Smarter Balanced Assessment Consortium
Claims, Targets, and Standard Alignment for Math

The Smarter Balanced Assessment Consortium (SBAC) has created a hierarchy comprised of claims and targets that together can be used to make statements about student achievement. The claim is a broad statement that will outline the outcomes achieved with mastery of the standards within it. Within each claim are a variety of assessment targets that further clarify the knowledge and specific skills that cross over a cluster of standards.

The following tables layout the claims and targets for claims 1-4. Each target may feature a standard or a variety of standards that make up the skill(s) of the target. Each target also features a Depth of Knowledge level(s) and item type(s) in which the target may be assessed.

Item Types:

- MC – Multiple Choice, Single Correct Response
- MS – Multiple Choice, Multiple Correct Response
- EQ – Equation/Numeric
- MA – Matching Tables
- TI – Fill-in tables
- DD – Drag and Drop
- HS – Hot Spot
- G – Graphing
- GI – Graphing Interaction
- ST – Short Text

Depth of Knowledge:

- 1 - Recall
- 2 - Skill/Concept
- 3 - Strategic Thinking
- 4 - Extended Thinking

Work:
Not all content in a given grade is emphasized equally in the standards. Some clusters require greater emphasis than others based on the depth of ideas, the time they take to master, and/or their importance to future mathematics or the demands of college and career readiness. The following tables identify the additional and supporting work for the grade by shading. If no shading is included, all standards listed are part of the major work for that level.

Claim	Target	DOK	Standards	Item Types
1: **Concepts and Procedures:** Students can explain and apply mathematical concepts and carry out mathematical procedures with precision and fluency.	**A:** Know that there are numbers that are not rational, and approximate them by rational numbers.	1, 2	**8.NS.1:** Know that numbers that are not rational are called irrational. Understand informally that every number has a decimal expansion; for rational numbers show that the decimal expansion repeats eventually, and convert a decimal expansion which repeats eventually into a rational number.	MS, MC, MA, EQ, DD, G
			8.NS.2: Use rational approximations of irrational numbers to compare the size of irrational numbers, locate them approximately on a number line diagram, and estimate the value of expressions (e.g., π^2). For example, by truncating the decimal expansion of √2, show that √2 is between 1 and 2, then between 1.4 and 1.5, and explain how to continue on to get better approximations.	
	B: Work with radicals and integer exponents.	1, 2	**8.EE.1:** Know and apply the properties of integer exponents to generate equivalent numerical expressions. For example, $3^2 \times 3^{-5} = 3^{-3} = 1/3^3 = 1/27$.	MC, MS, EQ
			8.EE.2: Use square root and cube root symbols to represent solutions to equations of the form $x^2 = p$ and $x^3 = p$, where p is a positive rational number. Evaluate square roots of small perfect squares and cube roots of small perfect cubes. Know that √2 is irrational.	
			8.EE.3: Use numbers expressed in the form of a single digit times an integer power of 10 to estimate very large or very small quantities, and to express how many times as much one is than the other. For example, estimate the population of the United States as 3×10^8 and the population of the world as 7×10^9, and determine that the world population is more than 20 times larger.	
			8.EE.4: Perform operations with numbers expressed in scientific notation, including problems where both decimal and scientific notation are used. Use scientific notation and choose units of appropriate size for measurements of very large or very small quantities (e.g., use millimeters per year for seafloor spreading). Interpret scientific notation that has been generated by technology.	

