2020 High School Math Standards Project

Oregon Conceptual Framework for High School Mathematics (2018 Draft)

Table of Contents

Background **4**
Identifying Core Concepts for Draft Framework 4
2+1 Course Design 5
Moving Mathways Forward Learning Communities 5
Using this Document **5**
Using the Draft Conceptual Framework for High School Math (Part 1) 5
Using the Full Crosswalk with NCTM (2018) and CCSSM (2010) (Part 2) 7
Using the NCTM (2018) Essential Skills Crosswalk (Part 3) 8
Using the Smarter Balanced Content Specifications (2015) Crosswalk (Part 4) 9
Resources **10**
Oregon Department of Education Resources 10
National Council of Teachers of Mathematics (NCTM) Resources 10
Common Core State Standards (CCSS) Resources 10
Position Papers 10
Reports 10
Contact 10
Part 1: Draft Conceptual Framework for High School Math **11**
Number Quantity and Measurement (NQ) 12
Algebra and Functions (AF) 13
Statistics and Probability (SP) 16
Geometry and Modeling (GM) 18

Part 2: Full Crosswalk with NCTM (2018) and CCSSM (2010) 19
NQ.A – Number Sense 20
NQ.B – Measurement 21
AF.A – Algebra 22
AF.B – Functions 26
AF.C – Connecting Algebra, Functions, and Geometry 30
SP.A – Data Science 33
SP.B – Visualizing, Describing, and Using Data 35
SP.C – Statistical Inference 37
SP.D – Probability 39
GM.A – Transformations 41
GM.B – Geometric Arguments, Reasoning, and Modeling 43
Part 3: NCTM (2018) Essential Skills Crosswalk 45
Essential Skills in Number (EC.N) 46
Essential Concepts in Algebra and Functions (EC.AF) 46
Essential Concepts in Statistics and Probability (EC.SP) 48
Essential Concepts in Geometry and Measurement (EC.GM) 50
Part 4: Smarter Balanced Content Specifications (2015) Crosswalk 53
Crosswalk Organized by SBAC Claims 54
Crosswalk Organized by SBAC Claim Frequency 58

Background

The Oregon State Board of Education is responsible for periodically reviewing and revising academic standards and performance indicators for diploma requirements. This work includes the adoption of essential learning skills in the area of mathematics. Adoption must involve teachers and other educators, parents of students and other citizens and provide ample opportunity for public comment. (ORS 329.045).

Additionally, the State Board of Education is responsible for establishing a schedule for the review and adoption of instructional materials that align to academic standards (ORS 337.050). In January 2016, the Board adopted a revised schedule that placed the next review of mathematics materials in the summer of 2022 for use in classrooms in the fall of 2023-24 school year.

In preparation of the next instructional materials review, Oregon Department of Education (ODE) staff plan to present updated academic standards to the State Board of Education in the 2020-21 school year. The attached draft framework was shared with Oregon educators in the winter of 2018/19. The intent is to provide ample opportunity to review and revise the framework before it is presented to the State Board of Education as the next academic content standards for mathematics in 2020.

Identifying Core Concepts for Draft Framework

The National Council of Teachers of Mathematics (NCTM) identified Essential Concepts of High School Math within Catalyzing Change in High School Mathematics (2018), which was used as a framework to organize the Oregon Conceptual Framework for High School Mathematics (2018).

Additional information used to create the proposed framework includes the High School Focus Content document created for the 2015 Oregon math instructional materials review which was based on the content identified within the Smarter Balanced Content Specifications (2015) and the High School Publisher's Criteria for Mathematics (2013).

Together, these resources provided the foundation to create the draft proposed framework. Starting in December 2018, ODE staff will be providing multiple opportunities for feedback about the draft framework. Future opportunities will be posted on the Oregon Math Project and on the Oregon Educator Network. A standing form will be set up to submit feedback which can be used to submit feedback on an ongoing basis until at least the summer of 2020.

- Link to Feedback Form for the 2020 High School Math Standards Project

2+1 Course Design

The 2+1 Course Model for high school mathematics breaks from the tradition of a single sequence of high school math courses to a two-credit core of high school mathematics followed by at least one credit of high school math that addresses student interests and aspirations.

The intent of the content identified in the Draft Conceptual Framework for High School would be that students would have the opportunity to learn all content identified within their first two high school credits. Third credit options could be created that focus on a subset of high school framework, such as algebra or data science. Advanced courses could also be created that align to entry level credit bearing post-secondary courses in mathematics. Additional guidance on the development of third credit options will be provided prior to the 2020 standards adoption.

Moving Mathways Forward Learning Communities

In December 2018, staff from 50 high schools across the state met to begin looking at practical solutions to change the way high school math is experienced by students. This work includes developing prototype course experiences aligned to the draft framework and 2+1 course design. These efforts will be part of the feedback process for the 2020 math standards. Interested high schools are encouraged to contact Mark Freed for more information or join the Moving Mathways Forward community group on the Oregon Educator Network.

Using this Document

This document is divided into four sections which are described below. Each section can be found in the navigation pane in Word by selecting the "View" tab then selecting the "Navigation Pane option. In Adobe, the navigation pane should be available in the Bookmark menu on the side of the application window. It is anticipated that several versions of this document will be published in 2019 and 2020, so the draft version indicated in the footer will indicate which version you may be looking at. Any questions about how to use this document can be sent to Mark Freed at the Oregon Department of Education.

Using the Draft Conceptual Framework for High School Math (Part 1)

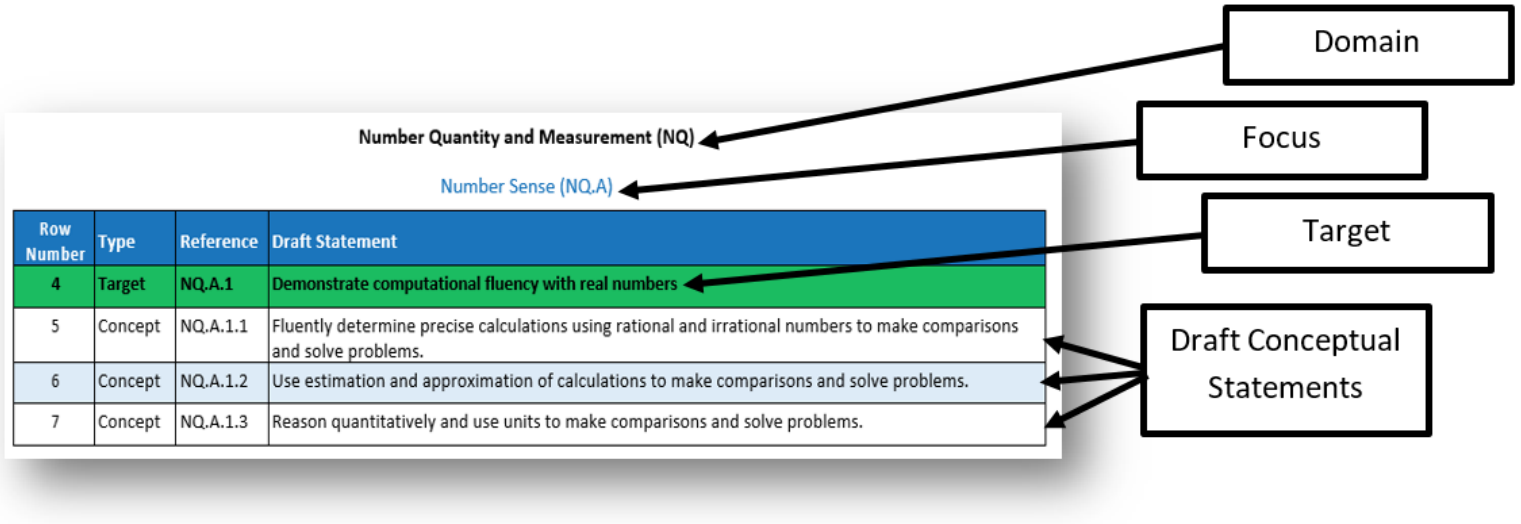
The first section of the document presents the most simplified version of the current draft framework and would be the type of wording that could potentially be presented to the State Board of Education for adoption in 2020. The intent is that the content identified in this section would be core math content expectations for all Oregon high school students in a *two credit sequence* for students.

Third credit courses could either provide another opportunity for students to learn a subset of these standards, or new content that may not be identified as core high school content.

The framework is organized using the following structure:

- **Draft Concept Statements** articulate what students should be able to understand and be able to do. Statements are generally limited to a single sentence and would potentially be presented to the State Board of Education for consideration a standard for adoption in 2020. Statements should be interpreted as anchor statements that would be expanded upon in later documentation within instructional and assessment frameworks after the content is adopted by the State Board.
- **Targets** are groups of related content expectations, but do not necessarily represent a content expectation themselves. Rather they could be interpreted as potential reporting categories for proficiency grading or summative assessment reports.
- **Focus** statements are a group of related targets within a given domain.
- **Domains** are larger groups of related content expectations across focus, target, and conceptual statements. Content from different domains may sometimes be closely related and similar ideas may exist in more than on domain.

