

Mathematics Assessment Framework

Grade 7

BOLD=Eligible for NMSBA

Italics=Classroom Assessment Only

Strand: NUMBER AND OPERATIONS

Standard: Students will understand numerical concepts and mathematical operations.

5-8 Benchmark N.1: Understand numbers, ways of representing numbers, relationships among numbers, and number systems.

Performance Standards

7.N.1.1 Determine the absolute value of rational numbers.

7.N.1.2 Illustrate the relationships among natural (i.e., counting) numbers, whole numbers, integers, rational and irrational numbers.

7.N.1.3 Use properties of the real-number system to explain reasoning and to formulate and solve real-world problems.

7.N.1.4 Read, write, and compare rational numbers in scientific notation (e.g., positive and negative powers of 10) with approximate numbers using scientific notation.

7.N.1.5 Simplify numerical expressions using order of operations.

5-8 Benchmark N.2: Understand the meaning of operations and how they relate to one another.

Performance Standards

7.N.2.1 Add, subtract, multiply, and divide rational numbers (e.g., integers, fractions, terminating decimals) and take positive rational numbers to whole-number powers.

7.N.2.2 Convert terminating decimals into reduced fractions.

7.N.2.3 Calculate given percentages of quantities and use them to solve problems (e.g., discounts of sales, interest earned, tips, markups, commission, profit, simple interest).

7.N.2.4 Add and subtract fractions with unlike denominators.

7.N.2.5 Multiply, divide, and simplify rational numbers by using exponent rules.

7.N.2.6 Understand the meaning of the absolute value of a number:

a. interpret the absolute value as the distance of the number from zero on a number line

b. determine the absolute value of real numbers

7.N.2.7 Find square roots of perfect whole-number squares.

7.N.2.8 Simplify and evaluate positive rational numbers raised to positive whole number powers.

7.N.2.9 Solve addition, subtraction, multiplication, and division problems that use positive and negative integers and

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combinations of these operations.

5-8 Benchmark N.3: Compute fluently and make reasonable estimates.

- 7.N.3.1 Use estimation to check reasonableness of results, and use this information to make predictions in situations involving rational numbers, pi, and simple algebraic equations.
- 7.N.3.2 Convert fractions to decimals and percents and use these representations in estimations, computations, and applications.
- 7.N.3.3 Read, write, and compare rational numbers in scientific notation (e.g., positive and negative powers of 10) with approximate numbers using scientific notation.
- 7.N.3.4 Calculate the percentage of increases and decreases of a quantity.
- 7.N.3.5 Add and subtract fractions with unlike denominators.
- 7.N.3.6 Use the inverse relationship between raising to a power and extracting the root of a perfect square integer.

Strand: ALGEBRA

Standard: Students will understand algebraic concepts and applications.

5-8 Benchmark A.1: Understand patterns, relations, and functions.

Performance Standards

- 7.A.1.1 Identify and continue patterns presented in a variety of formats.
- 7.A.1.2 Represent a variety of relationships using tables, graphs, *verbal* rules, and possible symbolic notation, and recognize the same general pattern presented in different representations.
- 7.A.1.3 Simplify numerical expressions by applying properties of rational numbers, and justify the process used.
- 7.A.1.4 Interpret and evaluate expressions involving integer powers and simple roots.
- 7.A.1.5 Graph and interpret linear functions.
- 7.A.1.6 Solve problems involving rate, average speed, distance, and time.

5-8 Benchmark A.2: Represent and analyze mathematical situations and structures using algebraic symbols.

Performance Standards

- 7.A.2.1 Write *verbal* expressions and sentences as algebraic expressions and equations:
 - a. evaluate algebraic expressions
 - b. solve simple linear equations
 - c. graph and interpret results

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- 7.A.2.2 Use variables and appropriate operations to write an expression, an equation, or an inequality that represents a *verbal* description.
- 7.A.2.3 Use the order of operations to evaluate algebraic expressions.
- 7.A.2.4 Simplify numerical expressions by applying properties of rational numbers.
- 7.A.2.5 Graph linear functions and identify slope as positive or negative.
- 7.A.2.6 Use letters as variables in mathematical expressions to describe how one quantity changes when a related quantity changes.

