Instructions

Additional Board Member Suggested Amendments

Date: August 2026

Utah State Board of Education

Following the submission of Board Member recommended amendments during Step 10 of the Standards Revision Process (December/January 2026), the mathematics standards writing committee met multiple times to revise the Draft P-12 Mathematics Standards.

During the January 15, 2026 Board meeting, the Board approved an external review of the Draft P-12 Mathematics Standards. Through a competitive procurement process, WestEd was awarded the contract for this review. The updated Draft P-12 Mathematics Standards were the Standards that WestEd used for their review. The updated Draft P-12 Mathematics Standards and the products of the WestEd review are linked below.

- **Updated Draft Standards based on Step 10 Board Member Suggested Amendments & Writing Committee Review**
  - Draft P-12 Utah Core Mathematics Standards, Step 11 August 2026
  - Draft AGA Secondary Mathematics Standards, Step 11 August 2026
  - Step 10: Writing Committee Response to Board Member Suggested Amendments
- **WestEd Review Documents**
  - Full Final Report
  - Review Rubrics
  - Review Notes/Recommendations by Standard

Instructions for submitting additional recommended amendments based on the WestEd Review of the Draft P-12 Mathematics Standards:

1. Find the tab with your name on it. This will be the space in which you can capture any additional suggested amendments you would like to be considered following your review of the updated draft and the WestEd Report.

2. In your tab, copy and paste the standard code and writing committee wording of the standard that you would like to amend from the Draft P-12 Utah Core Mathematics Standards, Step 11 August 2026 or the Draft AGA Secondary Mathematics Standards, Step 11 August 2026 into the first two columns of the table.

3. Write your proposed amended language into the third column on the table. If needed, include optional notes in the fourth column.

4. The Standards & Assessment Committee will review suggested amendments. It is suggested that Board members submit their amendments for consideration by 5:00 PM on August 21, 2026

Example:

Standard Code (e.g	Step 11 Draft Standard	Suggested Amendment based on WestEd Review	Notes (optional)

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1.OA.1)			
K.CC.3	Use one-to-one correspondence to accurately identify the quantity of objects in a group of 0–20. Understand that the last number stated represents the number of objects counted. (MP 6)	Use one-to-one correspondence to accurately identify the quantity of objects in a group of 0–20. ~~Understand~~ Demonstrate that the last number stated represents the number of objects counted. (MP 6)	Demonstrate was a more measurable verb recommended in the WestEd feedback

Link to P-2 Tracked Changes

Tracked Changes Draft Introduction & P-2 Utah Core Mathematics Standards, Step 11

Jennie Earl

Additional Board Member Suggested Amendments

Utah State Board of Education

Date: August 2026

Standard Code (e.g 1.OA.1)	Step 11 Draft Standard	Suggested Amendment based on WestEd Review	Notes
Overall thoughts	We sacrificed clarity in the standards for continuity in language related to the MP throughout the document. The standards can indicate which MP is related to the standard and use clearer language and developmentally appropriate ways of developing the MPs. "In and out of context" is vague and not clearly defined. I am consistently reading this comment. The terms "flexibly, accurately, and efficiently" are abstract and open to interpretation without examples. I know we are saying the "core guides" will have the examples. When we write assessments, do we use the standards or core guides?		One other note: We need to deal with pages 45-49 in the full West ed document. We are off on our intent with the mathematical practices. I am not going to include every piece here, but we need to make modifications based on their recommendations on these pages. How can we do this?
			I am not going to include every piece here, but we need

			to make modifications based on their recommendations on these pages. How can we do this? Staff Response: Staff considered the recommendations from WestEd mentioned above and recommends the following changes. *Staff recommendation:* Staff recommendation: Mathematical Practice 1: Ask and answer questions to build mathematical knowledge Students formulate questions about mathematical concepts. They build upon their background knowledge to help them clarify, connect, or extend mathematical ideas. During mathematical discourse, students ask questions to deepen their understanding of mathematics.

			Asking questions cultivates students' curiosity about mathematical relationships and helps them refine their understanding. As students build their capacity to ask and answer mathematical questions, they engage in more meaningful discourse about mathematics. When students ask and answer their own questions, they develop skills that help them persevere in mathematical problem solving. *Mathematical Practice 2: Add or remove context to make sense of mathematics* *Students add or remove context to help make sense of mathematical concepts. Students add context by connecting numbers and operations to images, stories, objects, and events. They remove context from a situation by representing the mathematics using numbers, symbols, and equations. This process involves two complementary mathematical*

			skills: 1) decontextualizing—or abstracting a concrete situation by representing it symbolically and manipulating the symbols to arrive at a numerical or symbolic solution—and 2) recontextualizing, or pausing to probe the referents in the original problem during the manipulation and interpreting the numerical or symbolic answer in context. *When students contextualize and decontextualize mathematical concepts, they can make sense of underlying structures to help them solve problems. Quantitative reasoning entails habits of creating a coherent representation of the problem at hand; considering the units involved; attending to the meaning of quantities, not just how to compute them; and knowing and flexibly using different properties of operations and objects.*

			Working in and out of context throughout a learning progression empowers students to make sense of mathematics and persevere as they examine abstract and real-world problems. This process allows students to take their knowledge of mathematics and meaningfully apply it to their lives. Mathematical Practice 3: Construct, justify, and communicate clear and reasonable arguments Students construct arguments explaining mathematical reasoning and assumptions by using known facts, definitions, and procedures to justify a strategy, solution, or conjecture. They justify their reasoning using symbols, words, and concrete referents such as objects, drawings, diagrams, and actions. Through discourse with peers, students examine arguments,

			identify errors or unsupported claims, and refine their reasoning. They listen to or read the arguments of others, decide whether they make sense, ask questions to clarify, improve, or build on their arguments. Constructing, justifying, and communicating arguments fosters a deep understanding of mathematical concepts. By defending their conjectures, and critiquing the reasoning of their peers, students solidify their mathematical understanding and identify potential flaws in their reasoning. Clear communication enables students to articulate their thoughts effectively, enhancing their ability to explain their reasoning to others. Discourse with peers exposes students to diverse perspectives, promoting critical thinking and

			collaborative problem-solving. Mathematical Practice 4: Model with Mathematics Mathematical models use structures to represent relationships. Students build and use verbal, contextual, visual, symbolic, and physical models to represent and make sense of the relationships between quantities in real-world situations and mathematical problems. Students use mathematical models to solve problems in everyday life, society, and the workplace; identifying important quantities; analyzing relationships; drawing conclusions; and revising the model if necessary. This process is distinctive for its cyclic nature, where, starting from a real-world situation, students or modelers formulate a mathematical representation, work through it, and then return to the context to assess the model's

			validity and applicability. Using models enhances student learning by providing students with multiple ways to represent and understand mathematical concepts, connect mathematical concepts to real-world situations, and develop problem-solving skills. Students explore the idea that various models can showcase mathematical thinking in valuable ways. Using multiple models helps students notice the connections between mathematical structures and promotes the development of mathematical generalizations that can be leveraged as tools to make sense of and persevere in solving novel problems. Mathematical Practice 7: Describe and represent structures, patterns, and relationships Students describe and

			represent structures, patterns, and relationships to make sense of mathematics. While engaging in mathematical tasks, students make generalizations about the structure of numbers and become more flexible and efficient in applying mathematical concepts. They can see complicated things, such as the place value system and some algebraic expressions, as single objects or as being composed of several objects. Students demonstrate these skills when they identify patterns and make connections across mathematical ideas. Students notice when calculations are repeated, look for general methods and shortcuts, and abstract patterns into algebraic rules. Analyzing these relationships allows students to bridge the gap between concrete

			observations and abstract reasoning. Mathematical Practice 8: Make conjectures and evaluate the results Students make mathematical generalizations by observing patterns, proposing conjectures, and testing their validity against known facts, definitions, and procedures. Making mathematical conjectures involves a rigorous metacognitive process. Students make sense of the mathematical situation, make a claim, monitor and evaluate progress, change course if necessary, persevere when stuck, and check answers using a different method. Developing and assessing conjectures encourages active engagement and critical thinking. Students formulate conjectures, test them, and refine their understanding

			based on the outcomes. This iterative process fosters a deeper understanding of underlying mathematical principles. It promotes curiosity, students' ownership of their learning, and the development of positive mathematical identities.
P3.CC.1 1 1	Recite number names in sequence to 10, ~~attending to structure and precise language.~~ (MP6,7)	Too Vague	Left reference to the Mathematical Practices
P3.CC.2 0 1	Begin to recognize that written numbers represent a quantity. Use a variety of *tools* to *build and model* numbers. (MP 4, 5)	Too Broad Non-observable verb	* *Staff recommendation: Match written numerals to a given quantity 1-5. Use tools to build and model numbers. (MP 4-5)*
P3.CC.4 1 1	~~Begin to~~ use *accurate* number names to identify the number of objects in a group of up to 5 objects, ~~recognizing that~~ identifying the last number in a count ~~represents~~ as	Non observable lacks performance expectation Vague/ambiguous language	Observable *Staff recommendation: Count a group of up to 5 objects using accurate number*

	the total number of objects (MP6)		*names, and identify that the last number named tells the total quantity counted (cardinality). (MP 6)*
P3.CC.5 1 1	P3.CC.5 ~~With support,~~ identify whether the number of objects in one group is the same as those in another group for sets of up to 4 objects, by saying the "same number". ~~using *precise* mathematical language~~. (MP6)	Too vague; Poorly specified Vague Ambiguous language	• Measurable-clear-references MP-6 *Staff recommendation: Identify whether the number of objects in one group is the same as those in another group for sets of up to 4 objects. (MP 6)*
P3.CC.6 1 1	Identify whether an object is "first" or "second" in a sequence by noticing ordinal structure and use these ~~Begin to recognize~~ ordering words in everyday *contexts*. (MP 2)	Unclear hard to measure "begin to recognize" Vague/ambiguous language	*Staff recommendation: Identify whether an object is "first" or "second" in a sequence. Use ordinal terms (e.g. "first", "second") in everyday contexts. (MP 6)*
P3.CC.7 1 1	P3.CC.7 Subitize quantities up to 3 using *patterns and structures*. (MP 7)	Non-observable verb While term "subitize" is a technical math term that may not be familiar to parents or some educators without explanation, it is appropriate and precise language for PK standards. The phrase "using patterns and structures" however is vague and does not clearly describe what students should do or what this looks like in practice.	* *Staff recommendation: Name the number without counting each object (subitize) for quantities up to 3. (MP 7)*

