUMBER AND NUMERICAL OPERATIONS	
A. Number Sense	
4.1.8A1 Extend understanding of the number system by constructing meanings for the following (unless otherwise noted, all indicators for grade 8 pertain to these sets of numbers as well): <ul style="list-style-type: none"> • Rational numbers • Percents • Exponents • Roots • Absolute values • Numbers represented in scientific notation 	1-3, 2-1, 2-8, 2-9, 3-1, 3-2, 3-3, 5-1, 5-2
4.1.8A2 Demonstrate a sense of the relative magnitudes of numbers.	2-2, 3-3
4.1.8A3 Understand and use ratios, proportions, and percents (including percents greater than 100 and less than 1) in a variety of situations.	4-1, 4-4, 4-7, 5-1, 5-2, 5-3, 5-4, 5-5, 5-6, 5-7
4.1.8A4 Compare and order numbers of all named types.	2-2, 3-3
4.1.8A5 Use whole numbers, fractions, decimals, and percents to represent equivalent forms of the same number.	2-1, 2-2, 5-1, 5-2, PS8
4.1.8A6 Recognize that repeating decimals correspond to fractions and determine their fractional equivalents. <ul style="list-style-type: none"> • $\frac{5}{7} = 0.714285714285\dots = 0.\overline{714285}$ 	2-1
4.1.8A7 Construct meanings for common irrational numbers, such as π (pi) and the square root of 2.	3-2, 3-3, 7-2
B. Numerical Operations	
4.1.8B1 Use and explain procedures for performing calculations involving addition, subtraction, multiplication, division, and exponentiation with integers and all number types named above with: <ul style="list-style-type: none"> • Pencil-and-paper • Mental math • Calculator 	1-2, 1-4, 2-1, 2-2, 2-3, 2-4, 2-8, 2-9, 3-1, 3-2, 3-3, 3-4, 4-2, 4-7, 4-7b, 5-2, 5-4, 5-7, 7-2, 8-1, 8-3, 8-5, 8-6, 8-7
4.1.8B2 Use exponentiation to find whole number powers of numbers.	1-2, 2-8
4.1.8B3 Find square and cube roots of numbers and understand the inverse nature of powers and roots.	3-1, 3-2
4.1.8B4 Solve problems involving proportions and percents.	4-4, 4-7, 5-1, 5-2, 5-3, 5-4, 5-5, 5-6, 5-7
4.1.8B5 Understand and apply the standard algebraic order of operations, including appropriate use of parentheses.	1-2
C. Estimation	
4.1.8C1 Estimate square and cube roots of numbers.	3-2
4.1.8C2 Use equivalent representations of numbers such as fractions, decimals, and percents to facilitate estimation.	5-2, 5-4, 5-5, PS1

PS = Prerequisite Skill Appendix (pp. 600–615)

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4.1.8C3	Recognize the limitations of estimation and assess the amount of error resulting from estimation.	5-5a, 5-5
STANDARD 4.2: GEOMETRY AND MEASUREMENT		
A. Geometric Properties		
4.2.8A1	Understand and apply concepts involving lines, angles, and planes. <ul style="list-style-type: none"> • Complementary and supplementary angles • Vertical angles • Bisectors and perpendicular bisectors • Parallel, perpendicular, and intersecting planes • Intersection of plane with cube, cylinder, cone, and sphere 	6-1, 6-1b, 6-2b, 6-3b, 7-4, 7-7, 7-8
4.2.8A2	Understand and apply the Pythagorean theorem.	3-4, 3-5
4.2.8A3	Understand and apply properties of polygons. <ul style="list-style-type: none"> • Quadrilaterals, including squares, rectangles, parallelograms, trapezoids, rhombi • Regular polygons • Sum of measures of interior angles of a polygon • Which polygons can be used alone to generate a tessellation and why 	6-4, 6-5a, 6-5, 6-9b
4.2.8A4	Understand and apply the concept of similarity. <ul style="list-style-type: none"> • Using proportions to find missing measures • Scale drawings • Models of 3D objects 	4-5, 4-6, 4-7
4.2.8A5	Use logic and reasoning to make and support conjectures about geometric objects.	6-4b
B. Transforming Shapes		
4.2.8B1	Understand and apply transformations. <ul style="list-style-type: none"> • Finding the image, given the pre-image, and vice-versa • Sequence of transformations needed to map one figure onto another • Reflections, rotations, and translations result in images congruent to the pre-image • Dilations (stretching/shrinking) result in images similar to the pre-image 	4-8, 6-7, 6-8, 6-9