5-8 Benchmark A.3: Use mathematical models to represent and understand quantitative relationships.

Performance Standards

- 7.A.3.1 Create scale models and use them for dimensional drawings.
- 7.A.3.2 Understand and use the coordinate plane to graph ordered pairs and linear equations.
- 7.A.3.3 Select and use an appropriate model for a particular situation.

5-8 Benchmark A.4: Analyze changes in various contexts.

Performance Standards

- 7.A.4.1 Use variables and appropriate operations to write an expression, an equation, and/or an inequality that represents a *verbal* description involving change.
- 7.A.4.2 Interpret and evaluate expressions involving integer powers and simple roots as they relate to change.
- 7.A.4.3 Graph and interpret linear functions as they are used to solve problems.
- 7.A.4.4 Solve two-step equations and inequalities with one variable over the rational numbers, interpret the solution or solutions in the context from which they arose, and verify the reasonableness of the results.

Strand: GEOMETRY

Standard: Students will understand geometric concepts and applications.

5-8 Benchmark G.1: Analyze characteristics and properties of two- and three-dimensional geometric shapes and develop mathematics arguments about geometric relationships.

Performance Standards

- 7.G.1.1 Classify geometric figures as similar or congruent.
- 7.G.1.2 Understand the concept of a constant (e.g., π) and use the formulas for the circumference and area of a circle.

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7.G.1.3 Explain and use the Pythagorean theorem.

7.G.1.4 Determine the radius, diameter, and circumference of a circle and explain their relationship.

7.G.1.5 Use properties to classify solids including pyramids, cones, prisms, and cylinders.

5-8 Benchmark G.2: Specify locations and describe spatial relationships using coordinate geometry and other representational systems.

Performance Standards

7.G.2.1 Construct and use coordinate graphs to plot simple figures, determine lengths and areas related to them, and determine the image under translations and reflections.

5-8 Benchmark G.3: Apply transformations and use symmetry to analyze mathematical situations.

Performance Standards

7.G.3.1 Determine how perimeter and area are affected by changes of scale.

5-8 Benchmark G.4: Use visualization, spatial reasoning, and geometric modeling to solve problems.

Performance Standards

7.G.4.1 Compute the perimeter and area of common geometric shapes and use the results to find measures of less common objects.

7.G.4.2 Identify and describe the properties of two-dimensional figures:

- a. identify angles as vertical, adjacent, complementary, or supplementary and provide descriptions of these terms
- b. use the properties of complementary and supplementary angles and the sum of the angles of a triangle to solve problems involving an unknown angle
- c. draw quadrilaterals and triangles from given information

Strand: MEASUREMENT

Standard: Students will understand measurement systems and applications.

5-8 Benchmark M.1: Understand measurable attributes of objects and the units, systems, and processes of measurement.

Performance Standards

7.M.1.1 Choose appropriate units of measure and ratios to recognize new equivalences (e.g., 1 square yard equals 9 square feet) to solve problems.

7.M.1.2 Select and use the appropriate size and type of unit for a given measurement situation.

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- 7.M.1.3 Compare masses, weights, capacities, geometric measures, times, and temperatures within measurement systems.
- 7.M.1.4 Approximate the relationship between standard and metric measurement systems (e.g., inches and centimeters, pounds and kilograms, quarts and liters).
- 7.M.1.5 Use measures expressed as rates and measures expressed as products to solve problems, check the units of the solutions, and analyze the reasonableness of the answer.

5-8 Benchmark M.2: Apply appropriate techniques, tools, and formulas to determine measurements.