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P3.OA.1 1 1	*Describe* and *model* simple *patterns* in the environment and begin to duplicate and extend those patterns. (MP 4, 7)	Poorly specified; Lacks performance expectation; Too vague The phrase “begin to” is vague and does not clearly define the expected level of performance. “Simple patterns” is not defined (e.g., repeating AB patterns), which may lead to varying interpretations. “Model” could be interpreted in different ways without clarification. “Describe” can vary in rigor (poorly specified). "Simple patterns" is vague. "Begin to" makes the performance threshold unclear (how much accuracy or independence counts as “beginning”?). More accessible language than "duplicate" and "extend" patterns could be used.	*Staff recommendation: Describe repeating patterns in the environment. Duplicate and extend those patterns. (MP 7)*
P3 across all the P3 standards	Remove “with prompting and support”	Vague "With prompting and support" is vague.	This is not necessary in preschool standards we need to simply say what we want children at that age to be able to do
P3.MG.2 1 1	With prompting and support, identify, *describe*, and *represent* basic shapes and their attributes. (MP 7)	"With prompting and support" is vague. “Describe” can vary in rigor (poorly specified). Teachers/ other stakeholders will likely have to make an inference about "represent"	
P3.D.1			*Vertical alignment* *Staff recommendation: Ask*

			questions about people or objects in the classroom and represent the data. (e.g. Build a class pictograph to answer the question "What is our favorite weather?") (MP 1)
P3.D.2 1 1	~~With prompting and support~~, collect and sort data or objects by attribute (color, shape, size, etc), ~~and~~ B*uild ~~data models~~*.real object and pictographs with the data (MP 4)	"With prompting and support" is vague. "Build data models" is vague.	Staff ? *Staff recommendation: Collect and sort data or objects by attribute (shape, size, etc). (MP 1)*
P3.D.3 1 1	~~With prompting and support,~~ *accurately* count the number of objects or data points in each category (no more than five objects per category). (MP 6)	Vague/ambiguous language	
P4.CC.1 1 1	~~With support~~, *accurately* recite number names and the counting sequence to 20. (MP 6)	Too vague; Poorly specified Vague/ambiguous language	
P4.CC.2 1 1	Associate quantities with written numerals up to 10. Begin to form numerals and use a variety of *tools* to represent quantities. (MP 5)	"Begin to form" and "use a variety of tools" are poorly specified/ vague. Vague/ambiguous language	*Staff recommendation: Associate quantities with written numerals up to 10. Practice forming numerals and use tools to represent quantities. (MP 5)*
P4.CC.4	Use *accurate* number names to identify the number of objects in a group of up to 10~~, recognizing that the last number in a count represents the total number of objects~~. (MP 6)	While "recognizing that" is an internal, non-observable phrase, "recognizing that the last number in a count represents the total number of objects" is essentially a different way of saying "Use accurate number names to identify the number of	*Staff recommendation: Use accurate number names to identify the number of objects in a group of up to 10. Explain that the last number in a count is the total number of objects.*

		objects in a group of up to 10" which is measurable and specific.	
P4.CC.6	Identify whether an object is "first" or "second", “third”, or “last” in a sequence by noticing ordinal structure and use these terms to ~~Begin to recognize~~ order~~ing~~ words in everyday *contexts*. (MP 2)	The phrase “begin to” is vague and does not clearly define the expected level of performance.	*Staff recommendation: Identify and state whether an object is “first,” “second,” “third,” or “last” in a sequence. Apply ordering words to everyday contexts. (MP 2)*
P4.CC.7 1 1	~~Use *patterns* and *structures* to~~ recognize groups without counting ~~(~~subitize) quantities of up to five. (MP 7)	Again, while the term “subitize” is specialized mathematical vocabulary that may not be familiar to parents or some educators without explanation, it is appropriate and precise language for describing the PE. However, the phrase “patterns and structures” is vague and does not clearly describe what students should actually do (e.g., recognize groups without counting, see arrangements like dice patterns).	*Staff recommendation: Name the number without counting each object (subitize) for quantities of up to five. (MP 7)*
P4.OA.1	~~*Build and use models* to~~ represent real-world situations involving addition (adding to or putting together) and subtraction (taking from or taking apart) with numbers up to and including 5. (MP 4)	"Build and use models" is not specific enough to know what the PE is	This honors the changes made by the committee and the ambiguous language recognized by WestEd *Staff recommendation: Use concrete and/or pictorial models to represent real-world situations involving addition (adding to or putting together) and subtraction (taking from or*

			taking apart) with numbers up to and including 5. (MP 4)
P4.OA.2 1 on developmental	Decompose numbers less than or equal to five using *a variety of models* ~~and explain why a number or set of objects can be broken apart in multiple ways. (MP 4, 8)~~ Or Decompose numbers less than or equal to 5 using quantities from 0-5.	…and explain why a number or set of objects can be broken apart in multiple ways" introduces reasoning that exceeds Pre-K expectations. It requires causal or structural reasoning about number systems, generalized understanding of number composition, and language-based justification of mathematical structure.	Staff *Staff Recommendation: Decompose numbers less than or equal to five using a variety of models (e.g. objects, drawings, fingers) and demonstrate that a number or set of objects can be broken apart in multiple ways. (MP 4)*
P4.OA.4 1 1	Create, duplicate, and extend simple repeated *patterns*. (MP 7)	"Simple patterns" is vague. I would specify the type of pattern (repeating patterns are most developmentally appropriate) and the appropriate pattern units which is what "simple" is hinting at.	*Staff recommendation: Create, duplicate, and extend repeating patterns. (MP 7)*
P4.MG.2 1 clarity 1 on developmental	Compare ~~the~~ measurable attributes of two objects including longer/shorter, same length; heavier/lighter same weight;holds more/less, holds the same amount.	"making and testing conjectures" introduces formal mathematical reasoning structures that are not appropriate for Pre-K. This implies hypothesizing general rules, systematic testing of claims, and abstract reasoning beyond observation. Pre-K students can predict, compare, and describe through perception and manipulation, but do not engage in structured hypothesis-testing or generalization. This language could lead teachers and parents to skip/ ignore the standard and inadvertently skip supporting Pre-K students with practicing the developmentally appropriate aspects	Agree with WestEd. I pulled some of Massachusetts language over because of the measurable attributes. *Staff recommendation: Compare two objects. Use measurable attributes to justify the comparison. (e.g. My friend has more crackers than me because his pile is bigger.) (MP 3)*

		of the standard. The term “making and testing conjectures” is abstract and may not be accessible for all educators or parents, especially at early grade levels. It is also not clear what it means to "compare measurable attributes of objects by making and testing conjectures." The "making and testing conjectures" language is unnecessary and creates clarity issues. lead teachers and parents to skip/ ignore the standard and inadvertently skip supporting Pre-K students with practicing the developmentally appropriate aspects of the standard.	
P4.MG.4	Use names of shapes to describe objects in the environment. Identify the relative positions of these objects *accurately* using terms such as above, below, beside, in front of, behind, and next to. (MP 6)	Using shape names to describe objects is a distinctly different PE than using prepositional terms like "above, below," etc.	Two standards *Staff recommendation: Identify the relative positions of objects in the environment accurately using terms such as above, below, beside, in front of, behind, and next to. (MP 6)*
P4.MG.5 1 1	Create basic shapes using *a variety of tools*. ~~With support,~~ combine basic shapes to create new shapes. (MP 5)	“With support” is unclear and does not define the type or level of assistance expected.	
P4.D.1 1 1	~~With prompting and support~~, *ask questions* about a given topic that lead to collecting, analyzing, and interpreting data gathered within the classroom. (MP 1)	"With prompting and support" is vague. "that lead to data collection” is not clearly measurable. The phrase “with prompting and support”	*

		is vague and does not define what type or level of assistance is expected; "that lead to collecting, analyzing, and interpreting data" may be difficult to interpret.	
P4.D.2 1 1	Collect and sort data or objects organized by attribute (color, shape, size, etc). ~~With prompting and support~~ *build ~~data~~ models with the data or objects*. (MP 4)	The phrase "with prompting and support" is vague and does not define what type or level of assistance is expected; "that lead to collecting, analyzing, and interpreting data" may be difficult to interpret. "With prompting and support" is vague.	*Staff recommendation: Collect and sort data or objects organized by attribute (e.g. color, shape, size). (MP 4)*
P4.D.3 1 1	With prompting and support, analyze data by *accurately* counting the number of objects or data points in each category. (MP 6)	"With prompting and support" is vague. The phrase "with prompting and support" is vague and does not define what type or level of assistance is expected; "that lead to collecting, analyzing, and interpreting data" may be difficult to interpret.	*Staff recommendation: Analyze data by accurately counting the number of objects or data points in each category. (MP 6)*
P4.D.4 1 1 1 developmental	~~With prompting and support,~~ interpret data to identify and ~~*justify*~~ explain which groups contain more, less, or the same amount. (MP 3)	Justifying their interpretation is not developmentally appropriate. Perhaps, a less formal/ broad term could be used to better capture the intent of the standard while being more developmentally appropriate. They can sometimes explain informally ("this one has more because I counted more"), but not construct structured justifications as arguments. "Justify" implies giving evidence-based explanations, structured	*Staff Recommendation: Ask questions about a given topic that can be answered by collecting data as a class.*

		mathematical reasoning, and explicit claim–evidence communication.	
K..CC.1	*Accurately* recite numbers in sequence from 1 to 100 by ones and tens. *Accurately* count backward from 10. Attend to patterns in tens and ones. ~~the counting *structure*~~. (MP 6, 7)	The phrase "attend to the counting structure" is abstract and does not clearly describe what students should notice or do (e.g., patterns in tens and ones).	*Staff recommendation: Accurately recite numbers in sequence from 1 to 100 by ones and tens. Accurately count backward from 10. (MP 6, 7)*
K.CC.2	*Accurately* count forward from a given number between 1 and 100. Attend to patterns in tens and ones.~~the *counting structure*~~. (MP 6, 7)	The phrase "attend to the counting structure" is abstract and does not clearly describe what students should notice or do (e.g., patterns in tens and ones).	
K.CC.3	Use one-to-one correspondence to *accurately* identify the quantity of objects in a group of 0–20. ~~Understand~~ Demonstrate that the last number stated represents the number of objects counted. (MP 6)	"Understand that the last number stated represents the number of objects counted": While this understanding can be inferred through performance, it is not explicitly stated in measurable terms (e.g., explain, demonstrate, justify).	Staff recommendation: Use one-to-one correspondence to *accurately* identify the quantity of objects in a group of 0–20. Explain that the last number stated represents the number of objects counted. (MP 6)
K.CC.8 1 1	recognize groups without counting ~~(~~subitize) quantities of up to 10. (MP 7)	The term "subitize" is technical and may not be familiar to all users, especially parents. The phrase "patterns and structures" is abstract and does not clearly describe what students should do (e.g., recognizing groups like dots on a ten-frame or dice).	Staff recommendation: Use visual *patterns and structures* (e.g. five frames, ten frames, dice, fingers) to subitize (name the number without counting each object) quantities up to 10. (MP 7)

