Core Math II

TNCore

	Domain	Cluster	Standard	PARCC Assessment Limits
Number and Quantity	The Real Number System (N-RN)	Extend the properties of exponents to rational exponents.	1. Explain how the definition of the meaning of rational exponents follows from extending the properties of integer exponents to those values, allowing for a notation for radicals in terms of rational exponents. *For example, we define* $5^{1/3}$ *to be the cube root of 5 because we want* $(5^{1/3})^3 = 5(^{1/3})^3$ *to hold, so* $(5^{1/3})^3$ *must equal 5.*	*There are no assessment limits for this standard. The entire standard is assessed in this course.*
			2. Rewrite expressions involving radicals and rational exponents using the properties of exponents.	*There are no assessment limits for this standard. The entire standard is assessed in this course.*
		Use properties of rational and irrational numbers.	3. Explain why the sum or product of two rational numbers is rational; that the sum of a rational number and an irrational number is irrational; and that the product of a nonzero rational number and an irrational number is irrational.	*There are no assessment limits for this standard. The entire standard is assessed in this course.*
	Quantities★ (N-Q)	Reason quantitatively and use units to solve problems.	2. Define appropriate quantities for the purpose of descriptive modeling.	This standard will be assessed in Math II by ensuring that some modeling tasks (involving Math II content or securely held content from previous grades and courses) require the student to create a quantity of interest in the situation being described (i.e., a quantity of interest is not selected for the student by the task). For example, in a situation involving volume of a prism or pyramid, the student might autonomously decide that the area of the base is a key variable in a situation, and then choose to work with that dimension to solve the problem.
	The Complex Number System (N-CN)	Perform arithmetic operations with complex numbers.	1. Know there is a complex number i such that $i^2 = -1$, and every complex number has the form $a + bi$ with a and b real.	*There are no assessment limits for this standard. The entire standard is assessed in this course.*
			2. Use the relation $i^2 = -1$ and the commutative, associative, and distributive properties to add, subtract, and multiply complex numbers.	*There are no assessment limits for this standard. The entire standard is assessed in this course.*
		Use complex numbers in polynomial identities and equations.	7. Solve quadratic equations with real coefficients that have complex solutions.	*There are no assessment limits for this standard. The entire standard is assessed in this course.*

