New York State Testing Program

Next Generation Mathematics Test

Performance Level Descriptions

Algebra II

Spring 2025

THE STATE EDUCATION DEPARTMENT / THE UNIVERSITY OF THE STATE OF NEW YORK /
ALBANY, NY 12234

Algebra II Performance Level Descriptions

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 Mathematics. There are students who meet the expectations of the standards with distinction, students who fully meet the expectations, students who minimally meet the expectations, students who partially meet the expectations, and students who do not demonstrate sufficient knowledge or skills required for any performance level. New York State assessments are designed to classify student performance into one of five levels based on the knowledge and skills the student has demonstrated.

NYS Level 5

Students performing at this level meet the expectations of the Mathematics Learning Standards **with distinction** for Algebra II.

NYS Level 4

Students performing at this level **fully meet** the expectations of the Mathematics Learning Standards for Algebra II. They are likely prepared to succeed in the next level of coursework.

NYS Level 3

Students performing at this level **minimally meet** the expectations of the Mathematics Learning Standards for Algebra II. They meet the content area requirements for a Regents diploma but may need additional support to succeed in the next level of coursework.

NYS Level 2

Students performing at this level **partially meet** the expectations of the Mathematics Learning Standards for Algebra II. Students with disabilities performing at this level meet the content area requirements for a local diploma but may need additional support to succeed in the next level of coursework.

NYS Level 1

Students performing at this level demonstrate knowledge, skills, and practices embodied by the Mathematics Learning Standards for Algebra II below that of Level 2.

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. The New York State Education Department convened a group of NYS mathematics educators to develop the initial draft PLDs for Algebra II. 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 4 (fully meet), 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 2 to Level 5. This process was repeated for all the standards within the course. The draft PLDs 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 3 knowledge and skills may simultaneously demonstrate certain knowledge and skills indicative of Level 4).

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 3, Level 4, or Level 5 on the assessment. These skills and knowledge 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 students' progress as well as a wealth of other skills that students are likely able to demonstrate (or can aspire to in the case of the next-highest PLD).

Note: Certain level 5 PLDs will be denoted with a star indicating the knowledge and skills represented will not be targeted by questions on the NYS Algebra II Regents Examination.

Algebra II Performance Level Descriptions

Cluster	Performance Level 5	Performance Level 4	Performance Level 3	Performance Level 2
Extend the properties of exponents to rational exponents. N-RN.A	Rewrite or simplify advanced multivariable expressions involving radicals or rational exponents where the exponent may contain a variable.	Rewrite or simplify multivariable expressions involving radicals or rational exponents.	Rewrite or simplify single variable expressions involving radicals or rational exponents.	Rewrite or simplify numerical expressions involving radicals or rational exponents.
Perform arithmetic operations with complex numbers. N-CN.A		Rewrite an expression that includes radicals with negative radicands as complex numbers.	Rewrite radical expressions with negative radicands as imaginary numbers.	Rewrite simple radical expressions with negative radicands as imaginary numbers.
	Rewrite multi-layered variable expressions containing both sums and products of complex numbers, including simplifying powers of i.	Rewrite variable expressions containing both sums and products of complex numbers, including simplifying powers of i.	Calculate numeric expressions containing both sums and simple products of complex numbers, including simplifying powers of i.	Calculate numeric sums or simple products of complex numbers, including simplifying i^2.

Algebra II Performance Level Descriptions

Cluster	Performance Level 5	Performance Level 4	Performance Level 3	Performance Level 2
Interpret the structure of expressions. A-SSE.A	Rewrite polynomial or rational expressions in different but equivalent forms using rigorous factoring methods such as factoring by substitution.	Rewrite polynomial or rational expressions in a different but equivalent form using advanced factoring methods, including grouping and factoring the sum and difference of cubes.	Rewrite polynomial or simple rational expressions in a different but equivalent form using basic factoring methods.	Factor quadratic expressions.
Write expressions in equivalent forms to reveal their characteristics. A-SSE.B	Use the properties of exponents to write an equivalent form of an exponential function, with rational coefficient exponents, in a real-world context.	Use the properties of exponents to write an equivalent form of an exponential expression.	Use the properties of exponents to write an equivalent form of a simple exponential expression.	Identify the parts of an exponential expression.