Figure 1: Example of a Draft Conceptual Framework in Section 1



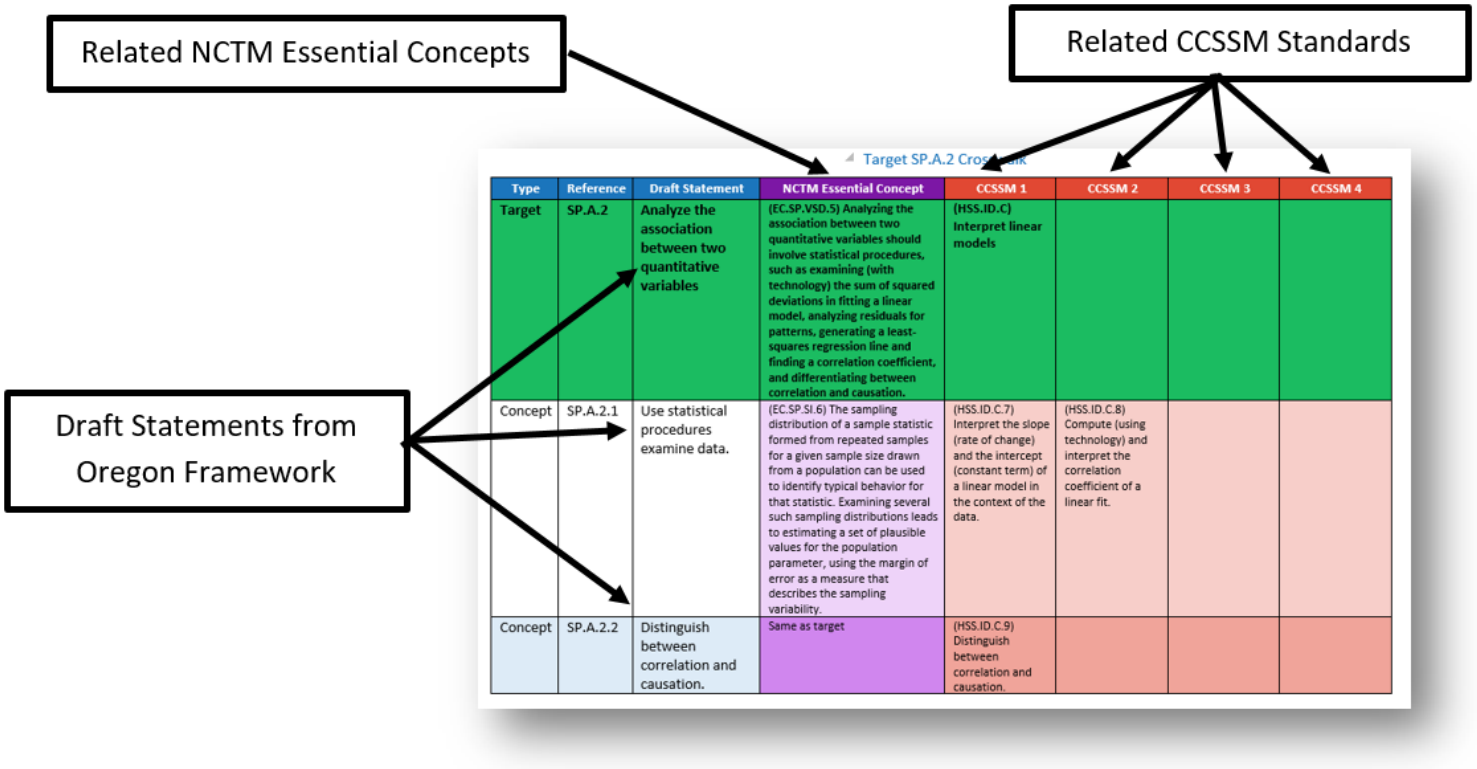
At this time, the conceptual framework is certainly in draft format and welcome feedback from educators prior to the final adoption. School are encouraged to use the concepts identified in the creation of pilot courses as part of the feedback process which can be made online using the ODE Feedback Form.

Using the Full Crosswalk with NCTM (2018) and CCSSM (2010) (Part 2)

The second section provides information to connect concepts identified within the draft framework to the Essential Concepts found within Catalyzing Change (NCTM, 2018) and the Common Core State Standards (CCSS, 2010). Tables can be read horizontally, where the language across the three documents can be compared.

An objective of the Oregon Mathways Project is to find focus within the core content for high school students. To achieve this objective, the draft framework was created as a third document that pulls from both NCTM and CCSS. This maybe a word for word copying of the language from one of the documents, a synthesis of wording from the original text, or a new statement that clarifies or connects concepts. Connections could be made at either the target or concept level depending on which would be a closest match.

Figure 2: Example of Crosswalk Tables Found in Section 2

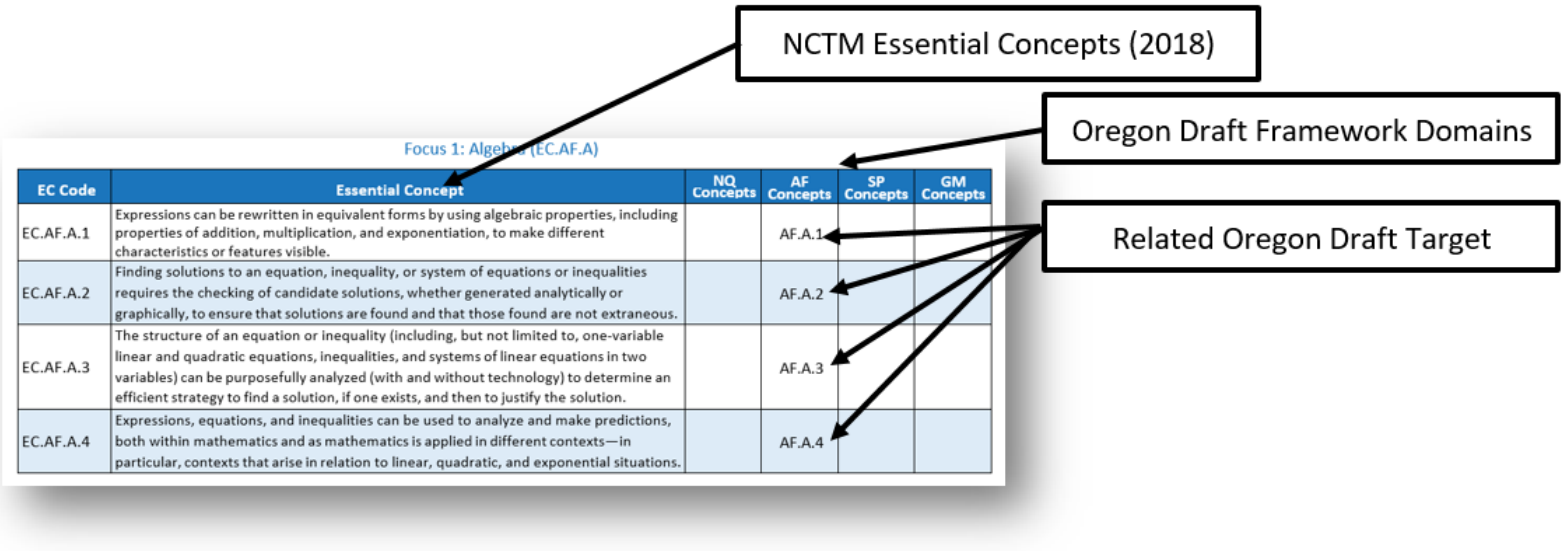


Using the NCTM (2018) Essential Skills Crosswalk (Part 3)

The third section of the document provides connects the NCTM essential skills to the Oregon Draft Framework. This would be the same connections provided in section 2, just indexed by the NCTM framework in section 3.

In general, the NCTM Essential Skills document was used as an organizing framework for the content and related CCSS content was place within this organizational structure. Some content was modified based on feedback from listening sessions from Oregon Educators between 2015-2018 including six regional workshops in the spring of 2018 that brought together high school and post-secondary educators to identify core content for this framework.

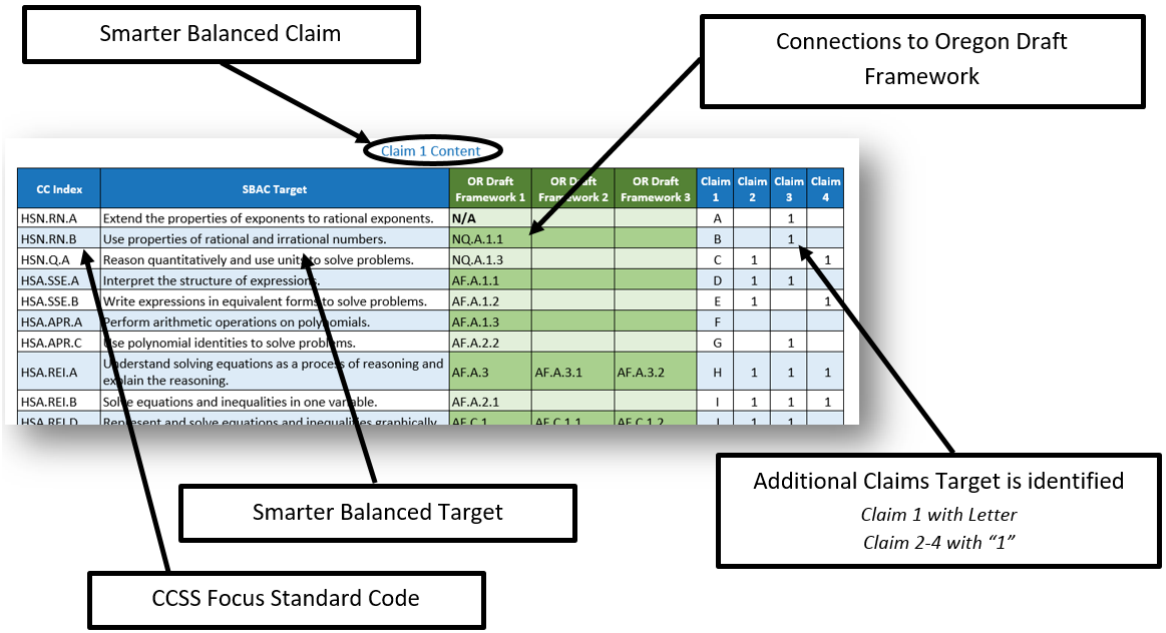
Figure 3: Example of NCTM to Oregon Framework Table in Section 3



Using the Smarter Balanced Content Specifications (2015) Crosswalk (Part 4)

The fourth section of the document provides connections to the content identified within the Smarter Balanced content specifications (2015). This information is first presented organized by Claim categories 1-4 within the Smarter Balanced framework. Then is then presented by frequency across claims from highest frequency across the four claims. As much as possible, connections to content identified in multiple claims was connected to the content within the proposed framework. A revised assessment blueprint would be made after content standards have been adopted in 2020, but connections to the 2015 framework could potentially.

Figure 4: Example of Crosswalk to Smarter Balanced by Content Claim in Section 4



Please not that it was intentional to map as many of the draft framework concepts onto the Smarter Balanced specifications as to provide continuity as much as possible. However, connections would *not necessarily be a one-to-one* connection. That is, connections at the target level do not imply that all standards would remain the same within the blueprint. Narrowing the focus of the summative assessment could be done by eliminating targets, but it also can be done by narrowing the scope of target expectations. Part of the feedback process will look at both of these methods in advance of the final adoption of standards.

Resources

Oregon Department of Education Resources

- *Oregon Math Project* on the ODE website
- *Oregon Math Project Forum* on the Oregon Educator Network (OEN)
- Moving Mathways Forward group on OEN
- Oregon Mathways Initiative: 2+1 Model group on OEN
- Current Oregon Math Standards (2010)
- Oregon Instructional Materials Adoption Schedule
- Link to latest Mathematics Instructional Material Review (2016-2022)

National Council of Teachers of Mathematics (NCTM) Resources

- Catalyzing Change in High School Mathematics (2018)
- Principles to Action: Ensuring Mathematical Success for All
- myNCTM Discussion Forum

Common Core State Standards (CCSS) Resources

- Common Core State Standards – Mathematics
- Illustrative Mathematics Tasks by Standard
- Student Achievement Partners Research and Articles

Position Papers

- CBMS Position Paper on Active Learning
- MAA Common Vision for Undergraduate Mathematical Sciences Programs in 2025
- MAA/NCTM Joint position on High School Calculus
- Additional NCTM Position Papers
- Additional NCSM Position Papers

Reports

- Report of the 2018 NSSME+
- NAEP (2018), Paths Through Mathematics and Science
- ACT (2018) Condition of College and Career Readiness 2018
- REL Northwest (2015), What predicts participation in developmental education in Oregon?
- NCEE (2013), What Does It Really Mean to Be College and Work Ready?
- Conference Board (2006), Are They Really Ready To Work?