Performance Standards

- 7.M.2.1 Apply strategies and formulas to find missing angle measurements in triangles and quadrilaterals.
- 7.M.2.2 Select and use formulas to determine the circumference of circles and the area of triangles, parallelograms, trapezoids, and circles.
- 7.M.2.3 Solve problems involving scale factors, ratios, and proportions.

Strand: DATA ANALYSIS AND PROBABILITY

Standard: Students will understand how to formulate questions, analyze data, and determine probabilities.

5-8 Benchmark D.1: Formulate questions that can be addressed with data and collect, organize, and display relevant data to answer them.

Performance Standards

- 7.D.1.1 Describe how data representations influences interpretation.
- 7.D.1.2 Select and use appropriate representation for presenting collected data and justify the selection.
- 7.D.1.3 Use measures of central tendency and spread to describe a set of data.
- 7.D.1.4 Choose between median and mode to describe a set of data and justify the choice for a particular situation.
- 7.D.1.5 Determine the quartiles of a data set.
- 7.D.1.6 Identify ordered pairs of data from a graph and interpret the data in terms of the situation depicted by the graph.
- 7.D.1.7 Use various scales and formats to display the same data set.
- 7.D.1.8 Identify and explain the misleading representations of data.
- 7.D.1.9 Collect, organize, and represent data sets that have one or more variables and identify relationships among variables within a data set.
- 7.D.1.10 Compute the minimum, lower quartile, median, upper quartile, and maximum of a data set.
- 7.D.1.11 Identify and explain the effects of scale and/or interval changes on graphs of whole number data sets.
- 7.D.1.12 Use and explain sampling techniques (e.g., observations, surveys, and random sampling) for gathering data.
- 7.D.1.13 Analyze problems by identifying relationships, distinguishing relevant from irrelevant information, identifying missing information, and selecting, *collecting*, and displaying appropriate data to address the problem.

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5-8 Benchmark D.2: Select and use appropriate statistical methods to analyze data.

Performance Standards

- 7.D.2.1 Choose and justify appropriate measures of central tendencies (e.g., mean, median, mode, range) to describe given or derived data.
- 7.D.2.2 Know various ways to display data sets (e.g., stem and leaf plot, box and whisker plot, scatter plots) and use these forms to display a single set of data or to compare two sets of data.
- 7.D.2.3 Use the analysis of data to make convincing arguments.
- 7.D.2.4 *Use appropriate technology to gather and display data sets and identify the relationships that exist among variables within the data set.*
- 7.D.2.5 Use data samples of a population and describe the characteristics and limitations of the sample.
- 7.D.2.6 Identify data that represent sampling errors and explain why the sample and the display might be biased.
- 7.D.2.7 Identify claims based on statistical data and evaluate the validity of the claims.

5-8 Benchmark D.3: Develop and evaluate inferences and predictions that are based on data.

Performance Standards

- 7.D.3.1 Formulate and justify mathematical conjectures based on data and a general description of the mathematical question or problem posed.
- 7.D.3.2 Analyze data to make accurate inferences, predictions, and to develop convincing arguments from data displayed in a variety of forms.
- 7.D.3.3 Approximate a line of best fit for a data set in a scatter plot form and make predictions using the simple equation of that line.

5-8 Benchmark D.4: Understand and apply basic concepts of probability.

Performance Standards

- 7.D.4.1 Determine the probability of a compound event composed of two independent events.
- 7.D.4.2 Identify examples of events having the probability of one or zero.
- 7.D.4.3 Describe the probability of events using fractions, decimals, and percents.
- 7.D.4.4 Express probability as a fraction, zero, or one.
- 7.D.4.5 Use probability to generate convincing arguments, draw conclusions, and make decisions in a variety of situations.
- 7.D.4.6 Make predictions based on theoretical probabilities of compound events.
- 7.D.4.7 Determine the probability of a simple event or a compound event composed of a simple, independent events.