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Claim	Target	DOK	Standards	Item Types
1: **Concepts and Procedures:** Students can explain and apply mathematical concepts and carry out mathematical procedures with precision and fluency.	**C:** Understand the connections between proportional relationships, lines, and linear equations.	1, 2	**8.EE.5:** Graph proportional relationships, interpreting the unit rate as the slope of the graph. Compare two different proportional relationships represented in different ways. For example, compare a distance-time graph to a distance-time equation to determine which of two moving objects has greater speed.	MC, EQ, G
			8.EE.6: Use similar triangles to explain why the slope m is the same between any two distinct points on a non-vertical line in the coordinate plane; derive the equation y = mx for a line through the origin and the equation y = mx + b for a line intercepting the vertical axis at b.	
	D: Analyze and solve linear equations and pairs of simultaneous linear equations.	1, 2	**8.EE.7:** Solve linear equations in one variable.	MC, MS, DD, EQ, G
			8.EE.8: Analyze and solve pairs of simultaneous linear equations	
	E: Define, evaluate, and compare functions.	1, 2	**8.F.1:** Understand that a function is a rule that assigns to each input exactly one output. The graph of a function is the set of ordered pairs consisting of an input and the corresponding output.	MS, MC, EQ, MA
			8.F.2: Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions). For example, given a linear function represented by a table of values and a linear function represented by an algebraic expression, determine which function has the greater rate of change.	
			8.F.3: Interpret the equation y = mx + b as defining a linear function, whose graph is a straight line; give examples of functions that are not linear. For example, the function $A = s^2$ giving the area of a square as a function of its side length is not linear because its graph contains the points (1,1), (2,4) and (3,9), which are not on a straight line.	

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Claim	Target	DOK	Standards	Item Types
1: **Concepts and Procedures:** Students can explain and apply mathematical concepts and carry out mathematical procedures with precision and fluency.	**F:** Use functions to model relationships between quantities.	1, 2	**8.F.4:** Construct a function to model a linear relationship between two quantities. Determine the rate of change and initial value of the function from a description of a relationship or from two (x, y) values, including reading these from a table or from a graph. Interpret the rate of change and initial value of a linear function in terms of the situation it models, and in terms of its graph or a table of values.	EQ, MA, MC, G
			8.F.5: Describe qualitatively the functional relationship between two quantities by analyzing a graph (e.g., where the function is increasing or decreasing, linear or nonlinear). Sketch a graph that exhibits the qualitative features of a function that has been described verbally.	
	G: Understand congruence and similarity using physical models, transparencies, or geometry software.	1, 2	**8.G.1:** Verify experimentally the properties of rotations, reflections, and translations: **a.** Lines are taken to lines, and line segments to line segments of the same length. **b.** Angles are taken to angles of the same measure. **c.** Parallel lines are taken to parallel lines.	MA, EQ, HS, G
			8.G.2: Understand that a two-dimensional figure is congruent to another if the second can be obtained from the first by a sequence of rotations, reflections, and translations; given two congruent figures, describe a sequence that exhibits the congruence between them.	
			8.G.3: Describe the effect of dilations, translations, rotations, and reflections on two-dimensional figures using coordinates.	
			8.G.4: Understand that a two-dimensional figure is similar to another if the second can be obtained from the first by a sequence of rotations, reflections, translations, and dilations; given two similar two-dimensional figures, describe a sequence that exhibits the similarity between them.	
			8.G.5: Use informal arguments to establish facts about the angle sum and exterior angle of triangles, about the angles created when parallel lines are cut by a transversal, and the angle-angle criterion for similarity of triangles. For example, arrange three copies of the same triangle so that the sum of the three angles appears to form a line, and give an argument in terms of transversals why this is so.	

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1: **Concepts and Procedures:** Students can explain and apply mathematical concepts and carry out mathematical procedures with precision and fluency.	**H:** Understand and apply the Pythagorean Theorem.	1, 2	**8.G.6:** Explain a proof of the Pythagorean Theorem and its converse.	EQ, MC
			8.G.7: Apply the Pythagorean Theorem to determine unknown side lengths in right triangles in real-world and mathematical problems in two and three dimensions.	
			8.G.8: Apply the Pythagorean Theorem to find the distance between two points in a coordinate system.	
	I: Solve real-world and mathematical problems involving volume of cylinders, cones, and spheres.	1, 2	**8.G.9:** Know the formulas for the volumes of cones, cylinders, and spheres and use them to solve real-world and mathematical problems.	EQ, MC