Contact

Mark Freed, Math Education Specialist, ODE
Email: Mark.Freed@state.or.us
Phone: 503-947-5610

Feedback Form

Link to Draft HS Framework Survey

Part 1: Draft Conceptual Framework for High School Math

Number Quantity and Measurement (NQ)

Number Sense (NQ.A)

Row Number	Type	Reference	Draft Statement
4	**Target**	**NQ.A.1**	**Demonstrate computational fluency with real numbers**
5	Concept	NQ.A.1.1	Fluently determine precise calculations using rational and irrational numbers to make comparisons and solve problems.
6	Concept	NQ.A.1.2	Use estimation and approximation of calculations to make comparisons and solve problems.
7	Concept	NQ.A.1.3	Reason quantitatively and use units to make comparisons and solve problems.

Measurement (NQ.B)

Row Number	Type	Reference	Draft Statement
9	**Target**	**NQ.B.1**	**Reason quantitatively to solve applied problems**
10	Concept	NQ.B.1.1	Use length, area, and volume measurements to solve applied problems.
11	Concept	NQ.B.1.2	Use properties of congruence and similarity to solve applied problems.
12	Concept	NQ.B.1.3	Use graphs and coordinates to solve applied problems.

Algebra and Functions (AF)

Algebra (AF.A)

Row Number	Type	Reference	Draft Statement
15	**Target**	**AF.A.1**	**Write expressions in equivalent forms by using algebraic properties**
16	Concept	AF.A.1.1	Interpret the structure of expressions using algebraic reasoning.
17	Concept	AF.A.1.2	Write expressions in equivalent forms to make different characteristics or features visible and solve problems.
18	Concept	AF.A.1.3	Perform arithmetic operations on expressions.
19	**Target**	**AF.A.2**	**Find solutions to an equation, inequality, or system of equations or inequalities**
20	Concept	AF.A.2.1	Solve equations and inequalities in one variable.
21	Concept	AF.A.2.2	Understand a problem and formulate an equation to solve it.
22	Concept	AF.A.2.3	Solve systems of equations.
23	**Target**	**AF.A.3**	**Understand solving equations as a process of reasoning and explain the reasoning**
24	Concept	AF.A.3.1	Determine an efficient strategy to find a solution.
25	Concept	AF.A.3.2	Purposefully analyze equations (with and without technology) to understand patterns and make predictions.
26	Concept	AF.A.3.3	Construct a viable argument to justify a solution method using expressions and equations.
27	**Target**	**AF.A.4**	**Create equations that describe numbers or relationships**
28	Concept	AF.A.4.1	Rearrange formulas to highlight a quantity of interest, using the same reasoning as in solving equations.
29	Concept	AF.A.4.2	Represent constraints by equations or inequalities, and by systems of equations and/or inequalities, and interpret solutions as viable or nonviable options in a modeling context.
30	Concept	AF.A.4.3	Create equations to solve problems within linear, exponential, and quadratic situations.

Functions (AF.B)

Row Number	Type	Reference	Draft Statement
32	**Target**	**AF.B.1**	**Understand the concept of a function and use function notation**
33	Concept	AF.B.1.1	Understand that a function from one set (called the domain) to another set (called the range) assigns to each element of the domain exactly one element of the range.
34	Concept	AF.B.1.2	Use function notation, evaluate functions for inputs in their domains, and interpret statements that use function notation in terms of a context.
35	Concept	AF.B.1.3	Recognize that sequences are functions, sometimes defined recursively, whose domain is a subset of the integers.
36	**Target**	**AF.B.2**	**Build a function that models a relationship between two quantities**
37	Concept	AF.B.2.1	Write a function that describes a relationship between two quantities.
38	Concept	AF.B.2.2	Build new functions using distinguishing attributes of families of linear, exponential, and quadratic functions to solve problems.
39	Concept	AF.B.2.3	Write arithmetic and geometric sequences both recursively and with an explicit formula to model situations.
40	**Target**	**AF.B.3**	**Identify and use key features of functions graphically**
41	Concept	AF.B.3.1	Locate critical points for a given function graphically.
42	Concept	AF.B.3.2	Analyze functions using symbolic manipulation.
43	Concept	AF.B.3.3	Create functions that meet given criteria for critical points.
44	**Target**	**AF.B.4**	**Use functions to model a variety of real situations**
45	Concept	AF.B.4.1	Interpret functions that arise in applications in terms of the context.
46	Concept	AF.B.4.2	Understand process of making and changing assumptions, assigning variables, and finding solutions to contextual problems.

Connecting Algebra, Functions, and Geometry (AF.C)

Row Number	Type	Reference	Draft Statement
48	**Target**	**AF.C.1**	**Represent and solve equations and inequalities graphically**
49	Concept	AF.C.1.1	Understand the graph of a function f is a set of ordered pairs (x,f(x)) in the coordinate plane.
50	Concept	AF.C.1.2	Use graphing technology to obtain exact or approximate solutions of equations, inequalities, and systems of equations and inequalities.
51	**Target**	**AF.C.2**	**Understand the effect of transformations on functions**
52	Concept	AF.C.2.1	Understand the effect of rigid motion transformation on functions.
53	Concept	AF.C.2.2	Understand the effect of dilations on functions.
54	**Target**	**AF.C.3**	**Use trigonometric functions to model and solve applied problems**
55	Concept	AF.C.3.1	Define trigonometric ratios and solve problems involving right triangles.
56	Concept	AF.C.3.2	Extend the domain of trigonometric functions using the unit circle.
57	Concept	AF.C.3.3	Create trigonometric functions to model periodic phenomena with specified amplitude, frequency, and midline.

Statistics and Probability (SP)

Data Science (SP.A)

Row Number	Type	Reference	Draft Statement
60	**Target**	**SP.A.1**	**Data in our world**
61	Concept	SP.A.1.1	Understand different types of data that arise from context.
62	Concept	SP.A.1.2	Make and defend informed data-based decisions.
63	**Target**	**SP.A.2**	**Analyze the association between two quantitative variables**
64	Concept	SP.A.2.1	Use statistical procedures examine data.
65	Concept	SP.A.2.2	Distinguish between correlation and causation.

Visualizing, Describing, and Using Data (SP.B)

Row Number	Type	Reference	Draft Statement
67	**Target**	**SP.B.1**	**Visualizing data sets**
68	Concept	SP.B.1.1	Understand and construct multiple ways to visualize data.
69	Concept	SP.B.1.2	Critique data visualization choices made in real-life contexts.
70	**Target**	**SP.B.2**	**Describe and use real life data**
71	Concept	SP.B.2.1	Understand distributions of quantitative data (continuous or discrete) in one variable and describe in the context of the data with respect to what is typical.
72	Concept	SP.B.2.2	Understand and work with very large data sets that arise from a given context and use technology to clean and organize data into manageable structures for analysis.

Statistical Inference (SP.C)

Row Number	Type	Reference	Draft Statement
74	**Target**	**SP.C.1**	**Understanding study designs**
75	Concept	SP.C.1.1	Understand different types of research design.
76	Concept	SP.C.1.2	Understand the role of randomization within common sampling techniques.
77	**Target**	**SP.C.2**	**Validating inferences**
78	Concept	SP.C.2.1	Make inferences and justify conclusions from research studies.
79	Concept	SP.C.2.2	Understand the role of bias and error in making inferences.

Probability (SP.D)

Row Number	Type	Reference	Draft Statement
81	**Target**	**SP.D.1**	**Calculate theoretical probabilities**
82	Concept	SP.D.1.1	Understand and calculate theoretical probabilities for independent and dependent events.
83	Concept	SP.D.1.2	Determine conditional probabilities and use them in context.
84	**Target**	**SP.D.2**	**Generate and analyze experimental probabilities**
85	Concept	SP.D.2.1	Recognize and explain the concepts of conditional probability and independence in everyday language and everyday situations.

Geometry and Modeling (GM)

Transformations (GM.A)

Row Number	Type	Reference	Draft Statement
89	**Target**	**GM.A.1**	**Representing transformations in the plane**
90	Concept	GM.A.1.1	Understand congruence in terms of rigid motions and describe transformations that will carry a given figure onto another.
91	Concept	GM.A.1.2	Understand similarity in terms of dilations and verify the properties of dilations given by a center and a scale factor.
92	**Target**	**GM.A.2**	**Applying transformations**
93	Concept	GM.A.2.1	Use transformations to demonstrate congruence.
94	Concept	GM.A.2.2	Use transformations in algebra through the concept of function families and through the analysis of graphs of functions as geometric figures.

Geometric Arguments, Reasoning, and Modeling (GM.B)

Row Number	Type	Reference	Draft Statement
96	**Target**	**GM.B.1**	**Communicate reasoning through proofs**
97	Concept	GM.B.1.1	Constructing proof whether a statement is true or false mathematically, and communicate reasoning in a variety of ways.
98	Concept	GM.B.1.2	Use technology to construct and explore figures with constraints to explore the independence and dependence of assumptions and conjectures.
99	**Target**	**GM.B.2**	**Modeling with geometry**
100	Concept	GM.B.2.1	Use geometric shapes, their measures, and their properties to describe objects in our world.
101	Concept	GM.B.2.2	Apply geometric methods to solve design problems.

Part 2: Full Crosswalk with NCTM (2018) and CCSSM (2010)

NQ.A – Number Sense

Target NQ.A.1 Crosswalk

Type	Reference	Draft Statement	NCTM Essential Concept	CCSSM 1	CCSSM 2	CCSSM 3	CCSSM 4
Target	**NQ.A.1**	**Demonstrate computational fluency with real numbers**					
Concept	NQ.A.1.1	Fluently determine precise calculations using rational and irrational numbers to make comparisons and solve problems.	(EC.N.1) Together, irrational numbers and rational numbers complete the real number system, representing all points on the number line.	(HSN.RN.B) Use properties of rational and irrational numbers.	(HSN.RN.B.3) Explain why the sum or product of rational numbers is rational;	(HSN.RN.B.3) The sum of a rational number and an irrational number is irrational; and	(HSN.RN.B.3) The product of a nonzero rational number and an irrational number is irrational.
Concept	NQ.A.1.2	Use estimation and approximation of calculations to make comparisons and solve problems.	(EC.GM.M.2) Constructing approximations of measurements with different tools, including technology, can support an understanding of measurement.	Not explicit in CCSSM			
Concept	NQ.A.1.3	Reason quantitatively and use units to make comparisons and solve problems.	(EC.N.2) Quantitative reasoning includes, and mathematical modeling requires, attention to units of measurement.	(HSN.Q.A) Reason quantitatively and use units to solve problems.	(HSN.Q.A.1) Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays.	(HSN.Q.A.2) Define appropriate quantities for the purpose of descriptive modeling.	(HSN.Q.A.3) Choose a level of accuracy appropriate to limitations on measurement when reporting quantities.

