New York State Testing Program
Next Generation Learning Standards
Mathematics Test

Performance Level Descriptions

Grade 6

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New York State Testing Program
Next Generation Mathematics Test

Performance Level Descriptions

GRADE 6

Performance level descriptions (PLDs) help communicate to students, families, educators, and the public the specific knowledge and skills expected of students when they demonstrate proficiency of a learning standard. The PLDs serve several purposes in classroom instruction and assessment. They are the foundation of rich discussion around what students need to do to perform at higher levels and to explain the progression of learning within a subject area. PLDs are also crucial in explaining student performance on the NYS assessments since they make a connection between the scale score, the performance level, and specific knowledge and skills typically demonstrated at that level.

Policy Definitions of Performance Levels

For each subject area, students perform along a continuum of the knowledge and skills necessary to meet the demands of the Learning Standards for English Language Arts and Mathematics. There are students who excel in standards, students who are proficient, students who are partially proficient, and students who are below proficient. New York State assessments are designed to classify student performance into one of four levels based on the knowledge and skills the student has demonstrated. These performance levels are defined as:

NYS Level 4

Students performing at this level **excel** in standards for their grade. They demonstrate knowledge, skills, and practices embodied by the Learning Standards that are considered **more than sufficient** for the expectations at this grade.

NYS Level 3

Students performing at this level are **proficient** in standards for their grade. They demonstrate knowledge, skills, and practices embodied by the Learning Standards that are considered **sufficient** for the expectations at this grade.

NYS Level 2

Students performing at this level are **partially proficient** in standards for their grade. They demonstrate knowledge, skills, and practices embodied by the Learning Standards that are considered partial but insufficient for the expectations at this grade. Students performing at Level 2 are considered on track to meet current New York high school graduation requirements but are **not yet proficient** in Learning Standards at this grade.

NYS Level 1

Students performing at this level are **below proficient** in standards for their grade. They may demonstrate **limited** knowledge, skills, and practices embodied by the Learning Standards that are considered **insufficient** for the expectations at this grade.

How were the PLDs developed?

Following best practice for the development of PLDs, the number of performance levels and their definitions were specified prior to the articulation of the full descriptions. New York State educators certified in the appropriate grade-levels and subject areas convened in separate meetings to develop the initial draft PLDs for Grades 3-8 English Language Arts and Mathematics, respectively. In developing PLDs, participants considered policy definitions of the performance level and the knowledge and skill expectations for each grade level in the Learning Standards. Once they established the appropriate knowledge and skills from a particular standard for NYS Level 3 (i.e., proficient in standards), panelists worked together to parse the knowledge and skills across the other performance levels in such a way that the progression of the knowledge and skills was clearly seen moving from Level 1 to Level 4. This process was repeated for all of the standards for each grade and subject area.

The draft PLDs were reviewed by the New York State Education Department's (NYSED's) Content Advisory Panels which consist of classroom teachers from elementary, middle and high school, school and district administrators, English Language Learners (ELLs) and students with disabilities (SWD) specialists, and higher education faculty members from across the state. The drafts then went through additional rounds of review and edits from a number of NYS-certified educators, content specialists, and assessment experts under NYSED supervision.

How can the PLDs be used by Educators and in Instruction?

The PLDs should be used as a guidance document to show the overall continuum of learning of the knowledge and skills from the Learning Standards. NYSED encourages the use of the PLDs for a variety of purposes, including differentiating instruction to maximize individual student outcomes, creating formative classroom assessments and rubrics to help identify target performance levels for individual or groups of students, and tracking student growth along the proficiency continuum as described by the PLDs. The knowledge and skills shown in the PLDs describe *typical* performance and progression, however the order in which students will demonstrate the knowledge and skills within and between performance levels may be staggered (i.e. a student who predominantly demonstrates Level 2 knowledge and skills may simultaneously demonstrate certain knowledge and skills indicative of Level 3.).

How are the PLDs used in Assessment?

PLDs are essential in setting performance standards (i.e., "cut scores") for New York State assessments. Standard setting panelists use PLDs to determine the expectations for students to demonstrate the knowledge and skills necessary to *just barely* attain a Level 2, Level 3, or Level 4 on the assessment. These knowledge and skills drive discussions that influence the panelists as they recommend the cut scores on the assessment.