4.2.8B2	Use iterative procedures to generate geometric patterns. <ul style="list-style-type: none"> • Fractals (e.g., the Koch Snowflake) • Self-similarity • Construction of initial stages • Patterns in successive stages (e.g., number of triangles in each stage of Sierpinski's Triangle) 	beyond the scope of this course
C. Coordinate Geometry		
4.2.8C1	Use coordinates in four quadrants to represent geometric concepts.	3-6, PS11
4.2.8C2	Use a coordinate grid to model and quantify transformations (e.g., translate right 4 units).	6-7, 6-8 , 6-9
D. Units of Measurement		
4.2.8D1	Solve problems requiring calculations that involve different units of measurement within a measurement system (e.g., 4'3" plus 7'10" equals 12'1").	PS3
4.2.8D2	Use approximate equivalents between standard and metric systems to estimate measurements (e.g., 5 kilometers is about 3 miles).	PS4

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4.2.8D3	Recognize that the degree of precision needed in calculations depends on how the results will be used and the instruments used to generate the measurements.	7-9
4.2.8D4	Select and use appropriate units and tools to measure quantities to the degree of precision needed in a particular problem-solving situation.	7-9
4.2.8D5	Recognize that all measurements of continuous quantities are approximations.	beyond the scope of this course
4.2.8D6	Solve problems that involve compound measurement units, such as speed (miles per hour), air pressure (pounds per square inch), and population density (persons per square mile).	4-1, 4-2
E. Measuring Geometric Objects		
4.2.8E1	Develop and apply strategies for finding perimeter and area. <ul style="list-style-type: none"> Geometric figures made by combining triangles, rectangles and circles or parts of circles Estimation of area using grids of various sizes Impact of a dilation on the perimeter and area of a two-dimensional figure 	7-1, 7-2, 7-3
4.2.8E2	Recognize that the volume of a pyramid or cone is one-third of the volume of the prism or cylinder with the same base and height (e.g., use rice to compare volumes of figures with same base and height).	7-6
4.2.8E3	Develop and apply strategies and formulas for finding the surface area and volume of a three-dimensional figure. <ul style="list-style-type: none"> Volume - prism, cone, pyramid Surface area - prism (triangular or rectangular base), pyramid (triangular or rectangular base) Impact of a dilation on the surface area and volume of a three-dimensional figure 	7-5, 7-6, 7-7, 7-8, 7-8b
4.2.8E4	Use formulas to find the volume and surface area of a sphere.	7-6, 7-8
STANDARD 4.3: PATTERNS AND ALGEBRA		
A. Patterns		
4.3.8A1	Recognize, describe, extend, and create patterns involving whole numbers, rational numbers, and integers. <ul style="list-style-type: none"> Descriptions using tables, verbal and symbolic rules, graphs, simple equations or expressions Finite and infinite sequences Arithmetic sequences (i.e., sequences generated by repeated addition of a fixed number, positive or negative) Geometric sequences (i.e., sequences generated by repeated multiplication by a fixed positive ratio, greater than 1 or less than 1) Generating sequences by using calculators to repeatedly apply a formula 	1-1, 2-8a, 11-1, 11-1b, 11-2, 11-3a, 11-3, 11-5a, 12-1
B. Functions and Relationships		
4.3.8B1	Graph functions, and understand and describe their general behavior. <ul style="list-style-type: none"> Equations involving two variables Rates of change (informal notion of slope) 	11-3a, 11-3, 11-4, 11-5a, 11-5, 11-7, 11-8
4.3.8B2	Recognize and describe the difference between linear and exponential growth, using tables, graphs, and equations.	2-8, 11-3, 12-1