NQ.B – Measurement

Target NQ.B.1 Crosswalk

Type	Reference	Draft Statement	NCTM Essential Concept	CCSSM 1	CCSSM 2	CCSSM 3	CCSSM 4
Target	**NQ.B.1**	**Reason quantitatively to solve applied problems**					
Concept	NQ.B.1.1	Use length, area, and volume measurements to solve applied problems.	(EC.GM.M.1) Areas and volumes of figures can be computed by determining how the figure might be obtained from simpler figures by dissection and recombination	(HSG.GMD.A) Explain volume formulas and use them to solve problems	(HSG.GMD.A.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.	(HSG.GMD.A.3) Use volume formulas for cylinders, pyramids, cones, and spheres to solve problems.	
Concept	NQ.B.1.2	Use properties of congruence and similarity to solve applied problems.	(EC.GM.M.3) When an object is the image of a known object under a similarity transformation, a length, area, or volume on the image can be computed by using proportional relationships.				
Concept	NQ.B.1.3	Use graphs and coordinates to solve applied problems.	(EC.GM.M.1) Areas and volumes of figures can be computed by determining how the figure might be obtained from simpler figures by dissection and recombination	(HSG.GPE.B) Use coordinates to prove simple geometric theorems algebraically	(HSG.GPE.B.7) Use coordinates to compute perimeters of polygons and areas of triangles and rectangles, e.g., using the distance formula		

AF.A – Algebra

Target AF.A.1 Crosswalk

Type	Reference	Draft Statement	NCTM Essential Concept	CCSSM 1	CCSSM 2	CCSSM 3	CCSSM 4
Target	**AF.A.1**	**Write expressions in equivalent forms by using algebraic properties**	**(EC.AF.A.1) Expressions can be rewritten in equivalent forms by using algebraic properties, including properties of addition, multiplication, and exponentiation, to make different characteristics or features visible.**				
Concept	AF.A.1.1	Interpret the structure of expressions using algebraic reasoning.	Same as target	(HSA.SSE.A) Interpret the structure of expressions.			
Concept	AF.A.1.2	Write expressions in equivalent forms to make different characteristics or features visible and solve problems.	Same as target	(HSA.SSE.B) Write expressions in equivalent forms to solve problems.			
Concept	AF.A.1.3	Perform arithmetic operations on expressions.	Same as target	(HSA.APR.A) Perform arithmetic operations on polynomials.			

Target AF.A.2 Crosswalk

Type	Reference	Draft Statement	NCTM Essential Concept	CCSSM 1	CCSSM 2	CCSSM 3	CCSSM 4
Target	**AF.A.2**	**Find solutions to an equation, inequality, or system of equations or inequalities**	**(EC.AF.A.2) Finding solutions to an equation, inequality, or system of equations or inequalities requires the checking of candidate solutions, whether generated analytically or graphically, to ensure that solutions are found and that those found are not extraneous.**				
Concept	AF.A.2.1	Solve equations and inequalities in one variable.	Same as target	(HSA.REI.B) Solve equations and inequalities in one variable			
Concept	AF.A.2.2	Understand a problem and formulate an equation to solve it.	Same as target	(HSA.APR.C) Use polynomial identities to solve problems			
Concept	AF.A.2.3	Solve systems of equations.	Same as target	(HSA.REI.C) Solve systems of equations			

Target AF.A.3 Crosswalk

Type	Reference	Draft Statement	NCTM Essential Concept	CCSSM 1	CCSSM 2	CCSSM 3	CCSSM 4
Target	**AF.A.3**	**Understand solving equations as a process of reasoning and explain the reasoning**	**(EC.AF.A.3) The structure of an equation or inequality (including, but not limited to, one-variable linear and quadratic equations, inequalities, and systems of linear equations in two variables) can be purposefully analyzed (with and without technology) to determine an efficient strategy to find a solution, if one exists, and then to justify the solution.**	**(HSA.REI.A) Understand solving equations as a process of reasoning and explain the reasoning.**			
Concept	AF.A.3.1	Determine an efficient strategy to find a solution.	Same as target	Not explicit in CCSSM			
Concept	AF.A.3.2	Purposefully analyze equations (with and without technology) to understand patterns and make predictions.	Same as target	(HSA.REI.A.2) Solve simple rational and radical equations in one variable, and give examples showing how extraneous solutions may arise.			
Concept	AF.A.3.3	Construct a viable argument to justify a solution method using expressions and equations.	Same as target	(HSA.REI.A.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.			

Target AF.A.4 Crosswalk

Type	Reference	Draft Statement	NCTM Essential Concept	CCSSM 1	CCSSM 2	CCSSM 3	CCSSM 4
Target	**AF.A.4**	**Create equations that describe numbers or relationships**	**(EC.AF.A.4) Expressions, equations, and inequalities can be used to analyze and make predictions, both within mathematics and as mathematics is applied in different contexts—in particular, contexts that arise in relation to linear, quadratic, and exponential situations.**	**(HSA.CED.A) Create equations that describe numbers or relationships.**			
Concept	AF.A.4.1	Rearrange formulas to highlight a quantity of interest, using the same reasoning as in solving equations.	Same as target	(HSA.CED.A.4) Rearrange formulas to highlight a quantity of interest, using the same reasoning as in solving equations			
Concept	AF.A.4.2	Represent constraints by equations or inequalities, and by systems of equations and/or inequalities, and interpret solutions as viable or nonviable options in a modeling context.	Same as target	(HSA.CED.A.3) Represent constraints by equations or inequalities, and by systems of equations and/or inequalities, and interpret solutions as viable or nonviable options in a modeling context.			
Concept	AF.A.4.3	Create equations to solve problems within linear, exponential, and quadratic situations.	Same as target	(HSA.CED.A.1) Create equations and inequalities in one variable and use them to solve problems.			

AF.B – Functions

Target AF.B.1 Crosswalk

Type	Reference	Draft Statement	NCTM Essential Concept	CCSSM 1	CCSSM 2	CCSSM 3	CCSSM 4
Target	**AF.B.1**	**Understand the concept of a function and use function notation**	**(EC.AF.F.1) Functions can be described by using a variety of representations: mapping diagrams, function notation (e.g., f(x) = x2), recursive definitions, tables, and graphs**	**(HSF.IF.A) Understand the concept of a function and use function notation.**			
Concept	AF.B.1.1	Understand that a function from one set (called the domain) to another set (called the range) assigns to each element of the domain exactly one element of the range.	(EC.AF.CAF.1) Functions shift the emphasis from a point-by-point relationship between two variables (input/output) to considering an entire set of ordered pairs (where each first element is paired with exactly one second element) as an entity with its own features and characteristics.	(HSF.IF.A.1) Understand that a function from one set (called the domain) to another set (called the range) assigns to each element of the domain exactly one element of the range. If f is a function and x is an element of its domain, then f(x) denotes the output of f corresponding to the input x. The graph of f is the graph of the equation y = f(x).			
Concept	AF.B.1.2	Use function notation, evaluate functions for inputs in their domains, and interpret statements that use function notation in terms of a context.	Same as target	(HSF.IF.A.2) Use function notation, evaluate functions for inputs in their domains, and interpret statements that use function notation in terms of a context.			
Concept	AF.B.1.3	Recognize that sequences are functions, sometimes defined recursively, whose domain is a subset of the integers.	Same as target	(HSF.IF.A.3) Recognize that sequences are functions, sometimes defined recursively, whose domain is a subset of the integers. For example, the Fibonacci sequence is defined recursively by f(0) = f(1) = 1, f(n+1) = f(n) + f(n-1) for n ≥ 1.			

Target AF.B.2 Crosswalk

Type	Reference	Draft Statement	NCTM Essential Concept	CCSSM 1	CCSSM 2	CCSSM 3	CCSSM 4
Target	**AF.B.2**	**Build a function that models a relationship between two quantities**	**(EC.AF.F.2) Functions that are members of the same family have distinguishing attributes (structure) common to all functions within that family.**	**(HSF.BF.A) Build a function that models a relationship between two quantities**			
Concept	AF.B.2.1	Write a function that describes a relationship between two quantities.	Same as target	(HSF.BF.A.1) Write a function that describes a relationship between two quantities.	Concept	AF.B.2.1	Write a function that describes a relationship between two quantities.
Concept	AF.B.2.2	Build new functions using distinguishing attributes of families of linear, exponential, and quadratic functions to solve problems.	Same as target	Not explicit in CCSSM			
Concept	AF.B.2.3	Write arithmetic and geometric sequences both recursively and with an explicit formula to model situations.	Same as target	(HSF.BF.A.2) Write arithmetic and geometric sequences both recursively and with an explicit formula, use them to model situations, and translate between the two forms.			

Target AF.B.3 Crosswalk

Type	Reference	Draft Statement	NCTM Essential Concept	CCSSM 1	CCSSM 2	CCSSM 3	CCSSM 4
Target	**AF.B.3**	**Identify and use key features of functions graphically**	**(EC.AF.F.3) Functions can be represented graphically, and key features of the graphs, including zeros, intercepts, and, when relevant, rate of change, and maximum/minimum values, can be associated with and interpreted in terms of the equivalent symbolic representation.**				
Concept	AF.B.3.1	Locate critical points for a given function graphically.	Same as target	(HSF.IF.C) Analyze functions using different representations.			
Concept	AF.B.3.2	Analyze functions using symbolic manipulation.	Same as target	(HSA.APR.B) Understand the relationship between zeros and factors of polynomials.			
Concept	AF.B.3.3	Create functions that meet given criteria for critical points.	Same as target	Not explicit in CCSSM			

Target AF.B.4 Crosswalk

Type	Reference	Draft Statement	NCTM Essential Concept	CCSSM 1	CCSSM 2	CCSSM 3	CCSSM 4
Target	**AF.B.4**	**Use functions to model a variety of real situations**	**(EC.AF.F.4) Functions model a wide variety of real situations and can help students understand the processes of making and changing assumptions, assigning variables, and finding solutions to contextual problems.**				
Concept	AF.B.4.1	Interpret functions that arise in applications in terms of the context.	Same as target	(HSF.IF.B) Interpret functions that arise in applications in terms of the context.	(HSF.LE.A) Construct and compare linear, quadratic, and exponential models and solve problems.		
Concept	AF.B.4.2	Understand process of making and changing assumptions, assigning variables, and finding solutions to contextual problems.	Same as target	(HSF.LE.B) Interpret expressions for functions in terms of the situation they model.			