PLDs are also used in question development. Question writers are assigned to write questions that draw on the specific knowledge and skills from a PLD. This ensures that each test has questions that distinguish performance all along the continuum. Teachers can use the PLDs in the same manner when developing both formative and summative classroom assessments. Tasks that require students to demonstrate knowledge and skills from the PLDs can be tied back to the performance level with which the PLD is associated, providing the teacher with feedback about the students' progress as well as a wealth of other skills that the student is likely able to demonstrate (or can aspire to in the case of the next-highest PLD).

Cluster	Performance Level 4	Performance Level 3	Performance Level 2	Performance Level 1
Students can apply and extend previous understandings of numbers to the system of rational numbers. (NY-6.NS.5-8)	Create real-world and mathematical problems that involve plotting ordered pairs on a coordinate plane.	Plot ordered pairs on a coordinate plane to solve real-world and mathematical problems. Use coordinates and absolute value to find distances between points with the same first coordinate or the same second coordinate in all 4 quadrants. (6.NS.8)	Plot ordered pairs on a coordinate plane to solve mathematical problems. Use coordinates and absolute value to find distances between points located in the same quadrant that have the same first coordinate or the same second coordinate.	Plot ordered pairs on a coordinate plane in quadrant I. Using the coordinates, find the distance between two points in quadrant I that have the same first coordinate or the same second coordinate. Explore how absolute value could be used to do this for two points in a quadrant.
Students can apply and extend previous understandings of arithmetic to algebraic expressions. (NY-6.EE.1-4)	Write, read, and evaluate numerical and algebraic expressions, including those that contain whole number exponents, as well as nested grouping.	Write, read, and evaluate numerical and algebraic expressions, including those that contain whole number exponents and which letters stand for numbers. (6.EE.1, 6.EE.2a)	Read and evaluate numerical and algebraic expressions, including those that contain whole number exponents.	Read and evaluate numerical expressions including those that contain whole number exponents.
		Identify parts of an algebraic or numerical expression using mathematical terms (term, coefficient, sum, difference, product, factor, and quotient) and view one or more parts of an expression as a single entity. (6.EE.2b)	Identify parts of a numerical expression using mathematical terms.	

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Students can apply and extend previous understandings of arithmetic to algebraic expressions. (NY-6.EE.1-4)	Evaluate and create expressions that arise from formulas in real-world problems. Perform arithmetic operations, including those involving whole-number exponents, as well as those that may or may not contain parentheses in the conventional order (Order of Operations). The expression could also contain nested grouping symbols.	Evaluate expressions given specific values for their variables, including those that arise from formulas in real-world problems. Perform arithmetic operations, including those involving whole-number exponents, as well as those that may or may not contain parentheses in the conventional order (Order of Operations).*† (6.EE.2c)	Evaluate formulas given specific values for their variables that arise from real-world problems. Perform arithmetic operations, including those involving whole-number exponents, but not those including parentheses.	Evaluate simple formulas with specific values for their variables. Perform simple arithmetic operations, including those involving whole number exponents.
	Be able to explain and rewrite an expression in different forms in real-world and mathematical problems to reveal and explain how the quantities are related.	Identify, generate, and apply equivalent expressions using properties of operations. (6.EE.3, 6.EE.4)	Identify equivalent numeric expressions.	Explore how properties of operations can be used to generate equivalent numeric expressions.

*† Expressions may or may not include parentheses. Nested grouping symbols are not included.

Cluster	Performance Level 4	Performance Level 3	Performance Level 2	Performance Level 1
Students can reason about and solve one-variable equations and inequalities. (NY-6.EE.5-8)		Use solving an equation or inequality as a process of answering a question: which values from a specified set, if any, make the equation or inequality true? Use substitution to determine whether a given number in a specified set makes an equation or inequality true. (6.EE.5)	Use substitution to determine whether a given number in a specified set makes an equation or inequality true.	Use substitution to determine whether a given whole number makes an equation true.
		Use variables to represent numbers and write expressions and single-step equations when solving real-world or mathematical problems. (6.EE.6)	Use variables to represent numbers and write expressions for single-step equations when solving mathematical problems.	
	Solve real-world and mathematical problems by writing and solving single or two-step equations. All values are nonnegative rational numbers.	Solve real-world and mathematical problems by writing and solving equations of the form $x + p = q$; $x - p = q$; $px = q$; and $\frac{x}{p} = q$ for cases in which p, q, and x are all nonnegative rational numbers.*‡ (6.EE.7)	Solve single-step equations with values that are nonnegative rational numbers.	Solve single-step equations with whole numbers.