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Strands and Cumulative Progress Indicators		Student Edition Lesson(s)
C. Modeling		
4.3.8C1	Analyze functional relationships to explain how a change in one quantity can result in a change in another, using pictures, graphs, charts, and equations.	11-2, 11-3a, 11-3, 11-5a
4.3.8C2	Use patterns, relations, symbolic algebra, and linear functions to model situations. <ul style="list-style-type: none"> Using concrete materials (manipulatives), tables, graphs, verbal rules, algebraic expressions/equations/inequalities Growth situations, such as population growth and compound interest, using recursive (e.g., NOW-NEXT) formulas (cf. science standard 5.5 and social studies standard 6.6) 	1-1, 1-2, 1-7, 1-8, 1-9, 2-7, 2-8a, 2-8, 5-8, 5-8b , 10-1a, 10-2, 10-3, 10-4a, 10-4, 10-5, 10-6, 10-7, 11-1, 11-1b , 11-2, 11-3a, 11-3, 11-5a, 11-6a, 11-7, 11-8, 12-3a
D. Procedures		
4.3.8D1	Use graphing techniques on a number line. <ul style="list-style-type: none"> Absolute value Arithmetic operations represented by vectors (arrows) (e.g., “$-3 + 6$” is “left 3, right 6”) 	1-3, 1-4, 1-5
4.3.8D2	Solve simple linear equations informally, graphically, and using formal algebraic methods. <ul style="list-style-type: none"> Multi-step, integer coefficients only (although answers may not be integers) Using paper-and-pencil, calculators, graphing calculators, spreadsheets, and other technology 	1-8, 1-9, 2-7, 10-1a, 10-2, 10-4a, 10-4, 11-5a, 11-7, 11-8
4.3.8D3	Solve simple linear inequalities.	10-6, 10-7, 11-8
4.3.8D4	Create, evaluate, and simplify algebraic expressions involving variables. <ul style="list-style-type: none"> Order of operations, including appropriate use of parentheses Distributive property Substitution of a number for a variable Translation of a verbal phrase or sentence into an algebraic expression, equation, or inequality, and vice versa 	1-2, 1-4, 1-5, 1-6, 1-7
4.3.8D5	Understand and apply the properties of operations, numbers, equations, and inequalities. <ul style="list-style-type: none"> Additive inverse Multiplicative inverse Addition and multiplication properties of equality Addition and multiplication properties of inequalities 	1-4, 1-5, 1-8, 1-9, 2-4, 10-6, 10-7
STANDARD 4.4: DATA ANALYSIS, PROBABILITY, AND DISCRETE MATHEMATICS		
A. Data Analysis		
4.4.8A1	Select and use appropriate representations for sets of data, and measures of central tendency (mean, median, and mode). <ul style="list-style-type: none"> Type of display most appropriate for given data Box-and-whisker plot, upper quartile, lower quartile Scatter plot Calculators and computer used to record and process information Finding the median and mean (weighted average) using frequency data. Effect of additional data on measures of central tendency 	8-6b, 9-1b, 9-3, 9-4, 9-4b, 9-5, 9-6, 11-6, 11-6b; Chapter 9 Game Zone
4.4.8A2	Make inferences and formulate and evaluate arguments based on displays and analysis of data.	8-7, 9-3, 9-4, 9-7

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Strands and Cumulative Progress Indicators		Student Edition Lesson(s)
4.4.8A3	Estimate lines of best fit and use them to interpolate within the range of the data.	11-6
4.4.8A4	Use surveys and sampling techniques to generate data and draw conclusions about large groups.	8-7
B. Probability		
4.4.8B1	Interpret probabilities as ratios, percents, and decimals.	8-1, 8-5, 8-6
4.4.8B2	Determine probabilities of compound events.	8-5
4.4.8B3	Explore the probabilities of conditional events (e.g., if there are seven marbles in a bag, three red and four green, what is the probability that two marbles picked from the bag, without replacement, are both red).	8-5
4.4.8B4	Model situations involving probability with simulations (using spinners, dice, calculators and computers) and theoretical models. <ul style="list-style-type: none"> • Frequency, relative frequency 	8-6, 8-6b