AF.C – Connecting Algebra, Functions, and Geometry

Target AF.C.1 Crosswalk

Type	Reference	Draft Statement	NCTM Essential Concept	CCSSM 1	CCSSM 2
Target	**AF.C.1**	**Represent and solve equations and inequalities graphically**	**(EC.AF.CAF.2) Graphs can be used to obtain exact or approximate solutions of equations, inequalities, and systems of equations and inequalities — including systems of linear equations in two variables and systems of linear and quadratic equations (given or obtained by using technology)**	**(HSA.REI.D) Represent and solve equations and inequalities graphically.**	
Concept	AF.C.1.1	Understand the graph of a function f is a set of ordered pairs (x,f(x)) in the coordinate plane.	Same as target	(HSA.REI.D.10) Understand that the graph of an equation in two variables is the set of all its solutions plotted in the coordinate plane, often forming a curve (which could be a line).	(HSA.REI.D.11) Explain why the x-coordinates of the points where the graphs of the equations y = f(x) and y = g(x) intersect are the solutions of the equation f(x) = g(x); find the solutions approximately, e.g., using technology to graph the functions, make tables of values, or find successive approximations. Include cases where f(x) and/or g(x) are linear, polynomial, rational, absolute value, exponential, and logarithmic functions.
Concept	AF.C.1.2	Use graphing technology to obtain exact or approximate solutions of equations, inequalities, and systems of equations and inequalities.	Same as target	(HSA.REI.D.12) Graph the solutions to a linear inequality in two variables as a half-plane (excluding the boundary in the case of a strict inequality), and graph the solution set to a system of linear inequalities in two variables as the intersection of the corresponding half-planes	

Target AF.C.2 Crosswalk

Type	Reference	Draft Statement	NCTM Essential Concept	CCSSM 1	CCSSM 2
Target	**AF.C.2**	**Understand the effect of transformations on functions**	**(EC.GM.T.4) Transformations in geometry serve as a connection with algebra, both through the concept of functions and through the analysis of graphs of functions as geometric figures.**	**(HSF.BF.B.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.**	
Concept	AF.C.2.1	Understand the effect of rigid motion transformation on functions.	Same as target	Same as target	
Concept	AF.C.2.2	Understand the effect of dilations on functions.	Same as target	Same as target	

Target AF.C.3 Crosswalk

Type	Reference	Draft Statement	NCTM Essential Concept	CCSSM 1	CCSSM 2	CCSSM 3
Target	**AF.C.3**	**Use trigonometric functions to model and solve applied problems**	**Not explicit in NCTM EC**			
Concept	AF.C.3.1	Define trigonometric ratios and solve problems involving right triangles.		(HSG.SRT.C) Define trigonometric ratios and solve problems involving right triangles		
Concept	AF.C.3.2	Extend the domain of trigonometric functions using the unit circle.		(HSF.TF.A) Extend the domain of trigonometric functions using the unit circle.		
Concept	AF.C.3.3	Create trigonometric functions to model periodic phenomena with specified amplitude, frequency, and midline.		(HSF.TF.B.5) Choose trigonometric functions to model periodic phenomena with specified amplitude, frequency, and midline.		

SP.A – Data Science

Target SP.A.1 Crosswalk

Type	Reference	Draft Statement	NCTM Essential Concept	CCSSM 1	CCSSM 2	CCSSM 3	CCSSM 4
Target	**SP.A.1**	**Data in our world**	**(EC.SP.VSD.6) Data-analysis techniques can be used to develop models of contextual situations and to generate and evaluate possible solutions to real problems involving those contexts.**				
Concept	SP.A.1.1	Understand different types of data that arise from context.	(EC.SP.VSD.1) Data arise from a context and come in two types: quantitative (continuous or discrete) and categorical. Technology can be used to "clean" and organize data, including very large data sets, into a useful and manageable structure—a first step in any analysis of data.	(HSS.ID.A) Summarize, represent, and interpret data on a single count or measurement variable			
Concept	SP.A.1.2	Make and defend informed data-based decisions.	(EC.SP.QL.1) Mathematical and statistical reasoning about data can be used to evaluate conclusions and assess risks. (EC.SP.QL.2) Making and defending informed data-based decisions is a characteristic of a quantitatively literate person.				

Target SP.A.2 Crosswalk

Type	Reference	Draft Statement	NCTM Essential Concept	CCSSM 1	CCSSM 2	CCSSM 3	CCSSM 4
Target	**SP.A.2**	**Analyze the association between two quantitative variables**	**(EC.SP.VSD.5) Analyzing the association between two quantitative variables should involve statistical procedures, such as examining (with technology) the sum of squared deviations in fitting a linear model, analyzing residuals for patterns, generating a least-squares regression line and finding a correlation coefficient, and differentiating between correlation and causation.**	**(HSS.ID.C) Interpret linear models**			
Concept	SP.A.2.1	Use statistical procedures examine data.	(EC.SP.SI.6) The sampling distribution of a sample statistic formed from repeated samples for a given sample size drawn from a population can be used to identify typical behavior for that statistic. Examining several such sampling distributions leads to estimating a set of plausible values for the population parameter, using the margin of error as a measure that describes the sampling variability.	(HSS.ID.C.7) Interpret the slope (rate of change) and the intercept (constant term) of a linear model in the context of the data.	(HSS.ID.C.8) Compute (using technology) and interpret the correlation coefficient of a linear fit.		
Concept	SP.A.2.2	Distinguish between correlation and causation.	Same as target	(HSS.ID.C.9) Distinguish between correlation and causation.			

SP.B – Visualizing, Describing, and Using Data

Target SP.B.1 Crosswalk

Type	Reference	Draft Statement	NCTM Essential Concept	CCSSM 1	CCSSM 2	CCSSM 3	CCSSM 4
Target	**SP.B.1**	**Visualizing data sets**	**(EC.SP.VSD.3) The association between two categorical variables is typically represented by using two-way tables and segmented bar graphs.**				
Concept	SP.B.1.1	Understand and construct multiple ways to visualize data.	(EC.SP.VSD.4) Scatterplots, including plots over time, can reveal patterns, trends, clusters, and gaps that are useful in analyzing the association between two contextual variables.	Summarize, represent, and interpret data on a single count or measurement variable (HSS.ID.A)	(HSS.ID.A.1) Understand and construct multiple ways to visualize data, including, but not limited to: line charts, column/bar charts, pie charts, area charts, pivot tables, and indicators.		
Concept	SP.B.1.2	Critique data visualization choices made in real-life contexts.	Not explicit in NCTM EC	(HSS.ID.B) Summarize, represent, and interpret data on two categorical and quantitative variables	(HSS.ID.B.5) Summarize categorical data for two categories in two-way frequency tables and segmented bar graph. Interpret relative frequencies in the context of the data	(HSS.ID.B.6) Represent data on two quantitative variables on a scatter plot, and describe how the variables are related.	

Target SP.B.2 Crosswalk

Type	Reference	Draft Statement	NCTM Essential Concept	CCSSM 1	CCSSM 2	CCSSM 3	CCSSM 4
Target	**SP.B.2**	**Describe and use real life data**					
Concept	SP.B.2.1	Understand distributions of quantitative data (continuous or discrete) in one variable and describe in the context of the data with respect to what is typical.	(EC.SP.VSD.2) Distributions of quantitative data (continuous or discrete) in one variable should be described in the context of the data with respect to what is typical (the shape, with appropriate measures of center and variability, including standard deviation) and what is not (outliers), and these characteristics can be used to compare two or more subgroups with respect to a variable.	(HSS.ID.A) Summarize, represent, and interpret data on a single count or measurement variable	(HSS.ID.A.2) Use statistics appropriate to the shape of the data distribution to compare center (median, mean) and spread (interquartile range, standard deviation) of two or more different data sets.	(HSS.ID.A.3) Interpret differences in shape, center, and spread in the context of the data sets, accounting for possible effects of extreme data points (outliers).	(HSS.ID.A.4) Use the mean and standard deviation of a data set to fit it to a normal distribution and to estimate population percentages. Recognize that there are data sets for which such a procedure is not appropriate. Use calculators, spreadsheets, and tables to estimate areas under the normal curve.
Concept	SP.B.2.2	Understand and work with very large data sets that arise from a given context and use technology to clean and organize data into manageable structures for analysis.	(EC.SP.VSD.1) Data arise from a context and come in two types: quantitative (continuous or discrete) and categorical. Technology can be used to "clean" and organize data, including very large data sets, into a useful and manageable structure—a first step in any analysis of data.	Not explicit in CCSSM			

SP.C – Statistical Inference

Target SP.C.1 Crosswalk

Type	Reference	Draft Statement	NCTM Essential Concept	CCSSM 1	CCSSM 2	CCSSM 3	CCSSM 4
Target	**SP.C.1**	**Understanding study designs**					
Concept	SP.C.1.1	Understand different types of research design.	(EC.SP.SI.1) Study designs are of three main types: sample survey, experiment, and observational study.	(HSS.IC.B.3) Recognize the purposes of and differences among sample surveys, experiments, and observational studies; explain how randomization relates to each			
Concept	SP.C.1.2	Understand the role of randomization within common sampling techniques.	(EC.SP.SI.2) The role of randomization is different in randomly selecting samples and in randomly assigning subjects to experimental treatment groups. (EC.SP.SI.5) The larger the sample size, the less the expected variability in the sampling distribution of a sample statistic.				

Target SP.C.2 Crosswalk

Type	Reference	Draft Statement	NCTM Essential Concept	CCSSM 1	CCSSM 2	CCSSM 3	CCSSM 4
Target	**SP.C.2**	**Validating inferences**		**(S.IC.A) Understand and evaluate random processes underlying statistical experiments**	**(HSS.IC.B) Make inferences and justify conclusions from sample surveys, experiments, and observational studies**		
Concept	SP.C.2.1	Make inferences and justify conclusions from research studies.	(EC.SP.SI.3) The scope and validity of statistical inferences are dependent on the role of randomization in the study design.	(HSS.IC.A.1) Understand statistics as a process for making inferences about population parameters based on a random sample from that population.	(HSS.IC.B.5) Use data from a random sample to draw inferences about a population with an unknown characteristic of interest. Generate multiple samples (or simulated samples) of the same size to gauge the variation in estimates or predictions and decide if differences between parameters are significant.	(HSS.IC.B.6) Evaluate reports based on data.	
Concept	SP.C.2.2	Understand the role of bias and error in making inferences.	(EC.SP.SI.4) Bias, such as sampling, response, or nonresponse bias, may occur in surveys, yielding results that are not representative of the population of interest.	(HSS.IC.B.4) Use data from a sample survey to estimate a population mean or proportion; develop a margin of error through the use of simulation models for random sampling.			