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1: **Concepts and Procedures:** Students can explain and apply mathematical concepts and carry out mathematical procedures with precision and fluency.	**J:** Investigate patterns of association in bivariate data.	1, 2	**8.SP.1:** Construct and interpret scatter plots for bivariate measurement data to investigate patterns of association between two quantities. Describe patterns such as clustering, outliers, positive or negative association, linear association, and nonlinear association.	MA, EQ, TI
			8.SP.2: Know that straight lines are widely used to model relationships between two quantitative variables. For scatter plots that suggest a linear association, informally fit a straight line, and informally assess the model fit by judging the closeness of the data points to the line.	
			8.SP.3: Use the equation of a linear model to solve problems in the context of bivariate measurement data, interpreting the slope and intercept. For example, in a linear model for a biology experiment, interpret a slope of 1.5 cm/hr. as meaning that an additional hour of sunlight each day is associated with an additional 1.5 cm in mature plant height.	
			8.SP.4: Understand that patterns of association can also be seen in bivariate categorical data by displaying frequencies and relative frequencies in a two-way table. Construct and interpret a two-way table summarizing data on two categorical variables collected from the same subjects. Use relative frequencies calculated for rows or columns to describe possible association between the two variables. For example, collect data from students in your class on whether or not they have a curfew on school nights and whether or not they have assigned chores at home. Is there evidence that those who have a curfew also tend to have chores?	

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Claim	Target/DOK	Standards	Item Types
2: **Problem Solving:** Students can solve a range of well-posed problems in pure and applied mathematics, making productive use of knowledge and problem-solving strategies.	**A:** Apply mathematics to solve well-posed problems in pure mathematics and arising in everyday life, society, and the workplace. (2, 3) **B:** Select and use appropriate tools strategically. (1, 2) **C:** Interpret results in the context of a situation. (2) **D:** Identify important quantities in a practical situation and map their relationships (e.g., using diagrams, two-way tables, graphs, flowcharts, or formulas). (1, 2, 3)	**8.EE.5:** Graph proportional relationships, interpreting the unit rate as the slope of the graph. Compare two different proportional relationships represented in different ways. For example, compare a distance-time graph to a distance-time equation to determine which of two moving objects has greater speed.	MC, MS, EQ, GI, MA, TI
		8.EE.6: Use similar triangles to explain why the slope m is the same between any two distinct points on a non-vertical line in the coordinate plane; derive the equation y = mx for a line through the origin and the equation y = mx + b for a line intercepting the vertical axis at b.	
		8.EE.7: Solve linear equations in one variable.	
		8.EE.8: Analyze and solve pairs of simultaneous linear equations	
		8.F.1: Understand that a function is a rule that assigns to each input exactly one output. The graph of a function is the set of ordered pairs consisting of an input and the corresponding output.	
		8.F.2: Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions). For example, given a linear function represented by a table of values and a linear function represented by an algebraic expression, determine which function has the greater rate of change.	
		8.F.3: . Interpret the equation y = mx + b as defining a linear function, whose graph is a straight line; give examples of functions that are not linear. For example, the function $A = s^2$ giving the area of a square as a function of its side length is not linear because its graph contains the points (1,1), (2,4) and (3,9), which are not on a straight line.	