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	Domain	Cluster	Standard	PARCC Assessment Limits
Algebra	Seeing Structure in Expressions (A-SSE)	Interpret the structure of expressions	1. Interpret expressions that represent a quantity in terms of its context.★ b. Interpret complicated expressions by viewing one or more of their parts as a single entity. *For example, interpret P*(1+*r*)n *as the product of P and a factor not depending on P.*	*i) Tasks are limited to quadratic expressions.*
			2. Use the structure of an expression to identify ways to rewrite it. *For example, see* $x^4 - y^4$ *as* $(x^2)^2 - (y^2)^2$, *thus recognizing it as a difference of squares that can be factored as* $(x^2 - y^2)(x^2 + y^2)$.	i) Tasks are limited to quadratic and exponential expressions, including related numerical expressions. ii) Examples: See an opportunity to rewrite $a^2 + 9a + 14$ as (a+7)(a+2). Recognize $53^2 - 47^2$ as a difference of squares and see an opportunity to rewrite it in the easier-to-evaluate form (53+47)(53-47).
		Write expressions in equivalent forms to solve problems	3. Choose and produce an equivalent form of an expression to reveal and explain properties of the quantity represented by the expression.★ a. Factor a quadratic expression to reveal the zeros of the function it defines. b. Complete the square in a quadratic expression to reveal the maximum or minimum value of the function it defines.	*There are no assessment limits for this standard. The entire standard is assessed in this course.*
	Arithmetic with Polynomials and Rational Expressions (A-APR)	Perform arithmetic operations on polynomials	1. Understand that polynomials form a system analogous to the integers, namely, they are closed under the operations of addition, subtraction, and multiplication; add, subtract, and multiply polynomials.	*There are no assessment limits for this standard. The entire standard is assessed in this course.*
	Creating Equations★ (A-CED)	Create equations that describe numbers or relationships	1. Create equations and inequalities in one variable and use them to solve problems. *Include equations arising from linear and quadratic functions, and simple rational and exponential functions.*	i) Tasks are limited to quadratic and exponential equations. ii) Tasks have a real-world context. iii) In simpler cases (such as exponential equations with integer exponents), tasks have more of the hallmarks of modeling as a mathematical practice (less defined tasks, more of the modeling cycle, etc.).
			2. Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales.	i) Tasks are limited to quadratic equations ii) Tasks have a real-world context. iii) Tasks have the hallmarks of modeling as a mathematical practice (less defined tasks, more of the modeling cycle, etc.).
			4. Rearrange formulas to highlight a quantity of interest, using the same reasoning as in solving equations. *For example, rearrange Ohm's law V = IR to highlight resistance R.*	i) Tasks are limited to quadratic equations ii) Tasks have a real-world context.
	Reasoning with Equations and Inequalities (A-REI)	Understand solving equations as a process of reasoning and explain the reasoning	1. Explain each step in solving a simple equation as following from the equality of numbers asserted at the previous step, starting from the assumption that the original equation has a solution. Construct a viable argument to justify a solution method.	i) Tasks are limited to quadratic equations.
		Solve equations and inequalities in one variable	4. Solve quadratic equations in one variable. a. Use the method of completing the square to transform any quadratic equation in *x* into an equation of the form $(x - p)^2 = q$ that has the same solutions. Derive the quadratic formula from this form. b. Solve quadratic equations by inspection (e.g., for $x^2 = 49$), taking square roots, completing the square, the quadratic formula and factoring, as appropriate to the initial form of the equation. Recognize when the quadratic formula gives complex solutions and write them as $a \pm bi$ for real numbers *a* and *b*.	*There are no assessment limits for this standard. The entire standard is assessed in this course.*
		Solve systems of equations	7. Solve a simple system consisting of a linear equation and a quadratic equation in two variables algebraically and graphically. *For example, find the points of intersection between the line* $y = -3x$ and the circle $x^2 + y^2 = 3$.	*There are no assessment limits for this standard. The entire standard is assessed in this course.*