SP.D – Probability

Target SP.D.1 Crosswalk

Type	Reference	Draft Statement	NCTM Essential Concept	CCSSM 1	CCSSM 2	CCSSM 3	CCSSM 4
Target	**SP.D.1**	**Calculate theoretical probabilities**					
Concept	SP.D.1.1	Understand and calculate theoretical probabilities for independent and dependent events.	(EC.SP.P.1) Two events are independent if the occurrence of one event does not affect the probability of the other event. Determining whether two events are independent can be used for finding and understanding probabilities.	(HSS.CP.A) Understand independence and conditional probability and use them to interpret data	(HSS.CP.A.1) 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.	(HSS.CP.A.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.	
Concept	SP.D.1.2	Determine conditional probabilities and use them in context.	(EC.SP.P.2) Conditional probabilities—that is, those probabilities that are "conditioned" by some known information—can be computed from data organized in contingency tables. Conditions or assumptions may affect the computation of a probability.	(HSS.CP.A) Understand independence and conditional probability and use them to interpret data	(HSS.CP.A.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.	(HSS.CP.A.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.	

Target SP.D.2 Crosswalk

Type	Reference	Draft Statement	NCTM Essential Concept	CCSSM 1	CCSSM 2	CCSSM 3	CCSSM 4
Target	**SP.D.2**	**Generate and analyze experimental probabilities**					
Concept	SP.D.2.1	Recognize and explain the concepts of conditional probability and independence in everyday language and everyday situations.	Not explicit in NCTM EC	(HSS.CP.A.5) Recognize and explain the concepts of conditional probability and independence in everyday language and everyday situations.			
Concept	SP.D.2.2	Compare theoretical probabilities from a model to observed frequencies.	Not explicit in NCTM EC	(7.SP.C.6) Approximate the probability of a chance 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.	(7.SP.C.7) Develop a probability model and use it to find probabilities of events. Compare probabilities from a model to observed frequencies; if the agreement is not good, explain possible sources of the discrepancy		

GM.A – Transformations

Target GM.A.1 Crosswalk

Type	Reference	Draft Statement	NCTM Essential Concept	CCSSM 1	CCSSM 2	CCSSM 3	CCSSM 4
Target	**GM.A.1**	**Representing transformations in the plane**	**(EC.GM.T.1) Applying geometric transformations to figures provides opportunities for describing the attributes of the figures preserved by the transformation and for describing symmetries by examining when a figure can be mapped onto itself.**	**(HSG.CO.A) Experiment with transformations in the plane**	**(HSG.CO.B) Understand congruence in terms of rigid motions**		
Concept	GM.A.1.1	Understand congruence in terms of rigid motions and describe transformations that will carry a given figure onto another.	(EC.GM.T.2) Showing that two figures are congruent involves showing that there is a rigid motion (translation, rotation, reflection, or glide reflection) or, equivalently, a sequence of rigid motions that maps one figure to the other.	(HSG.CO.A.2) Represent transformations in the plane using, e.g., transparencies and geometry software; describe transformations as functions that take points in the plane as inputs and give other points as outputs. Compare transformations that preserve distance and angle to those that do not (e.g., translation versus horizontal stretch).	(HSG.CO.A.3) Given a rectangle, parallelogram, trapezoid, or regular polygon, describe the rotations and reflections that carry it onto itself.	(HSG.CO.A.4) Develop definitions of rotations, reflections, and translations in terms of angles, circles, perpendicular lines, parallel lines, and line segments.	(HSG.CO.A.5) Given a geometric figure and a rotation, reflection, or translation, draw the transformed figure using, e.g., graph paper, tracing paper, or geometry software. Specify a sequence of transformations that will carry a given figure onto another.
Concept	GM.A.1.2	Understand similarity in terms of dilations and verify the properties of dilations given by a center and a scale factor.	(EC.GM.T.3) Showing that two figures are similar involves finding a similarity transformation (dilation or composite of a dilation with a rigid motion) or, equivalently, a sequence of similarity transformations that maps one figure onto the other.	(HSG.SRT.A) Understand similarity in terms of similarity transformations	(HSG.SRT.A.1) Verify experimentally the properties of dilations given by a center and a scale factor	(HSG.SRT.A.2) Given two figures, use the definition of similarity in terms of similarity transformations to decide if they are similar;	(HSG.SRT.A.2 cont.) 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.

Target GM.A.2 Crosswalk

Type	Reference	Draft Statement	NCTM Essential Concept	CCSSM 1	CCSSM 2	CCSSM 3	CCSSM 4
Target	**GM.A.2**	**Applying transformations**					
Concept	GM.A.2.1	Use transformations to demonstrate congruence.	(EC.GM.T.2) Showing that two figures are congruent involves showing that there is a rigid motion (translation, rotation, reflection, or glide reflection) or, equivalently, a sequence of rigid motions that maps one figure to the other.	(HSG.CO.5) Given a geometric figure and a rotation, reflection, or translation, draw the transformed figure using, e.g., graph paper, tracing paper, or geometry software. Specify a sequence of transformations that will carry a given figure onto another.	(HSG.SRT.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.		
Concept	GM.A.2.2	Use transformations in algebra through the concept of function families and through the analysis of graphs of functions as geometric figures.	(EC.GM.T.4) Transformations in geometry serve as a connection with algebra, both through the concept of functions and through the analysis of graphs of functions as geometric figures.	Not explicit in CCSSM			

GM.B – Geometric Arguments, Reasoning, and Modeling

Target GM.B.1 Crosswalk

Type	Reference	Draft Statement	NCTM Essential Concept	CCSSM 1	CCSSM 2	CCSSM 3	CCSSM 4
Target	**GM.B.1**	**Communicate reasoning through proofs**	**(EC.GM.GARP.3) Proofs of theorems can sometimes be made with transformations, coordinates, or algebra; all approaches can be useful, and in some cases one may provide a more accessible or understandable argument than another.**				
Concept	GM.B.1.1	Constructing proof whether a statement is true or false mathematically, and communicate reasoning in a variety of ways.	(EC.GM.GARP.1) Proof is the means by which we demonstrate whether a statement is true or false mathematically, and proofs can be communicated in a variety of ways (e.g., two-column, paragraph).	Not explicit in CCSSM			
Concept	GM.B.1.2	Use technology to construct and explore figures with constraints to explore the independence and dependence of assumptions and conjectures.	(EC.GM.GARP.2) Using technology to construct and explore figures with constraints provides an opportunity to explore the independence and dependence of assumptions and conjectures.	HSG.SRT.5 Use congruence and similarity criteria for triangles to solve problems and to prove relationships in geometric figures.			

Target GM.B.2 Crosswalk

Type	Reference	Draft Statement	NCTM Essential Concept	CCSSM 1	CCSSM 2	CCSSM 3	CCSSM 4
Target	**GM.B.2**	**Modeling with geometry**	**(EC.GM.SAPM.2) Experiencing the mathematical modeling cycle in problems involving geometric concepts, from the simplification of the real problem through the solving of the simplified problem, the interpretation of its solution, and the checking of the solution's feasibility, introduces geometric techniques, tools, and points of view that are valuable to problem solving.**				
Concept	GM.B.2.1	Use geometric shapes, their measures, and their properties to describe objects in our world.	same as target	(HSG.MG.A.1) Use geometric shapes, their measures, and their properties to describe objects (e.g., modeling a tree trunk or a human torso as a cylinder).			
Concept	GM.B.2.2	Apply geometric methods to solve design problems.	same as target	(HSG.MG.A.2) Apply concepts of density based on area and volume in modeling situations (e.g., persons per square mile, BTUs per cubic foot)			

Part 3: NCTM (2018) Essential Skills Crosswalk

Essential Skills in Number (EC.N)

EC Code	Essential Concept	NQ Concepts	AF Concepts	SP Concepts	GM Concepts
EC.N.1	Together, irrational numbers and rational numbers complete the real number system, representing all points on the number line.	NQ.A.1.1			
EC.N.2	Quantitative reasoning includes, and mathematical modeling requires, attention to units of measurement.	NQ.A.1.3			

Essential Concepts in Algebra and Functions (EC.AF)

Focus 1: Algebra (EC.AF.A)

EC Code	Essential Concept	NQ Concepts	AF Concepts	SP Concepts	GM Concepts
EC.AF.A.1	Expressions can be rewritten in equivalent forms by using algebraic properties, including properties of addition, multiplication, and exponentiation, to make different characteristics or features visible.		AF.A.1		
EC.AF.A.2	Finding solutions to an equation, inequality, or system of equations or inequalities requires the checking of candidate solutions, whether generated analytically or graphically, to ensure that solutions are found and that those found are not extraneous.		AF.A.2		
EC.AF.A.3	The structure of an equation or inequality (including, but not limited to, one-variable linear and quadratic equations, inequalities, and systems of linear equations in two variables) can be purposefully analyzed (with and without technology) to determine an efficient strategy to find a solution, if one exists, and then to justify the solution.		AF.A.3		
EC.AF.A.4	Expressions, equations, and inequalities can be used to analyze and make predictions, both within mathematics and as mathematics is applied in different contexts—in particular, contexts that arise in relation to linear, quadratic, and exponential situations.		AF.A.4		

Focus 2: Connecting Algebra to Functions (EC.AF.CAF)

EC Code	Essential Concept	NQ Concepts	AF Concepts	SP Concepts	GM Concepts
EC.AF.CAF.1	Functions shift the emphasis from a point-by-point relationship between two variables (input/output) to considering an entire set of ordered pairs (where each first element is paired with exactly one second element) as an entity with its own features and characteristics.		AF.B.1.1		
EC.AF.CAF.2	Graphs can be used to obtain exact or approximate solutions of equations, inequalities, and systems of equations and inequalities—including systems of linear equations in two variables and systems of linear and quadratic equations (given or obtained by using technology).		AF.C.1		

Focus 3: Functions (EC.AF.F)

EC Code	Essential Concept	NQ Concepts	AF Concepts	SP Concepts	GM Concepts
EC.AF.F.1	Functions can be described by using a variety of representations: mapping diagrams, function notation (e.g., f(x) = x2), recursive definitions, tables, and graphs		AF.B.1		
EC.AF.F.2	Functions that are members of the same family have distinguishing attributes (structure) common to all functions within that family.		AF.B.2		
EC.AF.F.3	Functions can be represented graphically, and key features of the graphs, including zeros, intercepts, and, when relevant, rate of change, and maximum/minimum values, can be associated with and interpreted in terms of the equivalent symbolic representation.		AF.B.3		
EC.AF.F.4	Functions model a wide variety of real situations and can help students understand the processes of making and changing assumptions, assigning variables, and finding solutions to contextual problems.		AF.B.4		

Essential Concepts in Statistics and Probability (EC.SP)

Focus 1: Quantitative Literacy (EC.SP.QL)

EC Code	Essential Concept	NQ Concepts	AF Concepts	SP Concepts	GM Concepts
EC.SP.QL.1	Mathematical and statistical reasoning about data can be used to evaluate conclusions and assess risks.			SP.A.1.2	
EC.SP.QL.2	Making and defending informed data-based decisions is a characteristic of a quantitatively literate person.			SP.A.1.2	