4.4.8B5	Estimate probabilities and make predictions based on experimental and theoretical probabilities.	8-1, 8-5, 8-6, 8-6b, 8-7
4.4.8B6	Play and analyze probability-based games, and discuss the concepts of fairness and expected value.	8-1, 8-2, 8-5, 8-6, 8-6b
C. Discrete Mathematics—Systematic Listing and Counting		
4.4.8C1	Apply the multiplication principle of counting. <ul style="list-style-type: none"> • Permutations: ordered situations with replacement (e.g., number of possible license plates) vs. ordered situations without replacement (e.g., number of possible slates of 3 class officers from a 23 student class) • Factorial notation • Concept of combinations (e.g., number of possible delegations of 3 out of 23 students) 	8-3, 8-4, 8-4b
4.4.8C2	Explore counting problems involving Venn diagrams with three attributes (e.g., there are 15, 20, and 25 students respectively in the chess club, the debating team, and the engineering society; how many different students belong to the three clubs if there are 6 students in chess and debating, 7 students in chess and engineering, 8 students in debating and engineering, and 2 students in all three?).	3-3a
4.4.8C3	Apply techniques of systematic listing, counting, and reasoning in a variety of different contexts.	8-2a, 8-2
D. Discrete Mathematics—Vertex-Edge Graphs and Algorithms		
4.4.8D1	Use vertex-edge graphs and algorithmic thinking to represent and find solutions to practical problems. <ul style="list-style-type: none"> • Finding the shortest network connecting specified sites • Finding a minimal route that includes every street (e.g., for trash pick-up) • Finding the shortest route on a map from one site to another • Finding the shortest circuit on a map that makes a tour of specified sites • Limitations of computers (e.g., the number of routes for a delivery truck visiting n sites is $n!$, so finding the shortest circuit by examining all circuits would overwhelm the capacity of any computer, now or in the future, even if n is less than 100) 	beyond the scope of this course

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STANDARD 4.5: MATHEMATICAL PROCESSES		
A. Problem Solving		
4.5.8A1	Learn mathematics through problem solving, inquiry, and discovery.	covered throughout the text
4.5.8A2	Solve problems that arise in mathematics and in other contexts (cf. workplace readiness standard 8.3). <ul style="list-style-type: none"> • Open-ended problems • Non-routine problems • Problems with multiple solutions • Problems that can be solved in several ways 	covered throughout the text
4.5.8A3	Select and apply a variety of appropriate problem-solving strategies (e.g., “try a simpler problem” or “make a diagram”) to solve problems.	1-8a, 2-8a, 3-3a, 4-5a, 5-5a, 6-4b, 7-3a, 8-2a, 9-1a, 10-4b, 11-6a, 12-7a
4.5.8A4	Pose problems of various types and levels of difficulty.	covered throughout the text
4.5.8A5	Monitor their progress and reflect on the process of their problem solving activity.	1-3b, 2-8b, 3-5b, 4-5b, 4-7b, 6-1b, 6-2b, 6-3b, 6-5a, 6-5b, 6-9b, 7-4a, 7-7a, 8-4b, 9-3b, 10-1a, 10-4a, 11-1b, 11-3a, 12-3a
B. Communication		
4.5.8B1	Use communication to organize and clarify their mathematical thinking. <ul style="list-style-type: none"> • Reading and writing • Discussion, listening, and questioning 	1-3b, 1-8a, 2-8a, 2-8b, 3-3a, 3-5b, 4-5a, 4-5b, 4-7b, 5-5a, 6-1b, 6-2b, 6-3b, 6-4b, 6-5a, 6-5b, 6-9b, 7-3a, 7-4a, 7-7a, 8-2a, 8-4b, 9-1a, 9-3b, 10-1a, 10-4a, 10-4b, 11-1b, 11-3a, 11-6a, 12-3a, 12-7a
4.5.8B2	Communicate their mathematical thinking coherently and clearly to peers, teachers, and others, both orally and in writing.	covered throughout the text