Core Math II

TNCore

	Domain	Cluster	Standard	PARCC Assessment Limits
Functions	Interpreting Functions (F-IF)	Interpret functions that arise in applications in terms of the context	4. For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship. *Key features include: intercepts; intervals where the function is increasing, decreasing, positive, or negative; relative maximums and minimums; symmetries; end behavior; and periodicity.*★	i) Tasks have a real-world context. ii) Tasks are limited to quadratic and exponential functions. The function types listed here are the same as those listed in the Math II column for standards F-IF.6 and F-IF.9.
			5. Relate the domain of a function to its graph and, where applicable, to the quantitative relationship it describes. *For example, if the function h(n) gives the number of person-hours it takes to assemble n engines in a factory, then the positive integers would be an appropriate domain for the function.*★	i) Tasks have a real-world context. ii) Tasks are limited to quadratic functions.
			6. Calculate and interpret the average rate of change of a function (presented symbolically or as a table) over a specified interval. Estimate the rate of change from a graph.★	i) Tasks have a real-world context. ii) Tasks are limited to quadratic and exponential functions. The function types listed here are the same as those listed in the Math II column for standards F-IF.4 and F-IF.9.
		Analyze functions using different representations	7. Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases.★ a. Graph linear and quadratic functions and show intercepts, maxima, and minima. b. Graph square root, cube root, and piecewise-defined functions, including step functions and absolute value functions. e. Graph exponential and logarithmic functions, showing intercepts and end behavior, and trigonometric functions, showing period, midline, and amplitude.	For F-IF.7a: i) Tasks are limited to quadratic functions. For F-IF.7e i) Tasks are limited to exponential functions.
			8. Write a function defined by an expression in different but equivalent forms to reveal and explain different properties of the function. a. Use the process of factoring and completing the square in a quadratic function to show zeros, extreme values, and symmetry of the graph, and interpret these in terms of a context. b. Use the properties of exponents to interpret expressions for exponential functions. *For example, identify percent rate of change in functions such as* $y = (1.02)^t$, $y = (0.97)^t$, $y = (1.01)^{12t}$, $y = (1.2)^{t/10}$, *and classify them as representing exponential growth or decay.*	*There are no assessment limits for this standard. The entire standard is assessed in this course.*
			9. Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions). *For example, given a graph of one quadratic function and an algebraic expression for another, say which has the larger maximum.*	i) Tasks are limited to on quadratic and exponential functions. ii) Tasks do not have a real-world context. The function types listed here are the same as those listed in the Math II column for standards F-IF.4 and F-IF.6.
	Building Functions (F-BF)	Build a function that models a relationship between two quantities	1. Write a function that describes a relationship between two quantities.★ a. Determine an explicit expression, a recursive process, or steps for calculation from a context. b. Combine standard function types using arithmetic operations. *For example, build a function that models the temperature of a cooling body by adding a constant function to a decaying exponential, and relate these functions to the model.*	For F-BF.1a: i) Tasks have a real-world context. ii) Tasks may involve linear functions, quadratic functions, and exponential functions.
		Build new functions from existing functions	3. Identify the effect on the graph of replacing $f(x)$ by $f(x) + k$, $k\,f(x)$, $f(kx)$, and $f(x + k)$ for specific values of k (both positive and negative); find the value of k given the graphs. Experiment with cases and illustrate an explanation of the effects on the graph using technology. *Include recognizing even and odd functions from their graphs and algebraic expressions for them.*	i) Identifying the effect on the graph of replacing f(x) by f(x) + k, k f(x), f(kx), and f(x+k) for specific values of k (both positive and negative) is limited to linear and quadratic functions. ii) Experimenting with cases and illustrating an explanation of the effects on the graph using technology is limited to linear functions, quadratic functions, square root functions, cube root functions, piecewise-defined functions (including step functions and absolute value functions), and exponential functions. iii) Tasks do not involve recognizing even and odd functions. The function types listed in note (ii) are the same as those listed in the Math I and Math II columns for standards F-IF.4, F-IF.6, and F-IF.9.

Core Math II

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	Domain	Cluster	Standard	PARCC Assessment Limits
Geometry	Similarity, Right Triangles, and Trigonometry (G-SRT)	Understand similarity in terms of similarity transformations	1. Verify experimentally the properties of dilations given by a center and a scale factor: a. A dilation takes a line not passing through the center of the dilation to a parallel line, and leaves a line passing through the center unchanged. b. The dilation of a line segment is longer or shorter in the ratio given by the scale factor.	*There are no assessment limits for this standard. The entire standard is assessed in this course.*
			2. Given two figures, use the definition of similarity in terms of similarity transformations to decide if they are similar; explain using similarity transformations the meaning of similarity for triangles as the equality of all corresponding pairs of angles and the proportionality of all corresponding pairs of sides.	*There are no assessment limits for this standard. The entire standard is assessed in this course.*
			3. Use the properties of similarity transformations to establish the AA criterion for two triangles to be similar.	*There are no assessment limits for this standard. The entire standard is assessed in this course.*
		Prove theorems involving similarity	4. Prove theorems about triangles. *Theorems include: a line parallel to one side of a triangle divides the other two proportionally, and conversely; the Pythagorean Theorem proved using triangle similarity.*	*There are no assessment limits for this standard. The entire standard is assessed in this course.*
			5. Use congruence and similarity criteria for triangles to solve problems and to prove relationships in geometric figures.	*There are no assessment limits for this standard. The entire standard is assessed in this course.*
		Define trigonometric ratios and solve problems involving right triangles	6. Understand that by similarity, side ratios in right triangles are properties of the angles in the triangle, leading to definitions of trigonometric ratios for acute angles.	*There are no assessment limits for this standard. The entire standard is assessed in this course.*
			7. Explain and use the relationship between the sine and cosine of complementary angles.	*There are no assessment limits for this standard. The entire standard is assessed in this course.*
			8. Use trigonometric ratios and the Pythagorean Theorem to solve right triangles in applied problems.★	*There are no assessment limits for this standard. The entire standard is assessed in this course.*
	Geometric Measurement and Dimension (G-GMD)	Explain volume formulas and use them to solve problems	1. Give an informal argument for the formulas for the circumference of a circle, area of a circle, volume of a cylinder, pyramid, and cone. *Use dissection arguments, Cavalieri's principle, and informal limit arguments.*	*There are no assessment limits for this standard. The entire standard is assessed in this course.*
			3. Use volume formulas for cylinders, pyramids, cones, and spheres to solve problems.★	*There are no assessment limits for this standard. The entire standard is assessed in this course.*