K.OA.1		A simpler term could be used instead of "minuends"	Staff recommendation: Represent addition and subtraction within 10 *using a variety of tools and models*. *Attend to the precision and reasonableness* of results. (MP 4, 5, 6)
K.OA.2	~~Add or remove context~~	The phrase "add or remove context" may be interpreted in different ways. Additionally, terms such as "result unknown," "total unknown," "minuend", and "both addends unknown" are appropriate mathematical terminology but may require familiarity with word-problem taxonomies to be readily understood.	Check later Staff recommendation: *Build and use models* to solve addition and subtraction word problems within 10. Solve problem type situations of adding to and taking from with result unknown, putting together with the total unknown, and putting together with both addends unknown. (MP 2, 4) *Staff Response: The writers felt strongly that it was important to include problem types in the OA standards to provide clarity for educators and parents. We could include an appendix to the standards with a table providing more explanation about what each problem type entails. There is currently a problem type table*

			on page 13 of the first grade Core Guide.
K.OA.3 1 1 developmental	Compose and decompose numbers less than or equal to 10 in multiple ways *using a variety of models*. Make sums to 10 using numbers 1-9. ~~*Make conjectures*~~ *Recognize patterns* about why a number or set of objects can be broken apart in multiple ways~~.~~ (MP 4, 8)	While Kindergarten students can notice patterns, try different decompositions, and talk about what they see with guidance, they are not developmentally expected to form general mathematical claims ("conjectures"), reason about why decomposition is structurally always possible in abstract terms, or engage in MP8-style generalization beyond noticing patterns.	Staff recommendation: Compose and decompose numbers less than or equal to 10 in multiple ways *using a variety of models*. Make sums to 10 using numbers 1-9. *Explain* why a number or set of objects can be broken apart in multiple ways. (MP 4, 8)
K.OA.4 1 1	Use strategies to add and subtract *flexibly, accurately, and efficiently* using numbers less than or equal to 5. (MP 6) fluently add and subtract within 5, including 0	The terms "flexibly, accurately, and efficiently" are abstract and open to interpretation without examples. The word "strategies" is broad and does not specify which strategies students should use. The standard does not specify which strategies or how they should be demonstrated. "Flexibly" and "efficiently" are subjective and undefined, making them difficult to assess consistently without explicit criteria.	*flexibly, accurately, and efficiently* This is a recurring theme throughout the document. Staff recommendation: Use strategies to add and subtract *fluently* within 5. (MP 6)
K.MG,1	Describe several measurable attributes of a single object (e.g., length and weight), ~~*attending to precision and reasonableness*~~. Compare two objects with a common measurable attribute to see which object has "more of"/ "less of" the attribute, and *justify the results*. (MP 3, 6)	The phrase "attending to precision and reasonableness" is abstract and does not clearly describe observable student actions.	

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K.MG.5	Recognize that clocks are tools used to measure and show time. Connect the use of clocks to daily routines and events. *Recognize structures* and features of clocks. (MP 7)	Non-observable verb Recognize	Staff recommendation: Connect the use of clocks to daily routines and events. *NameRecognize structures* and features of clocks. (MP 7)
K.D.1 1 1	*Ask questions* ~~as a class~~ about a given topic that can be answered by ~~will lead to~~ collecting, analyzing, and interpreting data gathered within the classroom. (MP 1)	The phrase "ask questions…that will lead to collecting, analyzing, and interpreting data" is complex and does not clearly describe what kinds of questions students should ask. The role of individual students vs. the class is somewhat unclear.	Still seems a very high level skill. Staff recommendation: Ask questions about a given topic that can be answered by collecting data within the classroom. (MP 1)
K.D.3	Analyze data by comparing category ~~observing~~ *patterns and structures* in data models. *Accurately* count the number of objects or data points in each category. (MP 6, 7)	The phrase "analyze data by observing patterns and structures" is abstract and does not clearly describe what students should do (e.g., compare categories, identify most/least).	Staff recommends: Analyze data by describing *patterns and structures* in data models. (e.g. compare categories, identify most/least). *Accurately* count the number of objects or data points in each category. (MP 6, 7)
K.D.4 1 Developmental	Interpret data to identify and ~~*justify*~~ *explain* which groups contain more, less, or the same amount by comparing the number in each category. (MP 3)	Kindergarteners can interpret data to identify which group contains more or less; however, justifying their interpretation beyond that is not developmentally appropriate. Perhaps, a less formal/ broad term could be used to better capture the intent of the standard while being more developmentally appropriate. They can sometimes explain informally ("this one has more because I counted more"), but not	

		construct structured justifications as arguments. "Justify" implies giving evidence-based explanations, structured mathematical reasoning, and explicit claim–evidence communication.	
1.OA.1		Phrases like “minuends” and “unknowns in all positions” are precise and appropriate, but are also technical and may not be easily understood by parents or some educators.	Staff recommendations: *Build and use models* to solve addition and subtraction word problems within 20. Solve problem type situations of adding to, taking from, putting together, taking apart, and comparing with unknowns in all positions. (MP 2, 4) *Staff Response: The writers felt strongly that it was important to include problem types in the OA standards to provide clarity for educators and parents. We could include an appendix to the standards with a table providing more explanation about what each problem type entails. There is currently a problem type table on page 13 of the first grade Core Guide.*
1.OA.2	*Build and use models to solve story problems involving adding three whole*	It is not clear what is meant by "add or remove context to make sense of problems and solutions" in terms of a	*Staff recommendation: Build and use models to solve word problems involving adding*

	numbers with sums less than or equal to 20. Add or remove context to make sense of problems and solutions. (MP 2, 4)	clear performance expectation.	*three whole numbers with sums within 20. (MP 2, 4)*
1.OA.3 1 developmental	~~*Make and test conjectures about*~~ Demonstrate an understanding of the properties of addition. *Add context* to make sense of these properties as strategies to add and subtract. (MP 2, 8)	Grade 1 students can notice patterns, test examples, and describe what they see, but engaging in formal conjecture testing as a reasoning structure is not a developmentally appropriate expectation. - Jargon "Make and test conjectures" is appropriate and precise language, but may be unfamiliar to some parents & educators. Examples could help here. Jargon	This process of testing examples in early grades leads to the skill of testing conjectures in the upper grades. Staff? *Staff recommendation: Use the properties of addition to examine patterns in addition and subtraction. Test examples and non-examples of these properties in equations and story contexts. (MP 2, 8)*
1.OA.4	*Describe and represent subtraction as an unknown-addend problem. Determine the unknown whole number in an addition or subtraction equation relating three whole numbers, and justify the results. (MP 3, 7)*	The phrase “unknown-addend problem” is appropriate and precise, but also technical and may not be easily understood without explanation (e.g., thinking of subtraction as “what number plus ___ equals the total”).	*Staff recommendation: Describe and represent subtraction as an unknown-addend problem (e.g., thinking of subtraction as “what number plus ___ equals the total”). Determine the unknown whole number in an addition or subtraction equation relating three whole numbers, and justify the results. (MP 3, 7)*

			Staff Response: The writers felt strongly that it was important to include problem types in the OA standards to provide clarity for educators and parents. We could include an appendix to the standards with a table providing more explanation about what each problem type entails. There is currently a problem type table on page 13 of the first grade Core Guide.
1.OA.5 1 1	*Describe structures* and relationships by using number lines and counting sequences to connect counting to addition and subtraction. (MP 7)	The phrase "describe structures and relationships" is abstract and does not clearly define what students should actually do. It is unclear what specific structures (e.g., number line, counting sequence) or relationships are expected.	Staff? *Staff Response: We incorporated your suggestion.*
1.OA.6	*Add and subtract with sums and minuends less than or equal to 20. ~~Connect and justify different strategies for addition and subtraction.~~ Apply place value understanding and properties of operations (MP 3)*	While the term "minuends" is appropriate and precise, it is also technical and may not be familiar to parents or all educators. The phrase "connect and justify different strategies" is somewhat abstract and does not clearly describe what students should do in practice.	Staff? *Staff recommendation: Add and subtract within 20. Apply different strategies for addition and subtraction and explain the strategy using place value understanding, the relationship between addition and subtraction, and properties of addition. (MP 3)*
1.OA.7	*~~Use strategies to~~ add and subtract flexibly, accurately, and efficiently with*	The terms "flexibly, accurately, and efficiently" are somewhat abstract and	This is the last standard in this section. The outcome should

1 1	*sums and minuends less than or equal to 10. (MP 6)*	open to interpretation without clear definitions or examples. The word "strategies" is broad and does not specify what strategies students are expected to use (e.g., counting on, using objects, making 10).	be the ability to simply add and subtract numbers up to and including 10. Why did we make it so complex? Other standards in other states go up to 20. "Add and subtract within 20" *Staff Response: First grade students are practicing addition and subtraction within 20, but the fluency expectation for first grade is within 10. The fluency expectation for second grade is to be fluent with addition and subtraction within 20. This is typical across US state standards.* *Staff recommendation: Add and subtract fluently within 10. (MP 6)*
1.OA.8	*Build and use models to ~~make sense of the meaning of the equal sign.~~ show that the equal sign means both sides have the same value. Decide and explain ~~Make and test conjectures regarding~~ whether addition and subtraction equations are true or false. (MP 4, 8)*		*Staff recommendation: Build and use models (e.g. objects, drawing, equations) to understand the meaning of the equal sign. Demonstrate that both sides of an equation have equal value. Use evidence to explain whether addition and subtraction equations are true or false. (MP 4, 8)*