Focus 2: Visualizing and Summarizing Data (EC.SP.VSD)

EC Code	Essential Concept	NQ Concepts	AF Concepts	SP Concepts	GM Concepts
EC.SP.VSD.1	Data arise from a context and come in two types: quantitative (continuous or discrete) and categorical. Technology can be used to "clean" and organize data, including very large data sets, into a useful and manageable structure—a first step in any analysis of data.			SP.A.1.1	
EC.SP.VSD.2	Distributions of quantitative data (continuous or discrete) in one variable should be described in the context of the data with respect to what is typical (the shape, with appropriate measures of center and variability, including standard deviation) and what is not (outliers), and these characteristics can be used to compare two or more subgroups with respect to a variable.			SP.B.2.1	
EC.SP.VSD.3	The association between two categorical variables is typically represented by using two-way tables and segmented bar graphs.			SP.B.1	
EC.SP.VSD.4	Scatterplots, including plots over time, can reveal patterns, trends, clusters, and gaps that are useful in analyzing the association between two contextual variables.			SP.B.1.1	
EC.SP.VSD.5	Analyzing the association between two quantitative variables should involve statistical procedures, such as examining (with technology) the sum of squared deviations in fitting a linear model, analyzing residuals for patterns, generating a least-squares regression line and finding a correlation coefficient, and differentiating between correlation and causation.			SP.A.2	
EC.SP.VSD.6	Data-analysis techniques can be used to develop models of contextual situations and to generate and evaluate possible solutions to real problems involving those contexts.			SP.A.1	

Focus 3: Statistical Inference (EC.SP.SI)

EC Code	Essential Concept	NQ Concepts	AF Concepts	SP Concepts	GM Concepts
EC.SP.SI.1	Study designs are of three main types: sample survey, experiment, and observational study.			SP.C.1.1	
EC.SP.SI.2	The role of randomization is different in randomly selecting samples and in randomly assigning subjects to experimental treatment groups.			SP.C.1.2	
EC.SP.SI.3	The scope and validity of statistical inferences are dependent on the role of randomization in the study design.			SP.C.1.2	
EC.SP.SI.4	Bias, such as sampling, response, or nonresponse bias, may occur in surveys, yielding results that are not representative of the population of interest.			SP.C.2.2	
EC.SP.SI.5	The larger the sample size, the less the expected variability in the sampling distribution of a sample statistic.			SP.C.1.2	
EC.SP.SI.6	The sampling distribution of a sample statistic formed from repeated samples for a given sample size drawn from a population can be used to identify typical behavior for that statistic. Examining several such sampling distributions leads to estimating a set of plausible values for the population parameter, using the margin of error as a measure that describes the sampling variability.			SP.A.2.1	

Focus 4: Probability (EC.SP.P)

EC Code	Essential Concept	NQ Concepts	AF Concepts	SP Concepts	GM Concepts
EC.SP.P.1	Two events are independent if the occurrence of one event does not affect the probability of the other event. Determining whether two events are independent can be used for finding and understanding probabilities.			SP.D.1.1	
EC.SP.P.2	Conditional probabilities—that is, those probabilities that are "conditioned" by some known information—can be computed from data organized in contingency tables. Conditions or assumptions may affect the computation of a probability.			SP.D.2.2	

Essential Concepts in Geometry and Measurement (EC.GM)

Focus 1: Measurement (EC.GM.M)

EC Code	Essential Concept	NQ Concepts	AF Concepts	SP Concepts	GM Concepts
EC.GM.M.1	Areas and volumes of figures can be computed by determining how the figure might be obtained from simpler figures by dissection and recombining.	NQ.B.2			
EC.GM.M.2	Constructing approximations of measurements with different tools, including technology, can support an understanding of measurement.	NQ.A.1.2			
EC.GM.M.3	When an object is the image of a known object under a similarity transformation, a length, area, or volume on the image can be computed by using proportional relationships.	NQ.B.2.2			

Focus 2: Transformations (EC.GM.T)

EC Code	Essential Concept	NQ Concepts	AF Concepts	SP Concepts	GM Concepts
EC.GM.T.1	Applying geometric transformations to figures provides opportunities for describing the attributes of the figures preserved by the transformation and for describing symmetries by examining when a figure can be mapped onto itself.				GM.A.1
EC.GM.T.2	Showing that two figures are congruent involves showing that there is a rigid motion (translation, rotation, reflection, or glide reflection) or, equivalently, a sequence of rigid motions that maps one figure to the other.				GM.A.1.1
EC.GM.T.3	Showing that two figures are similar involves finding a similarity transformation (dilation or composite of a dilation with a rigid motion) or, equivalently, a sequence of similarity transformations that maps one figure onto the other.				GM.A.1.2
EC.GM.T.4	Transformations in geometry serve as a connection with algebra, both through the concept of functions and through the analysis of graphs of functions as geometric figures.				GM.A.2.2

Focus 3: Geometric Arguments, Reasoning, and Proof (EC.GM.GARP)

EC Code	Essential Concept	NQ Concepts	AF Concepts	SP Concepts	GM Concepts
EC.GM.GARP.1	Proof is the means by which we demonstrate whether a statement is true or false mathematically, and proofs can be communicated in a variety of ways (e.g., two-column, paragraph).				GM.B.1.1
EC.GM.GARP.2	Using technology to construct and explore figures with constraints provides an opportunity to explore the independence and dependence of assumptions and conjectures.				GM.B.1.2
EC.GM.GARP.3	Proofs of theorems can sometimes be made with transformations, coordinates, or algebra; all approaches can be useful, and in some cases one may provide a more accessible or understandable argument than another.				GM.B.1

Focus 4: Solving Applied Problems and Modeling in Geometry (EC.GM.SAPM)

EC Code	Essential Concept	NQ Concepts	AF Concepts	SP Concepts	GM Concepts
EC.GM.SAPM.1	Recognizing congruence, similarity, symmetry, measurement opportunities, and other geometric ideas, including right triangle trigonometry in real-world contexts, provides a means of building understanding of these concepts and is a powerful tool for solving problems related to the physical world in which we live.	NQ.B.2.2			
EC.GM.SAPM.2	Experiencing the mathematical modeling cycle in problems involving geometric concepts, from the simplification of the real problem through the solving of the simplified problem, the interpretation of its solution, and the checking of the solution's feasibility, introduces geometric techniques, tools, and points of view that are valuable to problem solving.				GM.B.2

This page is left intentionally blank

Part 4: Smarter Balanced Content Specifications (2015) Crosswalk

Crosswalk Organized by SBAC Claims

Claim 1 Content

CC Index	SBAC Target	OR Draft Framework 1	OR Draft Framework 2	OR Draft Framework 3	Claim 1	Claim 2	Claim 3	Claim 4
HSN.RN.A	Extend the properties of exponents to rational exponents.	**N/A**			A		1	
HSN.RN.B	Use properties of rational and irrational numbers.	NQ.A.1.1			B		1	
HSN.Q.A	Reason quantitatively and use units to solve problems.	NQ.A.1.3			C	1		1
HSA.SSE.A	Interpret the structure of expressions.	AF.A.1.1			D	1	1	
HSA.SSE.B	Write expressions in equivalent forms to solve problems.	AF.A.1.2			E	1		1
HSA.APR.A	Perform arithmetic operations on polynomials.	AF.A.1.3			F			
HSA.APR.C	Use polynomial identities to solve problems.	AF.A.2.2			G		1	
HSA.REI.A	Understand solving equations as a process of reasoning and explain the reasoning.	AF.A.3	AF.A.3.1	AF.A.3.2	H	1	1	1
HSA.REI.B	Solve equations and inequalities in one variable.	AF.A.2.1			I	1	1	1
HSA.REI.D	Represent and solve equations and inequalities graphically.	AF.C.1	AF.C.1.1	AF.C.1.2	J	1	1	
HSF.IF.A	Understand the concept of a function and use function notation.	AF.B.1	AF.B.1.1	AF.B.1.2	K	1	1	
HSF.IF.B	Interpret functions that arise in applications in terms of the context.	AF.A.4.1			L	1	1	1
HSF.IF.C	Analyze functions using different representations.	AF.A.3	AF.A.3.1		M	1	1	1
HSF.BF.A	Build a function that models a relationship between two quantities.	AF.B.2	AF.B.2.1	AF.B.2.3	N	1		1
HSG.SRT.C	Define trigonometric ratios and solve problems involving right triangles	AF.C.3.1			O	1		
HSS.ID.A	Summarize, represent, and interpret data on a single count or measurement variable	SP.A.1.1	SP.B.1.1	SP.B.2.1	P			1

Claim 2 Content

CC Index	SBAC Target	OR Draft Framework 1	OR Draft Framework 2	OR Draft Framework 3	Claim 1	Claim 2	Claim 3	Claim 4
HSN.Q.A	Reason quantitatively and use units to solve problems.	NQ.A.1.3			C	1		1
HSA.SSE.A	Interpret the structure of expressions.	AF.A.1.1			D	1	1	
HSA.SSE.B	Write expressions in equivalent forms to solve problems.	AF.A.1.2			E	1		1
HSA.CED.A	Create equations that describe numbers or relationships.	AF.A.4	AF.A.4.1	AF.A.4.2		1		1
HSA.REI.A	Understand solving equations as a process of reasoning and explain the reasoning.	AF.A.3	AF.A.3.1	AF.A.3.2	H	1	1	1
HSA.REI.B	Solve equations and inequalities in one variable.	AF.A.2.1			I	1	1	1
HSA.REI.C	Solve systems of equations.	AF.A.2.3				1	1	1
HSA.REI.D	Represent and solve equations and inequalities graphically.	AF.C.1	AF.C.1.1	AF.C.1.2	J	1	1	
HSF.IF.A	Understand the concept of a function and use function notation.	AF.B.1	AF.B.1.1	AF.B.1.2	K	1	1	
HSF.IF.B	Interpret functions that arise in applications in terms of the context.	AF.A.4.1			L	1	1	1
HSF.IF.C	Analyze functions using different representations.	AF.A.3	AF.A.3.1		M	1	1	1
HSF.BF.A	Build a function that models a relationship between two quantities.	AF.B.2	AF.B.2.1	AF.B.2.3	N	1		1
HSG.SRT.C	Define trigonometric ratios and solve problems involving right triangles	AF.C.3.1			O	1		
HSS.ID.C	Interpret linear models	SP.A.2	SP.A.2.1			1		
HSS.CP.A	Understand independence and conditional probability and use them to interpret data	SP.D.1.1	SP.D.1.2			1		