Core Math II

TNCore

	Domain	Cluster	Standard	PARCC Assessment Limits
Statistics and Probability	Interpreting Categorical and Quantitative Data (S-ID)	Summarize, represent, and interpret data on two categorical and quantitative variables	6. Represent data on two quantitative variables on a scatter plot, and describe how the variables are related. a. Fit a function to the data; use functions fitted to data to solve problems in the context of the data. *Use given functions or choose a function suggested by the context. Emphasize linear, quadratic, and exponential models.* b. Informally assess the fit of a function by plotting and analyzing residuals.	For S-ID.6a: i) Tasks have real-world context. ii) Tasks are limited to quadratic functions. For S-ID.6b: i) Tasks have a real-world context. ii) Tasks are limited to linear functions, quadratic functions, and exponential functions with domains in the integers.
	Conditional Probability and the Rules of Probability (S-CP)	Understand independence and conditional probability and use them to interpret data	1. Describe events as subsets of a sample space (the set of outcomes) using characteristics (or categories) of the outcomes, or as unions, intersections, or complements of other events ("or," "and," "not").	*There are no assessment limits for this standard. The entire standard is assessed in this course.*
			2. Understand that two events *A* and *B* are independent if the probability of *A* and *B* occurring together is the product of their probabilities, and use this characterization to determine if they are independent.	*There are no assessment limits for this standard. The entire standard is assessed in this course.*
			3. Understand the conditional probability of *A* given *B* as *P*(*A* and *B*)/*P*(*B*), and interpret independence of *A* and *B* as saying that the conditional probability of *A* given *B* is the same as the probability of *A*, and the conditional probability of *B* given *A* is the same as the probability of *B*.	*There are no assessment limits for this standard. The entire standard is assessed in this course.*
			4. Construct and interpret two-way frequency tables of data when two categories are associated with each object being classified. Use the two-way table as a sample space to decide if events are independent and to approximate conditional probabilities. *For example, collect data from a random sample of students in your school on their favorite subject among math, science, and English. Estimate the probability that a randomly selected student from your school will favor science given that the student is in tenth grade. Do the same for other subjects and compare the results.*	*There are no assessment limits for this standard. The entire standard is assessed in this course.*
			5. Recognize and explain the concepts of conditional probability and independence in everyday language and everyday situations. *For example, compare the chance of having lung cancer if you are a smoker with the chance of being a smoker if you have lung cancer.*	*There are no assessment limits for this standard. The entire standard is assessed in this course.*
		Use the rules of probability to compute probabilities of compound events in a uniform probability model	6. Find the conditional probability of *A* given *B* as the fraction of *B*'s outcomes that also belong to *A,* and interpret the answer in terms of the model.	*There are no assessment limits for this standard. The entire standard is assessed in this course.*
			7. Apply the Addition Rule, P(A or B) = P(A) + P(B) – P(A and B), and interpret the answer in terms of the model.	*There are no assessment limits for this standard. The entire standard is assessed in this course.*

	Major Content		**Supporting Content**		**Additional Content**

*Mathematical Modeling is a Standard for Mathematical Practice (MP4) and a Conceptual Category, and specific modeling standards appear throughout the high school standards indicated with a star (*). Where an entire domain is marked with a star, each standard in that domain is a modeling standard.