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1.NBT.4 1 1	*Build and use concrete and pictorial models to determine the sum of two two-digit numbers, a two-digit number and a one-digit number, and a two-digit number and a multiple of ten (less than or equal to 90). Use the models to represent and describe the structure of combining tens with tens, ones with ones, and composing ten ones to make a ten. Ask questions to compare concrete and pictorial models. (MP 4, 7, 8)* *Use concrete objects and drawings to find sums involving two-digit numbers, one-digit numbers, and multiples of ten up to 90. Explain how the model shows adding tens to tens, ones to ones, and making a new ten from ten ones. Compare concrete objects and drawings by describing how they show the same addition strategy. (MP 4, 7, 8)*	The statement is long and dense, combining multiple expectations into one, which reduces clarity. Phrases like "describe the structure of combining tens with tens, ones with ones" may be difficult to unpack without examples. "Ask questions to compare concrete and pictorial models" is vague and unclear in terms of what students should actually do.	Staff *Staff recommendation: Use concrete and pictorial models to find sums involving two-digit numbers, one-digit numbers, and multiples of ten up to 90. Explain how the model demonstrates combining tens with tens, ones with ones, and how it is sometimes necessary to group ten ones to make a ten. Compare concrete and pictorial models. (MP 4, 7)*
1.NB.5 1 1	*Build and use concrete and pictorial models* to subtract a multiple of ten from a larger multiple of ten. ~~*Ask questions to*~~ *compare* concrete and pictorial models based on place value,	"Ask questions to compare concrete and pictorial models" is too broad to be measurable, and also a distinctly different PE.	Staff *Staff recommendation: Use concrete and pictorial models based on place value, properties of operations,*

	properties of operations and the relationship between addition and subtraction explain the reasoning used.. (MP 1, 7) numeric solutions and explain the reasoning used.	is vague and unclear about what kinds of questions students should ask or what comparisons they should make.	*and/or the relationship between addition and subtraction to subtract a multiple of ten from a larger multiple of ten. Compare concrete and pictorial models; relate the model to a numerical method and explain the reasoning used. (MP 4, 7)*
1.MG.2 1 1	~~*Construct a reasonable argument about the*~~ *order* ~~*of*~~ *three objects sorted by length (. Compare the lengths of two objects indirectly using a third object and justify the results. (MP 3)*	Stakeholders will need to make an inference about what is "reasonable" and perhaps even what counts as an argument for this grade level. Insufficient guidance to understand PE Poorly specified Stakeholders will need to make an inference about what is "reasonable" and perhaps even what counts as an argument for this grade level.	* The original was about the "reasonable argument" the focuses on the length of the objects Staff recommendation: Order of three objects by length. Compare the lengths of two objects indirectly using a third object and *justify the results.* (MP 3)
1.MG.3	*Tell and write time in hours and half-hours using analog and digital clocks, attending to precision and reasonableness. (MP 63)*	The phrase "attending to precision and reasonableness" is abstract and does not clearly describe what students should demonstrate. Should "MP 63" be "MP 6" or "MP 6 and 3"? Insufficient guidance to understand PE; Unclear grammar/typo(s)	Staff recommendation: Tell and write time in hours and half-hours using analog and digital clocks. (MP 6)
1.MG.4	*Describe attributes of and identify common U.S. coins.* ~~*Attend to*~~	"Attend to precision" is non-observable.	Staff recommends: Describe

11	~~*precision*~~ *Accurately* ~~*when*~~ *representing their comparative values and use appropriate notation (5¢). (MP 6)*		attributes of and identify common U.S. coins.Represent their comparative values and *use appropriate notation* (5¢). (MP 6)
1.MG.5	*Ask questions to distinguish between defining and non-defining attributes of shapes (e.g. number of sides vs. color). Given defining attribute(s), build and draw shapes that possess the defining attribute. (MP 1)*	The terms “defining” and “non-defining attributes” are important but may not be easily understood without examples (e.g., number of sides vs. color). Jargon	
1.MG.6	*Use structures, patterns, and relationships to create a composite shape formed by two- and three-dimensional shapes and compose new shapes from the composite shape. (MP 7)* *Combine two-dimensional shapes, such as triangles, rectangles, or squares, and three-dimensional shapes, such as cubes, cones, or cylinders, to make a larger shape. Describe the smaller shapes used and explain how they form the larger shape. Create new shapes by taking apart or rearranging the larger shape. (MP 7)*	Jargon; Insufficient guidance to understand PE "Composite shape" is appropriate and precise language but may be unfamiliar to some without examples. It is not clear what is meant mathematically by "Use structures, patterns, and relationships to create a composite shape..."	Staff recommendation: Combine two-dimensional shapes (e.g. rectangles, squares, trapezoids, triangles, half circles, quarter circles) to create two-dimensional composite shapes; combine three-dimensional shapes (cubes, rectangular prisms, cones, and cylinders) to create three-dimensional composite shapes. Describe how the smaller shapes *form the structure* of the larger composite shape. (MP 7)

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1.D.1	*Determine a topic question and ask investigative questions that will lead to collecting, analyzing, and interpreting data within the context of the classroom. (MP 1)* *Choose a topic and write questions about it that can be answered by collecting data in the classroom. (MP 1)*	The phrase "determine a topic question" is vague and may not clearly distinguish between a general topic and a specific question. "Investigative questions" is somewhat abstract and may not be easily understood without examples.	Staff *Staff recommendations: Choose a topic and ask questions* that can be answered by collecting data within the context of the classroom. (MP 1)
1.D.3	*Analyze data sets and data visualizations with up to three categories. Ask questions to make sense of the data representation. (MP 1)*	The phrase "investigative questions" is somewhat abstract and not clearly defined.	*Staff recommendations: Analyze data sets and data visualizations with up to three categories. Ask and answer questions to make sense of the data representation (e.g. How many data points are there? How many in each category? How many more or less are in one category than another?). (MP 1)*
1.D.4 1 development	*Interpret data to answer ~~investigative~~ simple questions (e.g. which has more, the same amount, or what is the difference). ~~Construct and justify arguments about the data.~~ (MP 3)*	Grade 1 students can interpret data (answering simple questions like which has more and read simple graphs), but "Construct and justify arguments about the data" is more appropriate for later	Staff *Staff recommendations: Interpret data that answers*

al		grades. The phrase “investigative questions” is somewhat abstract and not clearly defined.	*investigative questions. Explain trends or patterns in the data. (MP 3)*
2 OA.1 1 1	*Build and use models to solve one-step addition and subtraction story problems with sums and minuends less than or equal to 100, and two-step addition and subtraction story problems with sums and minuends less than or equal to 20. Add or remove story context to solve problem type situations with unknowns in all positions while attending to the meaning of the equal sign. (MP 2, 4)*	While terms like “minuends” & “unknowns in all positions” are appropriate and precise, they are technical and may not be familiar and accessible to all. The phrase “attending to the meaning of the equal sign” is important but not clearly explained. The standard is very long and dense, combining many expectations (one-step, two-step, modeling, context, unknowns, equal sign). "Attending to" isn't an observable behavior.	No suggestion at this time. Just not clear and wordy *Staff Response: The writers felt strongly that it was important to include problem types like “unknowns in all positions” in the OA standards to provide clarity for educators and parents. We could include an appendix to the standards with a table providing more explanation about what each problem type entails. There is currently a problem type table on page 13 of the first grade Core Guide.* *Staff recommendation: Build and use models to solve one-step addition and subtraction word problems within 100 and two-step addition and subtraction word problems within 20. Solve problem type situations with unknowns in all positions. (MP 2, 4)*

2.OA.2 1 1	*Use strategies and properties to add and subtract flexibly, accurately, and efficiently with sums and minuends less than or equal to 20. Know from memory all sums of two one-digit numbers. (MP 6)*	"Know from memory"; "Flexibly" and "efficiently" are subjective and undefined, making them difficult to assess consistently without explicit criteria. "Use strategies and properties" is also too broad to be measurable. Vague/ambiguous language; Insufficient guidance to understand PE Because the terms “strategies and properties” are broad and not defined (e.g., counting on, making ten, commutative property), the PE is vague and unclear. The phrase “flexibly, accurately, and efficiently” is abstract and does not clearly describe observable student actions. The term “minuends” is technical and may not be easily understood by parents.	*Staff recommendation: Add and subtract fluently within 20. Explain mental strategies for addition and subtraction within 20 based on place value understanding, the relationship between addition and subtraction, and properties of operations. (MP 6)*
2.OA.4	*Build and use models involving repeated addition to determine the total number of objects in rectangular arrays with up to 5 rows and up to 5 columns. Describe and represent the structures and patterns of the arrays, including evaluating ~~Make and evaluate conjectures about~~ whether the sums are the same when adding by row or column. (MP 4, 7, 8)*	The statement is long and combines multiple expectations (modeling, describing patterns, making conjectures), which reduces clarity. Phrases like “describe and represent the structures and patterns” are abstract and not clearly defined. “Make and evaluate conjectures” may not be accessible without explanation.	*Staff recommendation: Build and use models of repeated addition to determine the total number of objects in rectangular areas with up to 5 rows and up to 5 columns. Describe and represent the structures and patterns of the arrays. Evaluate whether the sums are the same when adding by row or column. (MP*

			4, 7, 8)
2.NBT.2	*Count within 1,000, making conjectures about counting patterns; Skip-count by twos, fives, tens, and hundreds. (MP 8)*	The term "conjectures" while appropriate may be unfamiliar to many. Jargon	*Staff recommendation: Count within 1,000. Skip-count by twos, fives, tens, and hundreds. Make conjectures and predictions about counting patterns. (MP 8)* *Staff response: the writing committee felt strongly that including conjectures and patterns in this standard helped give purpose to skip counting and connects it as a pre-requisite skill to support early multiplication.*
2.NBT.5 1 1	*Use numerical strategies to determine the sum of up to four two-digit numbers, and the difference of two two-digit numbers flexibly, accurately, and efficiently. Justify a chosen strategy using the relationship between addition and subtraction, properties of addition, and/or place value language. (MP 3, 6)*	"Flexibly" and "efficiently" are subjective and undefined, making them difficult to assess consistently without explicit criteria.	Staff *Staff recommendation: Use numerical strategies to fluently add and subtract within 100. Justify the strategy using place value understanding, the relationship between addition and subtraction, and/or properties of addition. (MP 3, 6)*
2.NBT.6		The term “minuends” while appropriate is technical and may not be accessible to all users. The statement is very long and dense, combining multiple skills (modeling,	*Vertical alignment* *Staff recommendation: Build and use concrete and pictorial models to determine the sums and differences of three-digit*

		place value reasoning, questioning, strategy comparison).	*numbers within 1,000. Explain how the model demonstrates combining hundreds with hundreds, tens with tens, ones with ones, and how it is sometimes necessary to compose and decompose tens and hundreds. Ask questions to compare concrete and pictorial models with efficient numerical strategies.*
2.MG.3	*Construct, justify, and communicate clear and reasonable arguments when estimating lengths using inches, feet, centimeters, and meters. (MP 3)* *Estimate lengths using inches, feet, centimeters, and meters, and explain why the estimate is reasonable by comparing it to a known length, benchmark, or measurement tool. (MP 3)*	It is unclear what qualifies as a "reasonable argument" at this level.	Staff *Staff recommendation: Estimate lengths using inches, feet, centimeters, and meters. Justify why the estimate is reasonable by comparing it to a known length, benchmark, or measurement tool. (MP 3, 6)*
2.MG.5 1 1	*Build and use a number line diagram with equally spaced points labeled ~~corresponding to the numbers~~ 0, 1, 2 and so on,as a model to represent whole numbers as lengths from zero. ~~Strategically~~ use an open number line as a tool to model and solve whole-number addition and subtraction*	"Strategically use an open number line" is vague—what "strategically" means is not defined; " 0, 1, 2,... as a model" is also grammatically weird	*Staff recommendation:Build and use a number line diagram with equally spaced points labeling 0, 1, 2,... as a model to represent whole numbers as lengths from zero.*