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2: **Problem Solving:** Students can solve a range of well-posed problems in pure and applied mathematics, making productive use of knowledge and problem-solving strategies.	**A:** Apply mathematics to solve well-posed problems in pure mathematics and arising in everyday life, society, and the workplace. (2, 3) **B:** Select and use appropriate tools strategically. (1, 2) **C:** Interpret results in the context of a situation. (2) **D:** Identify important quantities in a practical situation and map their relationships (e.g., using diagrams, two-way tables, graphs, flowcharts, or formulas). (1, 2, 3)	**8.F.4:** Construct a function to model a linear relationship between two quantities. Determine the rate of change and initial value of the function from a description of a relationship or from two (x, y) values, including reading these from a table or from a graph. Interpret the rate of change and initial value of a linear function in terms of the situation it models, and in terms of its graph or a table of values.	MC, MS, EQ, GI, MA, TI
		8.F.5: Describe qualitatively the functional relationship between two quantities by analyzing a graph (e.g., where the function is increasing or decreasing, linear or nonlinear). Sketch a graph that exhibits the qualitative features of a function that has been described verbally.	
		8.G.1: Verify experimentally the properties of rotations, reflections, and translations: **a.** Lines are taken to lines, and line segments to line segments of the same length. **b.** Angles are taken to angles of the same measure. **c.** Parallel lines are taken to parallel lines.	
		8.G.2: Understand that a two-dimensional figure is congruent to another if the second can be obtained from the first by a sequence of rotations, reflections, and translations; given two congruent figures, describe a sequence that exhibits the congruence between them.	
		8.G.3: Describe the effect of dilations, translations, rotations, and reflections on two-dimensional figures using coordinates.	
		8.G.4: Understand that a two-dimensional figure is similar to another if the second can be obtained from the first by a sequence of rotations, reflections, translations, and dilations; given two similar two-dimensional figures, describe a sequence that exhibits the similarity between them.	

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3: **Communicating Reasoning:** Students clearly and precisely construct viable arguments to support their own reasoning and to critique the reasoning of others.	**A:** Test propositions or conjectures with specific examples. (2) **B:** Construct, autonomously, chains of reasoning that will justify or refute propositions or conjectures. (3, 4)[1] **C:** State logical assumptions being used. (2, 3) **D:** Use the technique of breaking an argument into cases. (2, 3) **E:** Distinguish correct logic or reasoning from that which is flawed and—if there is a flaw in the argument—explain what it is. (2, 3, 4) **F:** Base arguments on concrete referents such as objects, drawings, diagrams, and actions. (2, 3) **G:** At later grades, determine conditions under which an argument does and does not apply. (For example, area increases with perimeter for squares, but not for all plane figures.) (3, 4)	**8.EE.1:** Know and apply the properties of integer exponents to generate equivalent numerical expressions. For example, $3^2 \times 3^{-5} = 3^{-3} = 1/3^3 = 1/27$.	MC, MS, EQ, GI, MA, TI, ST[1]
		8.EE.5: Graph proportional relationships, interpreting the unit rate as the slope of the graph. Compare two different proportional relationships represented in different ways. For example, compare a distance-time graph to a distance-time equation to determine which of two moving objects has greater speed.	
		8.EE.6: Use similar triangles to explain why the slope m is the same between any two distinct points on a non-vertical line in the coordinate plane; derive the equation y = mx for a line through the origin and the equation y = mx + b for a line intercepting the vertical axis at b.	
		8.EE.7a: Give examples of linear equations in one variable with one solution, infinitely many solutions, or no solutions. Show which of these possibilities is the case by successively transforming the given equation into simpler forms, until an equivalent equation of the form x = a, a = a, or a = b results (where a and b are different numbers).	
		8.EE.7b: Solve linear equations with rational number coefficients, including equations whose solutions require expanding expressions using the distributive property and collecting like terms.	
		8.EE.8a: Understand that solutions to a system of two linear equations in two variables correspond to points of intersection of their graphs, because points of intersection satisfy both equations simultaneously.	
		8.F.1: Understand that a function is a rule that assigns to each input exactly one output. The graph of a function is the set of ordered pairs consisting of an input and the corresponding output.	