*‡ For the $\frac{x}{p} = q$ case, $p \neq 0$.

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Students can reason about and solve one-variable equations and inequalities. (NY-6.EE.5-8)		Recognize that inequalities have infinitely many solutions. Write inequalities of the form $x > c$, $x \geq c$, $x \leq c$ or $x < c$ to represent a constraint or condition in a real-world or mathematical problem. Represent solutions of inequalities on a number line. (6.EE.8)	Recognize that inequalities have infinitely many solutions. Given an inequality and its graph on a number line, determine and explain whether a given point is a solution to the inequality. Write inequalities of the form $x > c$, $x \geq c$, $x \leq c$ or $x < c$ to represent a constraint in mathematical problem.	Recognize that inequalities have infinitely many solutions. Given an inequality and its graph on a number line, determine and explain whether a given point is a solution to the inequality.

Cluster	Performance Level 4	Performance Level 3	Performance Level 2	Performance Level 1
Students can represent and analyze quantitative relationships between dependent and independent variables. (NY-6.EE.9)	In a real-world problem, use variables to represent two quantities that change in relationship to one another. Write an equation to express one quantity, thought of as the dependent variable, in terms of the other quantity, thought of as the independent variable. Given a verbal context and an equation, identify the dependent variable, in terms of the other quantity, thought of as the independent variable. Analyze the relationship between dependent and independent variables using graphs and tables and relate these to the equation.	In a real-world problem, use variables to represent two quantities that change in relationship to one another. Given a verbal context and an equation, identify the dependent variable, in terms of the other quantity, thought of as the independent variable. Analyze the relationship between dependent and independent variables using graphs and tables and relate these to the equation. (6.EE.9)	Given a verbal context and an equation, identify the dependent variable, in terms of the other quantity, thought of as the independent variable. Determine the relationship between dependent and independent variables using graphs and tables and relate these to the equation.	Given an equation and a partial table and graph, identify the relationship between the dependent and independent variable, relating the relationship to the equation. Generate additional table values and coordinates that demonstrate understanding of the relationship.

Cluster	Performance Level 4	Performance Level 3	Performance Level 2	Performance Level 1
Solve real-world and mathematical problems involving area, surface area and volume. (NY-6.G.1-5)		Find area of triangles, trapezoids, and other polygons by composing into rectangles or decomposing into triangles and quadrilaterals. Apply these techniques in the context of solving real-world and mathematical problems.[€§] (6.G.1)	Given a visual aid, find area of triangles, trapezoids, and other polygons by composing into rectangles or decomposing into triangles and quadrilaterals. Recognize that a triangle is half the area of a parallelogram or rectangle.	Decompose a rectangle into two right triangles, showing that the area of each is half the area of the rectangle. Apply the area formula to find the area of a right triangle, given the formula, correctly identifying the base and the height.
	Find and apply volume of right rectangular prisms with fractional edge lengths in the context of solving real-world and mathematical problems.	Find volumes of right rectangular prisms with fractional edge lengths in the context of solving real-world and mathematical problems. (6.G.2)	Find volume of right rectangular prisms with fractional edge lengths, given a diagram of the prism with labeled edge lengths.	Find the volume of a right rectangular prism with whole-number side lengths by packing it with unit cubes and show that the volume is the same as would be found by multiplying the edge lengths, equivalently by multiplying the height by the area of the base.

[€§] The inclusive definition of a trapezoid will be utilized, which defines a trapezoid as "A quadrilateral with at least one pair of parallel sides." (This definition includes parallelograms.)