	equations and word problems within 100. (MP 4, 5)		*Use an open number line as a tool to model and solve whole-number addition and subtraction equations and word problems within 100. (MP 4, 5)*
2.MG.6 1 1	*Attend to precision when telling and writing time to the nearest five minutes. Add context to determine when to use a.m. and p.m.~~, attending to reasonableness.~~ (MP 2, 6)*	The phrases “attending to reasonableness” and "add context" are abstract and does not clearly define what students should do.	*Staff recommendation: Attend to precision when telling and writing time to the nearest five minutes. Use context to determine when it is reasonable to use a.m. or p.m. (MP 2, 6)*
2.MG.7			Clarity of language *Staff recommendation: Solve word problems involving dollar bills, quarters, dimes, nickels, and pennies. (MP 2)*
2.MG.8	*~~Ask questions to~~ identify and describe shapes having specific attributes. Build and draw shapes that possess specified attributes. (MP 1)*	“Ask questions to identify and describe shape" is vague and high-inference. It does not specify the type, quality, or quantity of the questions, making it difficult to assess consistently.	Question asking is one of many ways to achieve this standard. *Staff recommendation: Build, draw, and identify shapes that possess specified attributes. Ask and answer questions about attributes to identify and describe shapes (e.g. How*

			many angles does this shape have? How many faces?). (MP 1, 4)
2.MG.10 1 1	*Describe and represent structures, patterns and relationships when partitioning two-dimensional shapes into two, three, or four equal shares; describe the shares using the words halves, thirds, a fourth of, quarters, etc. Recognize that equal parts of identical wholes need not have the same shape. (MP 7)*	The phrase "describe and represent structures, patterns and relationships" is abstract and does not clearly describe what students should do, and so it may be interpreted in multiple ways without additional guidance. In addition, "recognize that equal parts of identical wholes need not have the same shape" is conceptually clear but may require teacher interpretation to determine acceptable evidence of understanding. These aspects introduce some ambiguity in what counts as sufficient performance, making the standard only partially clear and accessible.	Staff * *Staff recommendation: Partition two-dimensional shapes into two, three, or four equal shares; describe the shares' relationship to the whole (e.g. two halves, one third, three fourths). Demonstrate that equal parts of identical wholes need not have the same shape. (MP 7)*
2.D.1 1 1	*Determine a topic question and ask investigative questions that will lead to collecting, analyzing, and interpreting data within the context of classroom and grade. (MP 1)* *Choose a topic and write questions about it that can be answered by collecting data in the classroom. (MP 1)*	The phrase "determine a topic question" is unclear and may blur the difference between a topic and a specific question. "Investigative questions" is somewhat abstract and not defined with examples. The phrase "within the context of classroom and grade" is awkward and vague. "Investigative questions that will lead to collecting, analyzing, and interpreting data" is indirect and high-inference. It focuses on the purpose of the questions rather than specifying observable	*Staff recommendation: Choose a topic and ask questions that can be answered by collecting data within the context of the classroom or school. (MP 1)*

		qualities (e.g., number, type, or alignment to variables).	
2.D.2 1 1	*Collect and organize data. Build data visualizations including bar graphs and pictographs with single-unit scales. Ask questions to consider a given data set about a classroom or grade level context, and organize that data using different variables. (MP 1, 4)*	"Ask questions to consider" is less precise and more open-ended. It does not clearly define what quality or type of questions students must produce, making it higher inference. The standard contains multiple expectations bundled together, making it harder to assess through a single, focused performance. The standard combines multiple expectations (collecting, graphing, questioning, organizing by variables), which reduces clarity. The phrase "ask questions to consider a given data set" is vague and does not clearly describe what kinds of questions students should ask. "Organize that data using different variables" may be unclear without examples of what variables mean at this level.	*Staff recommendation: Collect and organize data. Build data visualizations including bar graphs and pictographs with single-unit scales. Organize data by different variables. (MP 4)*
2.D.3	~~*Analyze data sets and single-unit scale data*~~ *Create single until scale visualizations using features such as titles, labels, and legends.* ~~*Ask questions to make sense of the data.*~~ *Use the data to solve simple addition, subtraction, and comparison questions.(MP 1)*	"Analyze" how? "Ask questions to make sense of the data" is vague and high-inference. It does not specify the type, quality, or purpose of the questions (e.g., comparison, interpretation, or inference). The phrase "make sense of the data" reflects an internal cognitive process, not a directly observable performance. The expectation combines multiple skills (analysis + question	*Staff recommendation: Analyze data sets and single-unit scale data visualizations using features such as titles, labels, and legends. Ask and answer addition, subtraction, and/or comparison questions to make sense of the data. (MP 1)*

		generation), which makes it harder to assess with a single, focused performance.	
2.D.4	*Interpret data to answer investigative questions. Construct and justify arguments about the data. Make conjectures about the impact missing data may have on interpretation of the data. (MP 3, 8)* *Use data displays, such as tables, charts, or graphs, to answer questions about the data. Explain conclusions by referring to specific data shown in the display. Describe how missing data could change the way the data is interpreted. (MP 3, 8)*	The phrase “investigative questions” is somewhat abstract and not defined with examples. “Construct and justify arguments” is formal and does not clearly describe what students should do (e.g., explain using data, point to a graph). “Make conjectures” while appropriate is technical and may not be easily understood without an example.	*Staff recommendation: Interpret data that answers investigative questions. Justify conclusions using specific information from the data set or visualization. Explain how missing data could change the way the data is interpreted.*
3.OA.3	*Solve multiplication and division story problems with products or dividends less than or equal to 100 and whole number quotients, using a variety of models. Add or remove context to solve situations involving equal groups, arrays, and measurement quantities. (MP 2, 4)* *Solve multiplication and division story problems with products or dividends less than or equal to 100 and*	"Add or remove context" is vague and high-inference. It does not clearly define what students must produce (e.g., rewriting problems, modifying scenarios, or selecting contexts). It is unclear how this behavior would be consistently observed and assessed. "Using a variety of models" is also high inference. The person developing the assessment will have to determine how many counts as "a variety" and which models are appropriate.	The problem with some of these ambiguous standards is that when test writers go to write the test they may interpret the content differently than the writers or educators. Staff

	whole-number quotients. Use drawings, equations, or other models to represent equal groups, arrays, and measurement quantities. Write or revise a story problem to match a given multiplication or division equation or model. (MP 2, 4)		
3.OA.4	~~*Evaluate*~~ *Find the unknown whole number in a multiplication or division equation. Represent division as an unknown-factor problem, and describe the relationship between multiplication and division. (MP 7)*	The phrase “evaluate the unknown whole number” is somewhat unclear—evaluate is not the most precise or commonly used term in this context (e.g., solve for or find would be clearer). “Represent division as an unknown-factor problem” is technical and may not be easily understood without explanation or an example.	
3.OA.5 1 1	*Make and assess conjectures about the properties of multiplication. Add context to make sense of these properties as strategies to multiply and divide with products and dividends less than or equal to 100. (MP 2, 8)* *Use and explain multiplication properties, such as changing the order of factors or breaking apart numbers, to solve multiplication and division problems within 100. Write or describe a story problem, drawing, or equation that shows how the property helps*	Because "assess conjectures" is not mathematically precise, it's not clear how it would be measured. The phrase “make and assess conjectures” is mathematically imprecise, so the PE is not clear. While appropriate, the term “dividends” is technical and may reduce accessibility for parents or some educators. “Add context to make sense of these properties” is vague and unclear in terms of expected student action.	

	solve the problem. (MP 2, 8) *Use and explain the commutative, associative, and distributive properties of multiplication as strategies to solve multiplication and division problems within 100. Write or describe a story problem, drawing, or equation that shows how the property helps solve the problem. (MP 2, 8)*		
3.OA.6 1 1	*Multiply and divide flexibly, accurately, and efficiently, with products, dividends, and divisors up to and including 100, and quotients up to and including 10. Know from memory all products of two one-digit numbers. (MP 6)*	"Flexibly" and "efficiently" are subjective and undefined, making them difficult to assess consistently without explicit criteria. The terms “flexibly, accurately, and efficiently” are abstract and not clearly measurable without examples. While appropriate and precise, technical terms like “dividends” and “divisors” may not be accessible to all users, especially parents.	This is consistently coming up. Is there a better way of articulating or simplifying expectations? Staff
3.OA.7 1 1	*Build and use models to solve two-step story problems involving whole numbers and having whole-number answers using the four operations, and attend to the reasonableness of answers. Remove context to represent*	“Attend to the reasonableness of answers” is not observable/well specified The phrases “attend to the reasonableness of answers” and "remove context" are abstract and not	

	situations as equations with a variable standing in for the unknown quantity. (MP 2, 4, 6)	clearly defined. The statement is long and combines multiple expectations (modeling, solving problems, checking reasonableness, translating to equations).	
3.NBT.3 1 1	*Determine sums and differences of three-digit whole numbers using numerical strategies flexibly, accurately, and efficiently. Justify a chosen strategy with place value language. (MP 3, 6)*	"Flexibly" and "efficiently" are subjective and undefined, making them difficult to assess consistently without explicit criteria. The terms “flexibly" and "efficiently” are abstract and do not clearly define observable student actions.	I am consistently reading this complaint it is also in 3.OA.6
3.NBT.4 1 1	*Find the product of a one-digit whole number and a multiple of 10 (10-90). Make and test conjectures to generalize patterns that occur when multiplying by a multiple of ten. (MP 8)*	While appropriate, the phrase “make and test conjectures” is technical and may not be easily understood by teachers outside math specialization or by parents. “Generalize patterns” is somewhat vague without examples (e.g., noticing that multiplying by 10 adds a zero). While make and test conjectures can be observable, it is broad and lacks precision. It does not specify the type of conjectures or criteria for acceptable generalizations. “Generalize patterns” is somewhat high-inference without clear expectations for how students must represent or communicate the generalization (e.g., rule, equation, explanation).	Staff

3.NF.1	*Describe and represent a fraction, a/b, as a numerator and a non-zero denominator, including unit fractions and fractions equal to whole numbers. Compose and decompose a fraction using unit fractions. Identify the meaning of the whole for a given context. (MP 7)*	Jargon While appropriate, the phrase "numerator and a non-zero denominator" may not be easily accessible to parents or non-specialists without explanation. The notation "a/b" is used without explanation of what the symbols represent. "Compose and decompose a fraction" is technical language that may be unclear to some without an example.	
3.NF.2	*Build and use number line models to represent fractions, using unit fractions as intervals. Connect number line models with area models by explaining how both models show the same fractional parts of a whole. ~~to make sense of fractions.~~ (MP 4)*	While appropriate, the phrase "using unit fractions as intervals" is technical and may not be easily understood without explanation or examples. "Make sense of fractions" is vague and does not clearly describe what behavior is actually expected of students.	
3.NF.3	*Build and use models to make sense of and generate equivalent fractions including whole numbers. Justify why equivalent fractions must reference the same whole to be equivalent. (MP 3, 4)* *Use number line models, area models, or drawings to show equivalent fractions, including fractions equivalent to whole numbers. Explain that fractions are equivalent when they*	"Make sense of ... equivalent fractions" is vague and does not clearly describe what is actually expected of students. The phrase "justify why equivalent fractions must reference the same whole" is unclear and may be difficult to interpret without clarification.	