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3: **Communicating Reasoning:** Students clearly and precisely construct viable arguments to support their own reasoning and to critique the reasoning of others.	**A:** Test propositions or conjectures with specific examples. (2) **B:** Construct, autonomously, chains of reasoning that will justify or refute propositions or conjectures. (3, 4)[1] **C:** State logical assumptions being used. (2, 3) **D:** Use the technique of breaking an argument into cases. (2, 3) **E:** Distinguish correct logic or reasoning from that which is flawed and—if there is a flaw in the argument—explain what it is. (2, 3, 4) **F:** Base arguments on concrete referents such as objects, drawings, diagrams, and actions. (2, 3) **G:** At later grades, determine conditions under which an argument does and does not apply. (For example, area increases with perimeter for squares, but not for all plane figures.) (3, 4)	**8.F.2:** Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions). For example, given a linear function represented by a table of values and a linear function represented by an algebraic expression, determine which function has the greater rate of change. **8.F.3: .** Interpret the equation y = mx + b as defining a linear function, whose graph is a straight line; give examples of functions that are not linear. For example, the function $A = s^2$ giving the area of a square as a function of its side length is not linear because its graph contains the points (1,1), (2,4) and (3,9), which are not on a straight line. **8.G.1:** Verify experimentally the properties of rotations, reflections, and translations: **a.** Lines are taken to lines, and line segments to line segments of the same length. **b.** Angles are taken to angles of the same measure. **c.** Parallel lines are taken to parallel lines. **8.G.2:** Understand that a two-dimensional figure is congruent to another if the second can be obtained from the first by a sequence of rotations, reflections, and translations; given two congruent figures, describe a sequence that exhibits the congruence between them. **8.G.4:** Understand that a two-dimensional figure is similar to another if the second can be obtained from the first by a sequence of rotations, reflections, translations, and dilations; given two similar two-dimensional figures, describe a sequence that exhibits the similarity between them.	MC, MS, EQ, GI, MA, TI, ST[1]

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Claim	Target/DOK	Standards	Item Types
4: **Modeling and data Analysis:** Students can analyze complex, real-world scenarios and can construct and use mathematical models to interpret and solve problems.	**A:** Apply mathematics to solve problems arising in everyday life, society, and the workplace. (2, 3) **B:** Construct, autonomously, chains of reasoning to justify mathematical models used, interpretations made, and solutions proposed for a complex problem. (2, 3, 4)[1] **C:** State logical assumptions being used. (1, 2) **D:** Interpret results in the context of a situation. (2, 3) **E:** Analyze the adequacy of and make improvements to an existing model or develop a mathematical model of a real phenomenon. (3, 4) **F:** Identify important quantities in a practical situation and map their relationships (e.g., using diagrams, two-way tables, graphs, flowcharts, or formulas). (1, 2, 3) **G*:** Identify, analyze and synthesize relevant external resources to pose or solve problems. (3, 4)	**8.EE.3:** Use numbers expressed in the form of a single digit times an integer power of 10 to estimate very large or very small quantities, and to express how many times as much one is than the other. For example, estimate the population of the United States as 3×10^8 and the population of the world as 7×10^9, and determine that the world population is more than 20 times larger. **8.EE.4:** Perform operations with numbers expressed in scientific notation, including problems where both decimal and scientific notation are used. Use scientific notation and choose units of appropriate size for measurements of very large or very small quantities (e.g., use millimeters per year for seafloor spreading). Interpret scientific notation that has been generated by technology. **8.EE.5:** Graph proportional relationships, interpreting the unit rate as the slope of the graph. Compare two different proportional relationships represented in different ways. For example, compare a distance-time graph to a distance-time equation to determine which of two moving objects has greater speed. **8.EE.6:** Use similar triangles to explain why the slope m is the same between any two distinct points on a non-vertical line in the coordinate plane; derive the equation y = mx for a line through the origin and the equation y = mx + b for a line intercepting the vertical axis at b. **8.EE.7:** Solve linear equations in one variable. **8.EE.8:** Analyze and solve pairs of simultaneous linear equations	MC, MS, EQ, GI, MA, TI, ST[1]