Algebra II Performance Level Descriptions

Cluster	Performance Level 5	Performance Level 4	Performance Level 3	Performance Level 2
Understand the relationship between zeros and factors of polynomials. A-APR.B	Apply the remainder theorem to determine multiple zeros, factors, or unknown coefficients for a multi-layered algebraic scenario.	Apply the remainder theorem to determine the remainder from the division of $p(x)$ by $(x - a)$ and if $(x - a)$ is a factor of $p(x)$.	Apply the remainder theorem to determine the remainder from the division of $p(x)$ by $(x - a)$ by evaluating $p(a)$.	Evaluate $p(a)$ to determine if $(x - a)$ is a factor.
	Determine zeros of quadratic, cubic, and quartic polynomials with zeros as variables and/or using advanced factoring methods.	Determine zeros of quadratic, cubic, and quartic polynomials using multiple factoring or graphing methods.	Determine zeros of quadratic and cubic polynomials using basic factoring or graphing methods.	Determine zeros of quadratic, cubic, and quartic polynomials when factors are provided.
Rewrite rational expressions. A-APR.D	Determine equivalent forms of a rational expression with a quadratic divisor, using a method of division.	Determine equivalent forms of a rational expression, with a linear divisor, using a method of division.	Determine equivalent forms of a simple rational expression, with a linear divisor, by inspection.	Determine equivalent forms of a rational expression, with a linear divisor, for factorable expressions (no remainder).
Create equations that describe numbers or relationships. A-CED.A	Create an advanced quadratic, exponential, or rational equation or inequality in one variable from a real-world context.	Create a quadratic, exponential, or rational equation or inequality in one variable from a real-world context.	Create a quadratic, exponential, or simple rational equation or inequality in one variable.	Create a linear equation or inequality in one variable.

Algebra II Performance Level Descriptions

Cluster	Performance Level 5	Performance Level 4	Performance Level 3	Performance Level 2
Understand solving equations as a process of reasoning and explain the reasoning. A-REI.A	Solve advanced radical and rational equations in one variable including equations with rational exponents and identify any extraneous solutions.	Solve radical and rational equations in one variable including equations with rational exponents and identify extraneous solutions.	Solve simple radical and rational equations in one variable including equations with rational exponents.	Verify that a number is a solution to a radical or rational equation.
Solve equations and inequalities in one variable. A-REI.B	Solve advanced quadratic equations in one variable that result in complex solutions, providing an answer in *a + bi* form where a and b can be any real numbers.	Solve quadratic equations in one variable that result in complex solutions, providing an answer in *a + bi* form, where a and b are rational numbers.	Solve quadratic equations in one variable that may result in complex solutions in pure imaginary form.	Solve quadratic equations in one variable with real solutions.
Solve systems of equations. A-REI.C	Solve a linear-quadratic system of equations containing a circle not centered at the origin.	Solve a linear-quadratic system of equations containing a circle whose center is on an axis.	Solve a linear-quadratic system of equations containing a parabola in vertex form or a circle centered at the origin.	Solve a linear-quadratic system of equations containing a parabola in standard form and a line in slope-intercept form.

Algebra II Performance Level Descriptions

Cluster	Performance Level 5	Performance Level 4	Performance Level 3	Performance Level 2
Represent and solve equations and inequalities graphically. **A-REI.D**	Given equations or descriptions for f and g, use technology to approximate the solution sets of or determine the number of solutions of $f(x) = g(x)$, $f(x) < g(x)$, or $f(x) \leq g(x)$, and interpret the solutions in a real-world context. (Functions are limited to polynomial, square root, cube root, absolute value, exponential, logarithmic, and trigonometric functions.)	Given equations for f and g, use technology to approximate the solution set of $f(x) < g(x)$, or $f(x) \leq g(x)$. (Functions are limited to polynomial, square root, cube root, absolute value, exponential, logarithmic, and trigonometric functions.)	Given equations for f and g, use technology to approximate the solutions of $f(x) = g(x)$ or determine the number of solutions of $f(x) = g(x)$. (Functions are limited to polynomial, square root, cube root, absolute value, exponential, logarithmic, and trigonometric functions.)	Given tables of values or graphs for f and g, state the solution(s) of $f(x) = g(x)$.
Understand the concept of a function and use function notation. **F-IF.A**	Given a sequence, generate the recursive or explicit formula, using subscript notation, and determine a specific term.	Identify an explicitly or recursively defined sequence from a function. (Sequences will be defined using subscript notation only.)	Determine the n^{th} term of a recursively defined sequence. (Sequences will be defined using subscript notation only.)	Determine the n^{th} term of an explicitly defined sequence. (Sequences will be defined using subscript notation only.)