	name the same amount of the same whole. (MP 3, 4)		
3.MG.1 1 1	*Make reasonable estimates about length, weight, and liquid volume. Select and use tools appropriately and strategically to find precise measurements. (MP 5, 6)* *Estimate length, weight, and liquid volume by comparing them to familiar benchmarks. Select and use measurement tools, such as rulers, scales, and measuring cups, to measure accurately. Explain whether an estimate is reasonable by comparing it to the measurement. (MP 5, 6)*	The phrases "Reasonable estimates" and "Appropriately and strategically" lack clear criteria (e.g., acceptable range), making it high-inference. The phrase "make reasonable estimates" is somewhat vague and does not define what counts as "reasonable." "Appropriately and strategically" are abstract terms that do not clearly describe observable student actions.	
3.MG.2 1 1	*Attend to precision when telling and writing time to the nearest minute. (MP 6)* *Tell and write time to the nearest minute by reading the hour and minute hands accurately and recording the time correctly. (MP 6)*	The phrase "attend to precision" is abstract and does not clearly describe what students should do to demonstrate precision (e.g., correctly reading the minute hand, writing time accurately). Poorly specified; Non-observable verb	

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3.MG.3	*Add or remove context to solve one-step story problems involving length, liquid volume, mass, and time. (MP 6)*	The central action ("add or remove context") is not clearly defined or observable. Non-observable verb; Too vague	There is a pattern here! Staff
3.MG.4 1 1	*Recognize area and perimeter as attributes of plane figures. Build and use models to understand the concept of unit squares and area. Select and use tools strategically and appropriately to distinguish between linear (perimeter) and area measures. Use tiling to show that the area of a rectangle is the same as would be found by multiplying side lengths. (MP 4, 5)* *Identify and describe area and perimeter as measurable attributes of plane figures. Use unit squares, grid paper, drawings, or tiles to model area, and use rulers or unit lengths to measure perimeter. Explain that perimeter measures the distance around a figure and area measures the number of square units that cover a figure. Use tiling to show that the area of a rectangle is the same as the product of its side lengths. (MP 4, 5)*	"Understand the concept…" and "recognize" are internal cognitive processes and are not directly observable unless paired with explicit performance (e.g., explain, demonstrate). "Strategically and appropriately" is vague and subjective, lacking specific criteria for assessment. The phrase "select and use tools strategically and appropriately" is abstract and not clearly measurable. The wording "distinguish between linear (perimeter) and area measures" may be unclear without examples.	
3.MG.5	*Build and use area models to represent the distributive property and*	While all the language in this standard is mathematically precise and appropriate,	

	relate the representations to the operations of addition and multiplication. (MP 4)	the terms “area model," "distributive property,” and “relate the representations to the operations” are technical and may not be easily understood by parents or some educators without explanation.	
3.MG.6 1 - developmental too early	*Add and remove context to solve real-world and mathematical problems involving perimeters of simple polygons and rectangular areas. Make and evaluate conjectures about rectangles with the same perimeter and different areas or with the same area and different perimeters. Describe how area and perimeter are related. (MP 4, 8)*	“Add and remove context” is vague and high-inference. It does not clearly define what students must do (e.g., create problems, rewrite situations, translate to equations), making it difficult to assess consistently. “Make and evaluate conjectures” lacks specific criteria for what counts as a valid or sufficient conjecture or evaluation. This standard blends Grade 3 foundational measurement (area + perimeter) and Grade 4 relational reasoning about measurement attributes. Grade 3 CCSS provides the computational and conceptual base Grade 4 CCSS provides the relational/generalization component. "Make and evaluate conjectures about rectangles with the same perimeter and different areas or same area and different perimeters” and “Describe how area and perimeter are related” align most strongly with CCSS.MATH.CONTENT.4.MD.A.3	“Add and remove context” Staff
3.MG.7 1 1	*Describe and represent shared attributes of shapes in a category, and recognize that the shared attributes*	While describing shared attributes of shapes in a category is a specific observable behavior, representing	

	define the larger category. Build models of quadrilaterals that do not belong to a given subcategory. (MP 4, 7) *Describe shared attributes of shapes in a category, such as the number of sides, angles, or parallel sides, and explain that those attributes define the larger category. Sort or draw quadrilaterals that do and do not belong to a given subcategory, such as rectangles or rhombuses, and explain the attributes used to make the decision. (MP 4, 7)*	shared attributes of shapes is not. "Build models of quadrilaterals" is also poorly specified. While it is clear what is meant by describing shared attributes of shapes in a category, it is not clear what is meant by representing shared attributes of shapes is not. "Build models of quadrilaterals" is also unclear due to the poor specification of the PE.	
3.MG.8 1 1	*Attend to precision when partitioning shapes into parts with equal areas and expressing the area of each part as a unit fraction of the whole. (MP 6)* *Partition shapes into equal-area parts and describe each part as one equal share of the whole. If a shape is divided into w equal-area parts, express the area of each part as the unit fraction $1/w$ of the whole. (MP 6)*	Attend to precision" is vague and not directly observable. It is not clear what is intended by "attend to precision when partitioning shapes." While "unit fraction" is appropriate and precise language, it may be unfamiliar to some. Also, "unit fraction of the whole" is not mathematically correct/precise usage. More correct language might be "expressing the area of the each part as a unit fraction 1/w where the whole has been divided into w parts," potentially with an example. More guidance is needed re: what the actual PE is here.	

3.D.1 1 1	*Determine a topic question and ask investigative questions that will lead to collecting, analyzing, and interpreting data. Identify whether the question asked will result in quantitative or categorical data. (MP 1)* *Choose a topic and write questions about it that can be answered by collecting data. Identify whether the question asked will result in quantitative or categorical data. (MP 1)*	"ask investigative questions that will lead to…" is indirect and high-inference. Vague/ambiguous language	Staff I don't know about these. Will we be able to make consistent test questions that all will understand.
3.D.2 1 1	*Select and use tools strategically to collect and organize data. Build data visualizations using scales of 2s, 5s, and 10s. Represent a data set with three or more categories. Ask questions to consider a given data set. Identify data as quantitative or categorical. (MP 1, 5)* *Select and use appropriate tools, such as tally charts, tables, or digital tools, to collect and organize data. Represent a data set with three or more categories using a bar graph or pictograph with a scale of 2s, 5s, or 10s. Ask and answer questions about the data, such as which category has the most, which has the least, or how*	"strategically" and "ask questions to consider a data set" lack specificity "strategically" and "ask questions to consider a data set" lack specificity	

	many more or fewer are in one category than another. Identify data as quantitative or categorical. (MP 1, 5)		
3.D.3 1 1 1 developmental -too early	*Analyze data sets and bar graphs and pictographs with scales of 2s, 5s, and 10s. Make and evaluate conjectures about benefits and drawbacks of different visualizations and scales used to analyze a set of data. (MP 6, 8)* *Read and interpret bar graphs and pictographs with scales of 2s, 5s, and 10s. Use the data display to answer questions (e.g. how many more than, the difference between, equal to) and explain how the scale helps show the data. (MP 6, 8)*	This standard blends grade 3 and 4. The conjecture/evaluation expectation reflects reasoning about representation design and comparative effectiveness, which is developmentally more appropriate for later grades e.g., early statistical reasoning (Grades 5–6 transition). The phrases “make and evaluate conjectures” and “benefits and drawbacks” are abstract. “make and evaluate conjectures about benefits and drawbacks” lacks clear criteria and precision. It requires high inference around what counts as acceptable reasoning	
3.D.4 1 1 developmental -too early	*Interpret data, including scaled visualizations, to answer investigative questions. Construct and justify arguments about the data. Identify patterns, trends, and outliers in the data. Identify ways to refine investigative questions, data collection, visualization, or analysis. (MP 3)*	This standard blends grade 3 and 4. Data-based argumentation + investigative refinement exceed Grade 3 expectations	

	Read and interpret bar graphs and pictographs with scales of 2s, 5s, and 10s. Use the data display to answer questions and explain how the scale helps show the data. (MP 6, 8)		
4.OA.1 — Measurability: 1; Clarity & Accessibility: 1	*Build and use models to visualize a multiplication equation as a comparison. Represent verbal statements of multiplicative comparisons as multiplication equations. ("35 is 5 times as many as 7"can be represented as 35 = 5 × 7). (MP 4, 7)*	Measurability: Includes multiple expectations; representing verbal statements is a separate performance expectation. Clarity: First sentence reads awkwardly; both expectations could use examples.	
4.OA.5 — Measurability: 1	Find factors and multiples of whole numbers. Make and test conjectures about the relationship between any whole number and its factors. (MP 8) Find factor pairs and multiples of whole numbers, and describe patterns that show how a whole number is related to its factors and multiples.	Measurability: "Make and test conjectures about the relationship" is not specific.	
4.OA.6 — Measurabilit	*Generate a number or shape pattern based on a given rule. Describe and represent the features of the pattern*	Measurability: "Describe and represent" and "make and test conjectures" are	

y: 1	*that are not explicitly stated in the rule itself. Make and test conjectures about how the pattern will continue. (MP 7, 8)* *Generate a number or shape pattern from a given rule, identify features of the pattern that are not stated in the rule, and explain how the pattern continues using words, numbers, tables, or drawings.*	open-ended.	
4.NBT.5 — Measurability: 1; Clarity & Accessibility: 1	*Use efficient algorithms to determine sums and differences of multi-digit whole numbers in real-world contexts and equations flexibly, accurately, and efficiently. Determine if sums and differences are reasonable. using estimation, place value, or the context of the problem (MP 2, 6)*	Measurability: "Flexibly" and "efficiently" are subjective and undefined. Clarity: These terms are abstract and open to interpretation without examples.	
4.NF.5 — Measurability: 1; Clarity & Accessibility: 1	*Build and use models to extend understanding of multiplication to fractions. Connect repeated addition to multiplication when multiplying a fraction by a whole number. Multiply a fraction by a whole number using numerical strategies. Solve problems involving multiplying a fraction by a whole number in real world contexts.*	Measurability: "Build and use models to extend understanding" is ambiguous and combines multiple expectations. Clarity: The phrasing may imply students select models with the intent of extending their own understanding.	