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4: **Modeling and data Analysis:** Students can analyze complex, real-world scenarios and can construct and use mathematical models to interpret and solve problems.	**A:** Apply mathematics to solve problems arising in everyday life, society, and the workplace. (2, 3) **B:** Construct, autonomously, chains of reasoning to justify mathematical models used, interpretations made, and solutions proposed for a complex problem. (2, 3, 4)[1] **C:** State logical assumptions being used. (1, 2) **D:** Interpret results in the context of a situation. (2, 3) **E:** Analyze the adequacy of and make improvements to an existing model or develop a mathematical model of a real phenomenon. (3, 4) **F:** Identify important quantities in a practical situation and map their relationships (e.g., using diagrams, two-way tables, graphs, flowcharts, or formulas). (1, 2, 3) **G*:** Identify, analyze and synthesize relevant external resources to pose or solve problems. (3, 4)	**8.F.4:** Construct a function to model a linear relationship between two quantities. Determine the rate of change and initial value of the function from a description of a relationship or from two (x, y) values, including reading these from a table or from a graph. Interpret the rate of change and initial value of a linear function in terms of the situation it models, and in terms of its graph or a table of values. **8.F.5:** Describe qualitatively the functional relationship between two quantities by analyzing a graph (e.g., where the function is increasing or decreasing, linear or nonlinear). Sketch a graph that exhibits the qualitative features of a function that has been described verbally. **8.G.6:** Explain a proof of the Pythagorean Theorem and its converse. **8.G.7:** Apply the Pythagorean Theorem to determine unknown side lengths in right triangles in real-world and mathematical problems in two and three dimensions. **8.G.8:** Apply the Pythagorean Theorem to find the distance between two points in a coordinate system. **8.G.9:** Know the formulas for the volumes of cones, cylinders, and spheres and use them to solve real-world and mathematical problems. **8.SP.1:** Construct and interpret scatter plots for bivariate measurement data to investigate patterns of association between two quantities. Describe patterns such as clustering, outliers, positive or negative association, linear association, and nonlinear association.	MC, MS, EQ, GI, MA, TI, ST[1]

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Claim	Target/DOK	Standards	Item Types
4: **Modeling and data Analysis:** Students can analyze complex, real-world scenarios and can construct and use mathematical models to interpret and solve problems.	**A:** Apply mathematics to solve problems arising in everyday life, society, and the workplace. (2, 3) **B:** Construct, autonomously, chains of reasoning to justify mathematical models used, interpretations made, and solutions proposed for a complex problem. (2, 3, 4)[1] **C:** State logical assumptions being used. (1, 2) **D:** Interpret results in the context of a situation. (2, 3) **E:** Analyze the adequacy of and make improvements to an existing model or develop a mathematical model of a real phenomenon. (3, 4) **F:** Identify important quantities in a practical situation and map their relationships (e.g., using diagrams, two-way tables, graphs, flowcharts, or formulas). (1, 2, 3) **G*:** Identify, analyze and synthesize relevant external resources to pose or solve problems. (3, 4)	**8.SP.2:** Know that straight lines are widely used to model relationships between two quantitative variables. For scatter plots that suggest a linear association, informally fit a straight line, and informally assess the model fit by judging the closeness of the data points to the line. **8.SP.3:** Use the equation of a linear model to solve problems in the context of bivariate measurement data, interpreting the slope and intercept. For example, in a linear model for a biology experiment, interpret a slope of 1.5 cm/hr. as meaning that an additional hour of sunlight each day is associated with an additional 1.5 cm in mature plant height. **8.SP.4:** Understand that patterns of association can also be seen in bivariate categorical data by displaying frequencies and relative frequencies in a two-way table. Construct and interpret a two-way table summarizing data on two categorical variables collected from the same subjects. Use relative frequencies calculated for rows or columns to describe possible association between the two variables. For example, collect data from students in your class on whether or not they have a curfew on school nights and whether or not they have assigned chores at home. Is there evidence that those who have a curfew also tend to have chores?	MC, MS, EQ, GI, MA, TI, ST[1]

* Denotes that target is measured in Performance Tasks only; Shaded standards denote additional and supporting clusters; [1] Denotes that item type is only applicable to target B; Tables were created using the released item specification tables provided by SBAC published on 2/04/2014.