Algebra II Performance Level Descriptions

Cluster	Performance Level 5	Performance Level 4	Performance Level 3	Performance Level 2
Interpret functions that arise in applications in terms of the context. F-IF.B	Accurately graph functions using technology and interpret key features of their graphs and tables in a real-world context. (Functions are limited to polynomial, exponential, square root, cube root, trigonometric, and logarithmic)	Accurately graph functions using technology and identify key features of their graphs and tables. (Functions are limited to polynomial, exponential, square root, cube root, trigonometric, and logarithmic)	Sketch functions using technology and identify key features of their graphs and tables. (Functions are limited to polynomial, exponential, square root, cube root, trigonometric and logarithmic)	Sketch functions using technology and identify key features of their graphs and tables. (Functions are limited to quadratic, exponential, and square root.)
	Calculate and interpret the average rate of change over a specified interval from a function represented by an equation, graph or table in a real-world context. (Functions are limited to polynomial, exponential, square root, cube root, trigonometric, and logarithmic.)	Calculate the average rate of change over a specified interval from a function represented by an equation, graph or table in a real-world context. (Functions are limited to polynomial, exponential, square root, cube root, trigonometric, and logarithmic.)	Calculate the average rate of change over a specified interval from a function represented by an equation, graph or table. (Functions are limited to polynomial, exponential, square root, cube root, trigonometric, and logarithmic.)	Calculate the average rate of change over a specified interval from a function represented by a graph or table. (Functions are limited to polynomial and exponential.)

Algebra II Performance Level Descriptions

Cluster	Performance Level 5	Performance Level 4	Performance Level 3	Performance Level 2
Analyze functions using different representations. F-IF.C	Rewrite an exponential function, in a real-world context, in order to reveal properties of the function.	Rewrite an exponential function in an equivalent form to interpret properties of the function.	Rewrite an exponential function in an equivalent form to identify properties of the function.	Identify an equivalent form of an exponential function.
	Compare properties of two functions, in a real-world context, with each represented in a different way. [Tasks may involve polynomial, exponential, cube root, square root, logarithmic, and trigonometric functions.]	Compare properties of two functions with each represented in a different way. [Tasks may involve polynomial, exponential, cube root, square root, logarithmic, and trigonometric functions.]	Compare properties of two functions with each represented in a different way. [Tasks may involve polynomial, exponential, cube root, square root, logarithmic functions.]	Compare properties of two functions with each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions). [Tasks are limited to simple polynomial and square root functions.]

Algebra II Performance Level Descriptions

Cluster	Performance Level 5	Performance Level 4	Performance Level 3	Performance Level 2
Build a function that models a relationship between two quantities. F-BF.A	Write an advanced function from a context that describes a relationship between two quantities either explicitly or recursively. [Tasks may involve linear, quadratic, and exponential functions.]	Write a function that may be in a context that describes a relationship between two quantities either explicitly or recursively. [Tasks may involve linear, quadratic, and exponential functions.]	Write a function that describes a relationship between two quantities either explicitly or recursively. [Tasks may involve linear, quadratic, and simple exponential functions.]	Write a function that describes a relationship between two quantities explicitly. [Tasks may involve linear, quadratic, and simple exponential functions.]
	Combine functions using arithmetic operations in a context.	Combine functions using one or more arithmetic operations.	Use addition, subtraction, multiplication, or division to combine simple functions using one arithmetic operation.	Use addition, subtraction, or multiplication to combine polynomial functions in standard form.
	Model arithmetic and geometric sequences in a context, using subscript notation both recursively and with an explicit formula, and translate between the two forms.	Using subscript notation, write simple arithmetic and geometric sequences both recursively and with an explicit formula, and translate between the two forms.	Given a simple arithmetic or geometric sequence written recursively, use subscript notation to write the sequence explicitly.	Using subscript notation, write a simple sequence as an explicit formula.