	(MP 2, 4) *Use models, repeated addition, and numerical strategies to multiply a fraction by a whole number, and solve real-world problems involving multiplication of a fraction by a whole number*		
4.NF.6 — Clarity & Accessibility: 1	~~*Build and use models to*~~ *express a fraction with denominator of 10 as an equivalent fraction with denominator of 100, and use this technique to add two fractions with respective denominators of 10 and 100. (MP 4)*	Clarity: "Build and use models" is somewhat vague and probably unnecessarily wordy; the performance expectation is clearer without it.	
4.MG.1 — Measurability: 1	*Add and remove context to solve real-world and mathematical problems involving the area and perimeter of rectangles and rectilinear shapes. Build and use models to make sense of the area and perimeter formulas for rectangles. (MP 2, 4)*	Measurability: Related expectations require different types of tasks and should not be combined into one standard. Possible divide into two standards. Depends on how we apply assessments. Do we assess each provision in the standards or do we assess each standard?	
4.MG.2 — Measurability: 1; Clarity &	*Draw points, lines, line segments, rays, angles (right, acute, and obtuse), and perpendicular and parallel lines. Describe these structures and their*	Measurability: "Describe these structures and their relationships" does not specify the needed level of precision. Clarity: "Describe these structures" could be	

Accessibility: 1	*relationships within two-dimensional figures. (MP 7)* Draw and identify points, lines, line segments, rays, right angles, acute angles, obtuse angles, perpendicular lines, and parallel lines, and describe how these geometric elements appear in two-dimensional figures.	clearer as “geometric elements.”	
4.MG.3 — Measurability: 1	*Describe angles as geometric figures formed by two rays with a common endpoint. Understand that an angle is measured with reference to a circle. Describe the relationship between an angle’s measure and the fraction of the circular arc that it represents. (MP 7)* Describe an angle as a geometric figure formed by two rays with a common endpoint, and explain angle measure in degrees as a fraction of a full circle.	Measurability: “Understand that an angle is measured with reference to a circle” is not measurable.	Clearer language
4.MG.4 — Measurability: 0	*Attend to precision and reasonableness when measuring or sketching angles in whole-number degrees using a protractor. (MP 6)* Measure and sketch angles in	Measurability: “Attend to precision and reasonableness” is not measurable.	

	whole-number degrees using a protractor, and check that the measurement or sketch is reasonable based on the type of angle.		
4.MG.5 — Measurability: 1; Clarity & Accessibility: 1	*Understand and demonstrate the additive nature of angle measures. Find and justify unknown angles on a diagram using addition and subtraction. (MP 3)* Use angle addition to show that adjacent angle measures add to the measure of the whole angle, and find and justify unknown angle measures in diagrams using addition and subtraction.	Measurability: "Understand" is not observable. Clarity: "Additive nature" is somewhat vague.	Possibly amend. Staff
4.D.2 — Measurability: 1; Clarity & Accessibility: 1	*Select and use tools strategically to collect and organize data. Build data visualizations. Ask questions to consider a given data set with up to two variables. (MP 1, 5)* Select appropriate tools to collect and organize data with up to two variables, create data visualizations, and ask comparison or relationship questions about the data set.	Measurability: "Use tools strategically" is not measurable. Clarity: "Ask questions to consider a given data set with up to two variables" is vague and lacks guidance.	
4.D.3 —	*Analyze data and data visualizations.*	Measurability: "Evaluate conjectures" is	.

Measurability: 1; Clarity & Accessibility: 1	*Evaluate conjectures about how different sampling processes or data visualizations might influence interpretation of data. (MP 6, 8)* Analyze data shown in tables, line plots, picture graphs, bar graphs, or other appropriate visualizations, and explain how the sampling process or choice of visualization may affect interpretation	vague. Clarity: Examples of data visualizations would help.	
4.D.4 — Measurability: 1; Clarity & Accessibility: 1	*Interpret data and data visualizations to answer investigative questions. Construct and justify arguments about the data. Discuss ways that the sampling process and sample size may affect how people draw conclusions from data. Identify ways to refine investigative questions, data collection, visualization, or analysis. (MP 3)* Interpret data visualizations to answer investigative questions, support conclusions with evidence from the data, explain how sampling process and sample size may affect conclusions, and suggest one way to	Measurability: "Construct and justify arguments about the data" is not specified enough. Clarity: Examples of data visualizations and investigative questions would help.	

	improve the question, data collection, visualization, or analysis.		
5.OA.2 — Measurability: 1	*Add context to make sense of numerical expressions involving multiple operations with parentheses, brackets, or braces. Write and/or evaluate numerical expressions. (SMP 2)*	Measurability: Contains two distinct performance expectations.	Note: The standards that have two distinct performance expectations, will we only test on one part of the standard? Is there a gap if both are not represented in the assessments as separate standards? Ok could be split
5.OA.3 — Measurability: 1	*Generate two numerical patterns using two given rules. Describe and represent relationships between corresponding terms. Form ordered pairs consisting of corresponding terms from the two patterns and graph the ordered pairs on a coordinate plane. (MP 7)*	Measurability: "Describe and represent relationships" is broad.	Ask staff Generate two numerical patterns from two given rules, form ordered pairs from corresponding terms, graph the ordered pairs on a coordinate plane, and describe the relationship between the two patterns. Unsure
5.NBT.6 —	*Use efficient numerical strategies*	Measurability: "Flexibly and efficiently" is	

Measurability: 1; Clarity & Accessibility: 1	*based on properties of multiplication and/or place value to multiply a whole number of up to four digits by a one digit whole number and to multiply two two-digit numbers flexibly, accurately, and efficiently in real-world contexts and equations. Determine if products are reasonable. (MP 2, 6)* Multiply a whole number of up to four digits by a one-digit whole number and multiply two two-digit numbers using place-value reasoning, properties of multiplication, or standard algorithms; solve problems in real-world contexts and equations, and use estimation to explain whether products are reasonable.	difficult to measure; “reasonable” can be subjective. Clarity: Terms are subjective and there is redundancy around efficiency.	
5.NBT.7 — Measurability: 1; Clarity & Accessibility: 1	*Use efficient numerical strategies based on properties of multiplication and/or place value to divide up to a four digit number by a one digit number. Communicate the meaning of the remainder in real world contexts. (MP 2, 3)* Divide a whole number of up to four digits by a one-digit whole number	Measurability: “Use efficient strategies” is vague; examples may help. Clarity: “Efficient numerical strategies” is vague.	

	using place-value reasoning, multiplication properties, or standard algorithms, show the strategy used, and explain the meaning of any remainder in real-world contexts.		
5.NF.3 — Measurability: 1	*Build and use models, including area models, to multiply fractions, whole numbers, and mixed numbers. Connect the properties of multiplication to multiplying fractions. Solve problems involving multiplication of fractions and mixed numbers using real world contexts and equations (fraction by a fraction, fraction by a mixed number, mixed number by mixed number). (MP 2, 4)*	Measurability: Solving problems appears to be a separate performance expectation.	Use area models, equations, and properties of multiplication to multiply fractions, whole numbers, and mixed numbers, and solve real-world problems involving multiplication of fractions and mixed numbers. 2 PE?
5.NF.4 — Clarity & Accessibility: 1	*Interpret multiplication as scaling. Construct, justify, and communicate clear and reasonable arguments about the size of the resulting product when multiplying a given number by a fraction greater than one, a fraction less than one, a fraction equal to one. Make and test conjectures about the size of the product based on the size of the factors without computing. (MP 3, 8)*	Clarity: “Interpret” is vague.	Use reasoning about scaling to explain how multiplying by a fraction greater than one, equal to one, or less than one affects the size of the product, and predict the relative size of a product without computing. simplified

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5.NF.5 — Measurability: 0; Clarity & Accessibility: 1	*Build and use models that extend understanding of division to divide unit fractions by whole numbers and whole numbers by unit fractions. Solve problems involving division of unit fractions by non-zero whole numbers and division of whole numbers by unit fractions using real world contexts and equations. Make conjectures about the relationship between multiplication and division when operating with fractions and evaluate the results. (MP 2, 4, 8)* Use models and equations to divide unit fractions by nonzero whole numbers and whole numbers by unit fractions, solve real-world problems involving these operations, and explain the relationship between multiplication and division with fractions.	Measurability: Contains three performance expectations that would be hard to measure together. Clarity: "Extend understanding of division" is ambiguous.	
5.MG.3 — Measurability: 1; Clarity & Accessibility note	*Build and use a model of the coordinate plane to represent real-world problems.* ~~*Understand*~~ *explain that the numbers in the coordinate pair indicate distance from the origin in the direction of the horizontal and vertical axes. Graph*	Measurability: "Understand" is not observable; building a model and graphing may be different expectations. Clarity: Missing a period after "plane."	Graph points in the first quadrant of the coordinate plane to represent real-world problems, and interpret each coordinate as a distance from the origin along the horizontal and vertical axes in the given

	points in the first quadrant of the coordinate plane Interpret coordinate values based on a given context. (MP 2, 4)		context. This is simpler but the other is fine
5.D.1 — Clarity & Accessibility: 1	*Determine a topic question and ask investigative questions that will lead to collecting, analyzing, and interpreting data with up to four variables. Ask questions to identify potential sources of bias in data collection, reprepresentation, and interpretation. (MP 1)*	Clarity: "Investigative questions" is unclear without examples; "representation" is misspelled.	Determine a topic question, ask investigative questions that can be answered with data involving up to four variables, and ask questions to identify possible sources of bias in data collection, representation, and interpretation. Uncertain looking for feedback
5.D.2 — Measurability: 1	*Select and use tools strategically, to collect and organize data. Build data visualizations. Ask questions to consider a given data set with up to four variables. Make conjectures about potential sampling approaches and how those approaches impact results. (MP 1, 5, 8)* Select appropriate tools to collect and organize data with up to four variables,	Measurability: "Use tools strategically" is vague.	Clearer

	create data visualizations, ask questions about the data set, and explain how different sampling approaches may affect results.		
5.D.4 — Clarity & Accessibility: 1	*Interpret data and data visualizations to answer investigative questions while considering the impact of data bias, choice of data visualizations, and sample size. Construct and justify arguments about the data based on visible features of distribution such as center and range. Identify ways to refine investigative questions, data collection, visualization, or analysis. (MP 3)* Interpret data and data visualizations to answer clearly stated questions, considering data bias, visualization choice, and sample size; support conclusions using visible features such as center and range; and identify one way to refine the question, data collection, visualization, or analysis.	Clarity: "Investigative questions" is unclear without examples.	Clearer
6.A.1 — Measurability: 1; Clarity & Accessibility:	*Use structure to write and evaluate numerical expressions involving whole numbers exponents. (MP 7)* Write and evaluate numerical expressions involving whole-number	Measurability and clarity: "Use structure to" is vague and does not clarify what students should do beyond writing and evaluating expressions.	clearer

1	exponents, using the order of operations and properties of exponents as appropriate.		
6.A.2 — Clarity & Accessibility: 1	*Describe and represent patterns and structures of expressions to write, read, and evaluate algebraic expressions. (MP 7)* Write, read, and evaluate algebraic expressions, and describe how the structure of an expression represents relationships among its terms, factors, and operations.	Clarity: The standard contains several parts, and some phrasing is awkward or unclear, such as describing patterns of expressions to read algebraic expressions.	Clearer
6.A.3 — Measurability: 1	~~*Use properties of operations as tools to*~~ *generate equivalent expressions. Using properties of operations and* ~~*understanding of arithmetic to*~~ *justify why two expressions are equivalent. (MP 3, 5)*	Measurability: “Use properties of operations and understanding as tools” is difficult to measure directly; the observable expectation is justifying equivalence.	
6.NS.1 — Measurability: 1	~~*Extend prior understanding of multiplication and division to*~~ *divide fractions by fractions.* ~~*Build and*~~ *using visual fraction models to make sense of and solve problems dividing fractions by fractions. Add and remove*	Measurability: “Extend prior understanding” is not observable.	