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Solve real-world and mathematical problems involving area, surface area, and volume. (NY-6.G.1-5)		Draw polygons in the coordinate plane given coordinates for the vertices. Use coordinates to find the length of a side joining points with the same first coordinate or the same second coordinate. Apply these techniques in the context of solving real-world and mathematical problems. (6.G.3)	Draw polygons in the coordinate plane given coordinates for the vertices. Use coordinates to find the length of a side joining points with the same first coordinate or the same second coordinate.	Draw polygons in quadrant I of the coordinate plane given coordinates for the vertices. Use coordinates to find the length of a side joining points with the same first coordinate or the same second coordinate.
		Represent three-dimensional figures using nets made up of rectangles and triangles and use the nets to find the surface area of these figures. Apply these techniques in the context of solving real-world and mathematical problems.£** (6.G.4)	Given a net made up of rectangles and triangles for a three-dimensional figure, use the net to find the surface area of the figure.	Given a net for a rectangular prism, find the surface area of the prism.
	Use area and volume models to explain perfect squares and perfect cubes in the context of solving real-world and mathematical problems.	Use area and volume models to explain perfect squares and perfect cubes. (6.G.5)	Use area and volume models to calculate perfect squares and perfect cubes.	Create a model of a perfect square and calculate its area. Find the volume of a perfect cube by packing it with unit cubes. Identify perfect squares and perfect cubes by building models.

£** Three-dimensional figures include only right rectangular prisms, right rectangular pyramids, and right triangular prisms. When finding surface areas, all necessary measurements will be given.

Cluster	Performance Level 4	Performance Level 3	Performance Level 2	Performance Level 1
Develop an understanding of statistical variability. (NY-6.SP.1-3)		Recognize that a statistical question is one that anticipates variability in the data related to the question and accounts for it in the answers. (6.SP.1a)	Distinguish between a statistical and non-statistical question. Recognize that a statistical question is used in data.	
		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.†† (6.SP.1b)	Use statistics to gain information about a population by examining a sample of the population.	Use statistics to gain information about a population by collecting a sample of the population.

†† Students need to understand that data are generated with respect to contexts or situations and can be used to answer questions about those contexts or situations.

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Develop an understanding of statistical variability. (NY-6.SP.1-3)	Distinguish and evaluate why the method and sample size used to collect data for a particular question is intended to reduce the difference between a population and a sample taken from the population so valid inferences can be drawn about the population. Generate multiple samples (or simulated samples) of the same size to recognize the variation in estimates or predictions.	Distinguish that the method and sample size used to collect data for a particular question is intended to reduce the difference between a population and a sample taken from the population so valid inferences can be drawn about the population. Generate multiple samples (or simulated samples) of the same size to recognize the variation in estimates or predictions.[‡‡] (6.SP.1c)	Distinguish that the method and sample size used to collect data for a particular question is intended to reduce the difference between a population and a sample taken from the population so valid inferences can be drawn about the population.	Explore that the method and sample size used to collect data for a particular question is intended to reduce the difference between a population and a sample taken from the population so valid inferences can be drawn about the population.
		Understand that a set of quantitative data collected to answer a statistical question has a distribution which can be described by its center, spread, and overall shape.[§§] (6.SP.2)	Realize that a set of quantitative data collected can be used to answer a statistical question and find the center of the distribution.	Collect a set of quantitative data to answer a statistical question.

[‡‡] Examples of acceptable methods to obtain a representative sample from a population include, but are not limited to, a simple random sample for a given population or a systematic random sample for an unknown population. Examples of unacceptable methods of sampling include, but are not limited to, online polls and convenience sampling because they introduce bias and are not representative of the population.

[§§] Students need to determine and justify the most appropriate graph to display a given set of data (pictograph, bar graph, histogram, dot plot). Students extend their knowledge of symmetric shapes, to describe data displayed in dot plots and histograms in terms of symmetry. They identify clusters, peaks and gaps, recognizing common shapes and patterns in these displays of data distributions, and ask why a distribution takes on a shape for the context of the variable being considered.