Algebra II Performance Level Descriptions

Cluster	NYS Level 5	NYS Level 4	NYS Level 3	NYS Level 2
Build new functions from existing functions. F-BF.B	Solve multi-layered problems exploring the effects of *k* on key features of functions. *Identify even or odd functions algebraically. (Functions are limited to polynomial, square root, cube root, exponential, trigonometric and logarithmic)	Identify the effect on a graph of replacing $f(x)$ with $f(x) + k$, $k\,f(x)$, $f(kx)$, and $f(x + k)$. Find the value of *k* given the graphs. Write a new function given the value of *k*. Identify even and odd functions from their graphs. (Functions are limited to polynomial, square root, cube root, exponential, trigonometric and logarithmic)	Identify the effect on a graph of replacing $f(x)$ with $f(x) + k$, $k\,f(x)$, and $f(x + k)$, where *k* is an integer. Find the value of *k* given the graphs. Write a new function given the value of *k*. Identify even and odd functions from their graphs. (Functions are limited to polynomial, square root, cube root, exponential, trigonometric and logarithmic)	Identify the effect on a graph of replacing $f(x)$ with $f(x) + k$, $k\,f(x)$, and $f(x + k)$. Find the value of k given the graphs. Write a new function given the value of *k*. (Functions are limited to polynomial, square root, cube root, exponential, and logarithmic)
	Find the inverse of an advanced one-to-one functions both algebraically and graphically.	Find the inverse of one-to-one functions, including exponential and logarithmic, both algebraically and graphically.	Find the inverse of simple one-to-one functions algebraically.	Determine if two functions are inverses from a graph.
	Write and evaluate the sum of a finite arithmetic or finite geometric series using summation (sigma) notation. Tasks include a real-world context.	Write the sum of a finite arithmetic or finite geometric series using summation (sigma) notation.	Evaluate the sum of a finite arithmetic or finite geometric series using summation (sigma) notation.	Determine if a series is arithmetic or geometric.
	Determine and use an arithmetic or geometric series to solve problems within a real-world context.	Given an arithmetic or geometric series, use the formula to solve problems within a real-world context.	Given an arithmetic or geometric series, use the formula to solve problems.	Find the sum of a series where a formula is not required.

*Level 5 PLDs denoted with a star indicate the knowledge and skills represented will not be targeted by questions on the NYS Algebra II Regents Examination.

Algebra II Performance Level Descriptions

Cluster	Performance Level 5	Performance Level 4	Performance Level 3	Performance Level 2
Construct and compare linear, quadratic, and exponential models and solve problems. **F-LE.A**	Construct and evaluate an exponential function given a description of a relationship within a real-world context.	Construct an exponential function given a description of a relationship within a real-world context.	Construct an exponential function given a graph or two input-output pairs.	Identify linear or simple exponential functions given a graph, a description of a relationship, or two input-output pairs.
	Solve advanced exponential equations with rational bases or base *e*.	Solve an exponential equation and evaluate logarithms using technology. (Bases are limited to natural numbers and *e*)	Solve a simple exponential equation and evaluate logarithms using technology. (Bases are limited to *e* and 10)	Evaluate logarithms using technology.
Interpret expressions for functions in terms of the situations they model. **F-LE.B**	Interpret changes in parameters of an exponential function in terms of a real-world context.	Interpret the parameters of an exponential function within a real-world context.	Interpret a parameter of an exponential function.	Determine if an exponential function represents growth or decay.

Algebra II Performance Level Descriptions

Cluster	Performance Level 5	Performance Level 4	Performance Level 3	Performance Level 2
Extend the domain of trigonometric functions using the unit circle. F-TF.A	Apply concepts of the unit circle in the coordinate plane to calculate the values of the six trigonometric functions given angles in radian measure.	Identify the angle of rotation, in standard position, of a radian measure.	Apply concepts of the unit circle in the coordinate plane to calculate the values for sine, cosine, and tangent functions given angles in radian measure.	Apply concepts of the unit circle in the coordinate plane to calculate the values for sine and cosine functions given angles in radian measure.
	Use the unit circle to determine symmetry (odd and even) and periodicity of sin(x), cos(x), and tan(x).	Identify symmetry (odd and even) and periodicity of sin(x), cos(x), and tan(x).	Identify symmetry (odd and even) and periodicity of sin(x), cos(x).	Evaluate sine and cosine values for positive and negative angles.
Model periodic phenomena with trigonometric functions. F-TF.B	Create appropriate sine or cosine functions to model periodic phenomena based on a real-world context of the amplitude, period, frequency horizontal shift, and midline.	Determine a sine or cosine function to model periodic phenomena with specified amplitude, period, frequency, horizontal shift, and midline.	Determine a sine or cosine function to model periodic phenomena with specified amplitude, period, frequency, and midline.	Identify amplitude, period, frequency or midline of a given sine or cosine model.
Prove and apply trigonometric identities. F.TF.C	Given the value of one trigonometric function and the sign or value of a second trigonometric function, find the value of any of the six trigonometric functions.	Given the value of one trigonometric function and the quadrant of the angle, find the value of any of the six trigonometric functions.	Given the value of sin x or cos x, find the value of the other function.	Given the signs or values of two trigonometric functions of an angle, determine the quadrant of the terminal side.