Claim 3 Content

CC Index	SBAC Target	OR Draft Framework 1	OR Draft Framework 2	OR Draft Framework 3	Claim 1	Claim 2	Claim 3	Claim 4
HSN.RN.A	Extend the properties of exponents to rational exponents.				A		1	
HSN.RN.B	Use properties of rational and irrational numbers.	NQ.A.1.1			B		1	
HSA.SSE.A	Interpret the structure of expressions.	AF.A.1.1			D	1	1	
HSA.APR.B	Understand the relationship between zeros and factors of polynomials.	AF.A.3.2					1	
HSA.APR.C	Use polynomial identities to solve problems.	AF.A.2.2			G		1	
HSA.APR.D	Rewrite rational expressions.						1	
HSA.REI.A	Understand solving equations as a process of reasoning and explain the reasoning.	AF.A.3	AF.A.3.1	AF.A.3.2	H	1	1	1
HSA.REI.B	Solve equations and inequalities in one variable.	AF.A.2.1			I	1	1	1
HSA.REI.C	Solve systems of equations.	AF.A.2.3				1	1	1
HSA.REI.D	Represent and solve equations and inequalities graphically.	AF.C.1	AF.C.1.1	AF.C.1.2	J	1	1	
HSF.IF.A	Understand the concept of a function and use function notation.	AF.B.1	AF.B.1.1	AF.B.1.2	K	1	1	
HSF.IF.B	Interpret functions that arise in applications in terms of the context.	AF.A.4.1			L	1	1	1
HSF.IF.C	Analyze functions using different representations.	AF.A.3	AF.A.3.1		M	1	1	1
HSF.BF.B	Build new functions from existing functions.	AF.B.2	AF.C.2				1	
HSF.TF.A	Extend the domain of trigonometric functions using the unit circle.	AF.C.3.2					1	
HSF.TF.C	Prove and apply trigonometric identities.						1	
HSG.CO.A	Experiment with transformations in the plane	GM.A.1	GM.A.1.1				1	
HSG.CO.B	Understand congruence in terms of rigid motions	GM.A.1					1	
HSG.CO.C	Prove geometric theorems						1	
HSG.SRT.A	Understand similarity in terms of similarity transformations	GM.A.1.2					1	
HSG.SRT.B	Prove theorems involving similarity	NQ.B.2.2					1	

Claim 4 Content

CC Index	SBAC Target	OR Draft Framework 1	OR Draft Framework 2	OR Draft Framework 3	Claim 1	Claim 2	Claim 3	Claim 4
HSN.Q.A	Reason quantitatively and use units to solve problems.	NQ.A.1.3			C	1		1
HSA.SSE.B	Write expressions in equivalent forms to solve problems.	AF.A.1.2			E	1		1
HSA.CED.A	Create equations that describe numbers or relationships.	AF.A.4	AF.A.4.1	AF.A.4.2		1		1
HSA.REI.A	Understand solving equations as a process of reasoning and explain the reasoning.	AF.A.3	AF.A.3.1	AF.A.3.2	H	1	1	1
HSA.REI.B	Solve equations and inequalities in one variable.	AF.A.2.1			I	1	1	1
HSA.REI.C	Solve systems of equations.	AF.A.2.3				1	1	1
HSF.IF.B	Interpret functions that arise in applications in terms of the context.	AF.A.4.1			L	1	1	1
HSF.IF.C	Analyze functions using different representations.	AF.A.3	AF.A.3.1		M	1	1	1
HSF.BF.A	Build a function that models a relationship between two quantities.	AF.B.2	AF.B.2.1	AF.B.2.3	N	1		1
HSF.LE.A	Construct and compare linear, quadratic, and exponential models and solve problems.	AF.A.4.1						1
HSF.LE.B	Interpret expressions for functions in terms of the situation they model.	AF.A.4.2						1
HSF.TF.B	Model periodic phenomena with trigonometric functions.	AF.C.3.3						1
HSG.GMD.A	Explain volume formulas and use them to solve problems	NQ.B.2.1						1
HSG.MG.A	Apply geometric concepts in modeling situations	GM.B.2.1	GM.B.2.2					1
HSS.ID.A	Summarize, represent, and interpret data on a single count or measurement variable	SP.A.1.1	SP.B.1.1	SP.B.2.1	P			1
HSS.ID.B	Summarize, represent, and interpret data on two categorical and quantitative variables	SP.B.1.2						1
HSS.IC.A	Understand and evaluate random processes underlying statistical experiments	SP.C.2.1						1
HSS.IC.B	Make inferences and justify conclusions from sample surveys, experiments, and observational studies	SP.C.1.1	SP.C.2					1

Crosswalk Organized by SBAC Claim Frequency

Four Claim Targets

CC Index	SBAC Target	OR Draft Framework 1	OR Draft Framework 2	OR Draft Framework 3	Claim 1	Claim 2	Claim 3	Claim 4
HSA.REI.A	Understand solving equations as a process of reasoning and explain the reasoning.	AF.A.3	AF.A.3.1	AF.A.3.2	H	1	1	1
HSA.REI.B	Solve equations and inequalities in one variable.	AF.A.2.1			I	1	1	1
HSF.IF.B	Interpret functions that arise in applications in terms of the context.	AF.A.4.1			L	1	1	1
HSF.IF.C	Analyze functions using different representations.	AF.A.3	AF.A.3.1		M	1	1	1

Three Claim Targets

CC Index	SBAC Target	OR Draft Framework 1	OR Draft Framework 2	OR Draft Framework 3	Claim 1	Claim 2	Claim 3	Claim 4
HSN.Q.A	Reason quantitatively and use units to solve problems.	NQ.A.1.3			C	1		1
HSA.SSE.A	Interpret the structure of expressions.	AF.A.1.1			D	1	1	
HSA.SSE.B	Write expressions in equivalent forms to solve problems.	AF.A.1.2			E	1		1
HSA.REI.C	Solve systems of equations.	AF.A.2.3				1	1	1
HSA.REI.D	Represent and solve equations and inequalities graphically.	AF.C.1	AF.C.1.1	AF.C.1.2	J	1	1	
HSF.IF.A	Understand the concept of a function and use function notation.	AF.B.1	AF.B.1.1	AF.B.1.2	K	1	1	
HSF.BF.A	Build a function that models a relationship between two quantities.	AF.B.2	AF.B.2.1	AF.B.2.3	N	1		1

Two Claim Targets

CC Index	SBAC Target	OR Draft Framework 1	OR Draft Framework 2	OR Draft Framework 3	Claim 1	Claim 2	Claim 3	Claim 4
HSN.RN.A	Extend the properties of exponents to rational exponents.	**N/A**			A		1	
HSN.RN.B	Use properties of rational and irrational numbers.	NQ.A.1.1			B		1	
HSA.APR.C	Use polynomial identities to solve problems.	AF.A.2.2			G		1	
HSA.CED.A	Create equations that describe numbers or relationships.	AF.A.4	AF.A.4.1	AF.A.4.2		1		1
HSG.SRT.C	Define trigonometric ratios and solve problems involving right triangles	AF.C.3.1			O	1		
HSS.ID.A	Summarize, represent, and interpret data on a single count or measurement variable	SP.A.1.1	SP.B.1.1	SP.B.2.1	P			1

One Claim Targets

CC Index	SBAC Target	OR Draft Framework 1	OR Draft Framework 2	OR Draft Framework 3	Claim 1	Claim 2	Claim 3	Claim 4
HSA.APR.A	Perform arithmetic operations on polynomials.	AF.A.1.3			F			
HSA.APR.B	Understand the relationship between zeros and factors of polynomials.	AF.A.3.2					1	
HSA.APR.D	Rewrite rational expressions.	**N/A**					1	
HSF.BF.B	Build new functions from existing functions.	AF.B.2	AF.C.2				1	
HSF.LE.A	Construct and compare linear, quadratic, and exponential models and solve problems.	AF.A.4.1						1
HSF.LE.B	Interpret expressions for functions in terms of the situation they model.	AF.A.4.2						1
HSF.TF.A	Extend the domain of trigonometric functions using the unit circle.	AF.C.3.2					1	
HSF.TF.B	Model periodic phenomena with trigonometric functions.	AF.C.3.3						1
HSF.TF.C	Prove and apply trigonometric identities.	**N/A**					1	
HSG.CO.A	Experiment with transformations in the plane	GM.A.1	GM.A.1.1				1	
HSG.CO.B	Understand congruence in terms of rigid motions	GM.A.1					1	
HSG.CO.C	Prove geometric theorems	**N/A**					1	
HSG.SRT.A	Understand similarity in terms of similarity transformations	GM.A.1.2					1	
HSG.SRT.B	Prove theorems involving similarity	NQ.B.2.2					1	
HSG.GMD.A	Explain volume formulas and use them to solve problems	NQ.B.2.1						1
HSG.MG.A	Apply geometric concepts in modeling situations	GM.B.2.1	GM.B.2.2					1
HSS.ID.B	Summarize, represent, and interpret data on two categorical and quantitative variables	SP.B.1.2						1
HSS.ID.C	Interpret linear models	SP.A.2	SP.A.2.1			1		
HSS.IC.A	Understand and evaluate random processes underlying statistical experiments	SP.C.2.1						1
HSS.IC.B	Make inferences and justify conclusions from sample surveys, experiments, and observational studies	SP.C.1.1	SP.C.2					1
HSS.CP.A	Understand independence and conditional probability and use them to interpret data	SP.D.1.1	SP.D.1.2			1		

Zero Claim Targets

CC Index	SBAC Target	OR Draft Framework 1	OR Draft Framework 2	OR Draft Framework 3	Claim 1	Claim 2	Claim 3	Claim 4
HSN.CN.A	Perform arithmetic operations with complex numbers.	**N/A**						
HSN.CN.B	Represent complex numbers and their operations on the complex plane.	**N/A**						
HSN.CN.C	Use complex numbers in polynomial identities and equations.	**N/A**						
HSN.VM.A	Represent and model with vector quantities.	**N/A**						
HSN.VM.B	Perform operations on vectors.	**N/A**						
HSN.VM.C	Perform operations on matrices and use matrices in applications.	**N/A**						
HSG.CO.D	Make geometric constructions	**N/A**						
HSG.SRT.D	Apply trigonometry to general triangles	**N/A**						
HSG.C.A	Understand and apply theorems about circles	**N/A**						
HSG.C.B	Find arc lengths and areas of sectors of circles	**N/A**						
HSG.GPE.A	Translate between the geometric description and the equation for a conic section	**N/A**						
HSG.GPE.B	Use coordinates to prove simple geometric theorems algebraically	NQ.B.2.3						
HSG.GMD.B	Visualize relationships between two-dimensional and three-dimensional objects	**N/A**						
HSS.CP.B	Use the rules of probability to compute probabilities of compound events.	**N/A**						
HSS.MD.A	Calculate expected values and use them to solve problems	**N/A**						
HSS.MD.B	Use probability to evaluate outcomes of decisions	**N/A**						