Cluster	Performance Level 4	Performance Level 3	Performance Level 2	Performance Level 1
Develop an understanding of statistical variability. (NY-6.SP.1-3)	Recognize that a measure of center for a quantitative data set summarizes all of its values with a single number while a measure of variation describes how its values vary with a single number. Compare a measure of center to a measure of variability.	Recognize that a measure of center (mean, median and mode) for a quantitative data set summarizes all of its values with a single number while a measure of variation (range) describes how its values vary with a single number. (6.SP.3)	Recognize that a measure of center for a quantitative data set summarizes all of its values with a single number.	Calculate measures of center.
Summarize and describe distributions. (NY-6.SP.4-5)		Display quantitative data in plots on a number line, including dot plots and histograms. (6.SP.4)	Display quantitative data on a number line using dot plots, when provided an interval/frequency tally chart, construct frequency histograms for a given quantitative data set.	Display quantitative data on a number line using dot plots.
		Summarize quantitative data sets in relation to their context. (6.SP.5)	Summarize quantitative data sets in relation to their context.	
		Report the number of observations. (6.SP.5a)	Report the number of observations.	Report the number of observations.
	Describe the nature of the attribute under investigation, including how it was measured and its units of measurement. Connect and relate to real-world situations.	Describe the nature of the attribute under investigation, including how it was measured and its units of measurement. (6.SP.5b)		

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Summarize and describe distributions. (NY-6.SP.4-5)		Calculate measure of variation (range) and measures of center (mean, median, and mode), as well as describe any overall pattern and any striking deviations from the overall pattern with reference to the context in which the data were gathered. (6.SP.5c)	Calculate range and measures of center, as well as describe any overall pattern.	Calculate measures of center.
	Relate and compare the range and the choice of measures of center to the shape of the data distribution and the context in which the data were gathered.	Relate the measure of variation (range) and the choice of measures of center(mean, median, and mode) to the shape of the data distribution and the context in which the data were gathered. (6.SP.5d)		
Investigate chance processes and develop, use, and evaluate probability models. (NY-6.SP.6-8)	Recognize and explain that the probability of a chance event is a number between 0 and 1 inclusive, 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.	Recognize that the probability of a chance event is a number between 0 and 1 inclusive, 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.SP.6)	Recognize that the probability of a chance event is a number between 0 and 1 inclusive, that expresses the likelihood of the event occurring. Larger numbers indicate greater likelihood.	Recognize that the probability of a chance event is a number between 0 and 1 inclusive.

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Investigate chance processes and develop, use, and evaluate probability models. (NY-6.SP.6-8)	Approximate the probability of a simple event by collecting data on the chance process that produces it and observing its long-run relative frequency, and predict the approximate relative frequency.	Approximate the probability of a simple 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.*** (6.SP.7)	Approximate the probability of a simple event by collecting data on the chance process that produces it and observing its long-run relative frequency.	
Investigate chance processes and develop, use, and evaluate probability models. (NY-6.SP.6-8)	Develop a probability model and use it to find probabilities of simple events. Compare probabilities from a model to observed frequencies; if the agreement is not good, explain possible sources of the discrepancy and how you could rectify the discrepancy.	Develop a probability model and use it to find probabilities of simple events. Compare probabilities from a model to observed frequencies; if the agreement is not good, explain possible sources of the discrepancy. (6.SP.8)	Develop a probability model and use it to find probabilities of simple events. Compare probabilities from a model to observed frequencies.	Given a probability model, use it to find probabilities of simple events.
	Develop and analyze a uniform probability model by assigning equal probability to all outcomes, and use the model to determine probabilities of simple events.	Develop a uniform probability model by assigning equal probability to all outcomes, and use the model to determine probabilities of simple events. (6.SP.8a)	Develop a uniform probability model by assigning equal probability to all outcomes.	Given a developed uniform probability model, determine the probability of simple events.

*** Compound events are introduced in grade 7.

Cluster	Performance Level 4	Performance Level 3	Performance Level 2	Performance Level 1
Investigate chance processes and develop, use, and evaluate probability models. (NY-6.SP.6-8)	Develop and analyze a probability model (which may not be uniform) by observing frequencies in data generated from a chance process.	Develop a probability model (which may not be uniform) by observing frequencies in data generated from a chance process. (6.SP.8b)	Observe and explain the frequencies in data generated from a chance process.	