Algebra II Performance Level Descriptions

Cluster	Performance Level 5	Performance Level 4	Performance Level 3	Performance Level 2
Summarize, represent, and interpret data on a single count or measurement variable. **S-ID.A**	Determine population percentages from a normal curve and use them to solve problems in a context.	Use technology to determine population percentages for an approximately normal data set.	Identify the mean, standard deviation, and boundary values for a population percentage in an approximately normal data set in a context.	Identify the mean, standard deviation, and boundary values for a population percentage in an approximately normal data set.
Summarize, represent, and interpret data on two categorical and quantitative variables. **S-ID.B**		Write a regression equation for a set of bivariate data and use it to solve problems in a context. [Functions are limited to quadratic, exponential, and power models]	Write a regression equation for a set of bivariate data. [Functions are limited to quadratic, exponential, and power models]	Represent a set of bivariate data on a scatter plot, and use it to describe how the variables are related.
Understand and evaluate random processes underlying statistical experiments. **S-IC.A**	Given a simulation based on a suggested parameter, construct an interval containing the middle 95% of plausible values, determine if a suggested parameter is likely, and draw an appropriate conclusion in a context.	Given a simulation based on a suggested parameter, construct an interval containing the middle 95% of plausible values and determine if a suggested parameter is likely.	Given a simulation based on a suggested parameter, construct an interval containing the middle 95% of plausible values.	Identify the sample statistic or suggested parameter in a given situation.

Algebra II Performance Level Descriptions

Cluster	Performance Level 5	Performance Level 4	Performance Level 3	Performance Level 2
Make inferences and justify conclusions from sample surveys, experiments, and observational studies. **S-IC.B**	Compare data collection methods (surveys, experiments, or observational studies) and draw an appropriate conclusion in a context.	Explain the purpose or method of randomization in the data collection method used in a context.	Identify the characteristics of the data collection method used in a context.	Identify the data collection method used in a context.
	Given a simulation based on a sample statistic, construct the 95% interval centered on the statistic (+/- two standard deviations) and determine if a value for a population parameter is plausible. Draw an appropriate conclusion in a context.	Given a simulation based on a sample statistic, construct the 95% interval centered on the statistic (+/- two standard deviations) and determine if a suggested parameter is plausible.	Given a simulation based on a sample statistic, construct the 95% interval centered on the statistic (+/- two standard deviations).	Identify the sample statistic or its standard deviation.
	Critique a claim from a context and draw conclusions using statistical evidence and language.	Draw conclusions from numerical summaries using statistical evidence and language.	Identify statistical characteristics or relationships (such as bias or causation) from a context.	Identify statistics (such as measures of center and spread) from numerical summaries.

Algebra II Performance Level Descriptions

Cluster	Performance Level 5	Performance Level 4	Performance Level 3	Performance Level 2
Understand independence and conditional probability and use them to interpret data. S-CP.A		Describe events in context as unions, intersections, or complements of other events.	Identify the union, intersection, or complement of an event.	Identify the complement of an event.
	Create a two-way table of data and calculate conditional probabilities to determine if events are independent.	Use a two-way table as a sample space to calculate conditional probabilities and determine if events are independent.	Use a two-way table as a sample space to calculate conditional probabilities.	Use a two-way table as a sample space to calculate probabilities.
Use the rules of probability to compute probabilities of compound events in a uniform probability model. S-CP.B	Apply the Addition Rule, $P(A \text{ or } B) = P(A) + P(B) - P(A \text{ and } B)$, and use it to determine other probabilities or characteristics of events.	Apply the Addition Rule, $P(A \text{ or } B) = P(A) + P(B) - P(A \text{ and } B)$ in a context.	Apply the Addition Rule, $P(A \text{ or } B) = P(A) + P(B) - P(A \text{ and } B)$.	Identify $P(A)$, $P(A \text{ and } B)$, and $P(B)$.