4.5.8B3	Analyze and evaluate the mathematical thinking and strategies of others.	1-5, 1-7, 2-3, 2-5, 3-1, 3-2, 3-4, 4-3, 4-6, 5-2, 5-3, 5-4, 5-7, 6-5, 6-9, 7-1, 7-5, 8-1, 8-3, 8-5, 9-4, 9-6, 10-2, 10-7, 11-2, 11-4, 11-8, 12-4, 12-5, 12-7
4.5.8B4	Use the language of mathematics to express mathematical ideas precisely.	covered throughout the text
C. Connections		
4.5.8C1	Recognize recurring themes across mathematical domains (e.g., patterns in number, algebra, and geometry).	1-1, 2-8a, 11-1
4.5.8C2	Use connections among mathematical ideas to explain concepts (e.g., two linear equations have a unique solution because the lines they represent intersect at a single point).	covered throughout the text
4.5.8C3	Recognize that mathematics is used in a variety of contexts outside of mathematics.	covered throughout the text
4.5.8C4	Apply mathematics in practical situations and in other disciplines.	covered throughout the text
4.5.8C5	Trace the development of mathematical concepts over time and across cultures (cf. world languages and social studies standards).	covered in the Chapter Resource Masters

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4.5.8C6	Understand how mathematical ideas interconnect and build on one another to produce a coherent whole.	covered throughout the text
D. Reasoning		
4.5.8D1	Recognize that mathematical facts, procedures, and claims must be justified.	covered throughout the text
4.5.8D2	Use reasoning to support their mathematical conclusions and problem solutions.	covered throughout the text
4.5.8D3	Select and use various types of reasoning and methods of proof.	1-3b, 2-8b, 3-5b, 4-5b, 4-7b, 6-1b, 6-2b, 6-3b, 6-5a, 6-5b, 6-9b, 7-4a, 7-7a, 8-4b, 9-3b, 10-1a, 10-4a, 11-1b, 11-3a, 12-3a
4.5.8D4	Rely on reasoning, rather than answer keys, teachers, or peers, to check the correctness of their problem solutions.	5-5a
4.5.8D5	Make and investigate mathematical conjectures. <ul style="list-style-type: none"> • Counterexamples as a means of disproving conjectures • Verifying conjectures using informal reasoning or proofs. 	1-2, 5-5a, 6-4b
4.5.8D6	Evaluate examples of mathematical reasoning and determine whether they are valid.	5-5a, 6-4b
E. Representations		
4.5.8E1	Create and use representations to organize, record, and communicate mathematical ideas. <ul style="list-style-type: none"> • Concrete representations (e.g., base-ten blocks or algebra tiles) • Pictorial representations (e.g., diagrams, charts, or tables) • Symbolic representations (e.g., a formula) • Graphical representations (e.g., a line graph) 	1-3b, 1-4, 1-5, 1-8, 3-1, 3-4, 3-5, 3-5b, 3-6, 5-8, 7-1, 7-2, 7-3, 7-5, 7-6, 7-7, 7-8, 9-1, 9-1b, 9-2, 9-3, 9-6, 9-7, 10-1a, 10-1, 10-2, 10-4a, 11-3a, 11-3, 11-4, 11-5a, 11-6a, 11-6, 11-6b, 11-7, 11-8, 12-2a, 12-2, 12-3a, 12-3, 12-4, 12-5, 12-7
4.5.8E2	Select, apply, and translate among mathematical representations to solve problems.	covered throughout the text
4.5.8E3	Use representations to model and interpret physical, social, and mathematical phenomena.	covered throughout the text
F. Technology		
4.5.8F1	Use technology to gather, analyze, and communicate mathematical information.	4-2b, 5-8b, 7-8b, 8-6b, 9-1b, 9-4b, 11-5a, 11-6b, 12-2a
4.5.8F2	Use computer spreadsheets, software, and graphing utilities to organize and display quantitative information.	4-2b, 5-8b, 7-8b, 8-6b, 9-1b, 9-4b, 11-5a, 11-6b, 12-2a
4.5.8F3	Use graphing calculators and computer software to investigate properties of functions and their graphs.	11-5a, 11-6b, 12-2a
4.5.8F4	Use calculators as problem-solving tools (e.g., to explore patterns, to validate solutions).	2-1, 2-2, 2-8
4.5.8F5	Use computer software to make and verify conjectures about geometric objects.	7-8b
4.5.8F6	Use computer-based laboratory technology for mathematical applications in the sciences.	Course 3 Science and Mathematics Lab Manual on the Internet (msmath3.net)

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