	context with problems involving division of fractions by fractions and interpret the quotients. (MP 2, 4) *Or simplify to:* *Divide fractions by fractions using visual fraction models, equations, and real-world contexts, and interpret the quotient in context.*		
6.NS.2 — Measurability: 1; Clarity & Accessibility: 1	~~*Describe and represent structures and patterns to apply an algorithm to*~~ *divide multi-digit decimals using an algorithm,* ~~*flexibly, accurately, and efficiently*~~*. Limited to division to a whole number dividend with a decimal divisor or a decimal dividend with a whole number divisor.* ~~*Determine and*~~ *justify situations where estimation is appropriate. (MP 3, 6, 7)*	Measurability and clarity: "Flexibly" and "efficiently" are subjective without examples or criteria.	
6.NS.3 — Measurability: 0; Clarity & Accessibility: 1	*Attend to precision and reasonableness when adding, subtracting, multiplying, and dividing multi-digit whole numbers and decimals flexibly, accurately, and efficiently. (MP 6)* Add, subtract, multiply, and divide	Measurability: "Attend to precision" is not observable, and "flexibly" and "efficiently" are subjective. Clarity: It is unclear what evidence shows precision or reasonableness.	Clearer

	multi-digit whole numbers and decimals accurately, and use estimation or inverse operations to check whether results are reasonable.		
6.NS.7 — Measurability: 1; Clarity & Accessibility: 1	*Build and use models to develop the definition of absolute value. Work with absolute value in and out of context. (MP 2, 4)* Use number line models and real-world contexts to define absolute value as a number's distance from zero, compare absolute values, and interpret absolute value in context.	Measurability and clarity: "Work with" and "develop the definition" are poorly specified.	Use number line models and real-world contexts to define absolute value as a number's distance from zero, compare absolute values, and interpret absolute value in context. Clearer
6.RP.1 — Measurability: 1	*Clearly communicate understanding of ratio relationships by using ratio language. (MP 3)* Use ratio language to describe the relationship between two quantities, including part-to-part and part-to-whole relationships, in real-world and mathematical situations.	Measurability: The standard does not specify which aspects of ratio relationships students must demonstrate.	Clearer
6.RP.2 — Measurabilit	~~*Clearly communicate understanding of the concept of a unit rate associated*~~	Measurability: The note indicates the standard may be too narrow compared	

y: 1	~~*with a ratio and use rate language to*~~ *represent and explain* ~~*a*~~ *unit rate*s *associated with a ratio relationship*s *using words, tables, diagrams, and numerical expressions. (MP 7)*	with other standards.	
6.RP.4 — Measurability: 1	*Use ratio and rate reasoning as a tool to make sense of and solve problems in context. (MP 5)* Solve real-world problems involving ratios and rates using tables, double number lines, tape diagrams, equations, or other appropriate representations.	Measurability: "Use as a tool" lacks a clear performance expectation.	Solve real-world problems involving ratios and rates using tables, double number lines, tape diagrams, equations, or other appropriate representations.
6.D.4 — Measurability: 1; Clarity & Accessibility: 1	*Construct, justify, and communicate answers to investigative questions about distributions. Consider the interpretation of the following features of distributions: center (mean and/or median), variability (mean absolute deviation and/or inter quartile range), and overall shape (symmetric or non-symmetric). Describe any striking deviations (outliers). Identify ways to refine investigative questions, data collection, visualization, or analysis. (MP 3)*	Measurability: "Consider" is not observable. Clarity: "Investigative questions" is unclear without examples.	Use features of distributions, including center, variability, shape, and outliers, to answer statistical questions, justify conclusions, and identify one way to refine the question, data collection, visualization, or analysis. Need additional feedback

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7.A.4 — Measurability: 1	*Build and use models including tables, graphs, and equations to represent ~~and understand the~~ relationships between independent and dependent variables; and describe how changes in one variable relate to changes in the other. (MP 4)*	Measurability: "Understand" is not observable.	
7.NS.1 — Measurability: 1; Clarity & Accessibility: 1	*Describe and represent structures, patterns and relationships to define rational numbers and make connections between fraction, decimal and percent representations. of a rational number. Flexibly use the various representations of rational numbers while attending to precision. (MP 6, 7)* Define rational numbers and convert among fraction, decimal, and percent representations of rational numbers, explaining how the representations are equivalent	Measurability and clarity: "Describe and represent structures, patterns and relationships" and "flexibly use" are vague and high-inference. There is also a wording error.	.
7.NS.3 — Measurability: 1	*Extend previous understanding of multiplication and division to multiply and divide rational numbers in and out of context. (MP 2)*	Measurability: "Extend previous understanding" is vague and not directly observable.	

	Multiply and divide rational numbers, including positive and negative fractions and decimals, in mathematical and real-world contexts.		
7.NS.4 — Measurability: 1; Clarity & Accessibility: 1	*Flexibly, accurately, and efficiently add, subtract, multiply and divide rational numbers including signed decimals and fractions in and out of context. Attend to precision and reasonableness of solutions. (MP 5, 6)* Add, subtract, multiply, and divide rational numbers, including signed decimals and fractions, in mathematical and real-world contexts, and use estimation or inverse operations to check whether solutions are reasonable.	Measurability and clarity: "Flexibly," "efficiently," and "attend to precision and reasonableness" are subjective or not well specified.	
7.RP.1 — Measurability: 1	*Calculate unit rates associated with ratios of fractions, including ~~ratios of~~ lengths, areas and other quantities. ~~Apply~~ use unit rate as a tool to make and evaluate conjectures about proportional relationships (MP 8)*	Measurability: Includes multiple expectations; "apply unit rate as a tool" is vague.	
7.RP.2 — Measurability: 1	*~~Understand~~ express percent of a quantity as a rate per 100. Describe and represent structures and patterns*	Measurability: "Understand" is an internal cognitive process and not observable.	Represent percent of a quantity as a rate per 100, and describe how percent is related to ratios and

	that connect percent to ratio. (MP 7)		equivalent fractions. Looking for feedback
7.G.1 — Measurability: 1	*Select and use tools appropriately and strategically (e.g., a compass, straightedge, dynamic geometry software) to draw and accurately describe scaled geometrical figures. Utilize the underlying structure of scale drawings to understand scale factor and solve real world and mathematical problems. (MP 5, 7)* Use tools such as a compass, straightedge, or dynamic geometry software to draw and describe scale drawings, determine scale factors, and solve real-world and Mathematical problems involving scale.	Measurability: "Understand" may be interpreted as part of the expectation, making the standard open to different interpretations.	
7.G.3 — Measurability: 1	~~*Flexibly, accurately and efficiently*~~ *solve real-world and mathematical problems involving perimeter and area of circles, triangles, quadrilaterals and polygons as well as surface area of right prisms. (MP 2, 6)*	Measurability: "Flexibly" and "efficiently" are vague.	
7.D.1 — Clarity &	*Formulate statistical* ~~*investigative*~~ *questions that anticipate variability in*	Clarity: "Investigative questions" is	

Accessibility: 1	*data collected from a random sample of a population. (MP 1)*	unclear without examples.	
7.D.2 — Measurability: 1	*Generate, collect, and organize randomly sampled data that is representative of the population ~~using tools appropriately.~~ Explain why random sampling is more likely to produce representative samples and support valid inferences ~~using clear and reasonable arguments.~~ (MP 3, 5)*	Measurability: "Using tools appropriately" is difficult to measure without criteria.	Is the yellow necessary?
8.A.2 — Measurability: 1	*Use structure and patterns of operations to simplify and evaluate algebraic expressions, including those involving rational coefficients, exponents, and polynomial terms. (MP 7)*	Measurability: "Use structure and patterns" is high-inference and not clearly observable.	Simplify and evaluate algebraic expressions involving rational coefficients, exponents, and polynomial terms, and explain which properties or patterns of operations support the simplification. Looking for feedback
8.A.4 — Clarity & Accessibility: 1	*Represent the structure and patterns of numbers expressed in ~~the form of a single digit times an integer power of 10~~ scientific notation to estimate very large or very small quantities, and express how many times as much one is than the other. (MP 7)*	Clarity: The sentence is dense and combines structure, scientific notation, estimation, and multiplicative comparison in one statement. Can we say scientific notation? Or is there a reason to add extra words?	.

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8.A.8 — Measurability: 1	~~*Use structures, patterns and properties of equivalence to*~~ *solve symbolic and real-world single-variable equations and inequalities with rational number coefficients and justify algebraically. Solve absolute value equations in the form |px|+q=c or |px+q|=c. (MP 7)*	Measurability: "Use structures and patterns" is non-observable; the standard also contains multiple expectations.	Solve symbolic and real-world single-variable equations and inequalities with rational coefficients, justify solution steps using properties of equivalence, and solve absolute value equations of the form |px| + q = c or |px + q| = c. Are these two different standards?
8.NS.1 — Measurability: 1; Clarity & Accessibility: 1	*Describe and represent structures and patterns comparing the set of irrational numbers to the set of rational numbers, in order to determine properties of irrational numbers. (MP 7)* Compare rational and irrational numbers using definitions, examples, and number-line representations, and explain properties that distinguish irrational numbers from rational numbers	Measurability and clarity: "Describe and represent structures and patterns" and "determine properties of irrational numbers" are broad and do not specify the expected representations or properties.	clearer
8.NS.4 — Measurability: 1; Clarity &	*Justify why sums and products of rational numbers are rational, that the sum of a rational number and an irrational number is irrational, and that*	Measurability and clarity: The standard combines justification of number-system properties with broad modeling language that lacks guidance.	Justify closure properties involving rational and irrational numbers, including sums and products, and use examples

Accessibility: 1	*the product of a nonzero rational number and an irrational number is irrational. Build and use models to connect to physical situations. (MP 3, 4)*		or models to connect these properties to mathematical or real-world situations. Looking for feedback
8.G.1 — Measurability: 1	*Use rigid transformations to establish a definition of congruent figures. Justify that two shapes are congruent through the use of rigid transformations. Make and evaluate conjectures about attributes of, rotations, reflections, and translations with and without coordinates. (MP 3, 8)*	Measurability: "Make and evaluate conjectures about attributes" is broad and high-inference; "with and without coordinates" adds ambiguity.	Use rotations, reflections, and translations to define and justify congruence of figures, and describe how these transformations affect position, orientation, and side lengths with and without coordinates. Looking for feedback
8.G.2 — Measurability: 1	*Use transformations (dilation, translation, reflection and rotation) to establish a definition of similar figures. Justify that two shapes are similar through the use of transformations. Make and examine conjectures about attributes of dilations, with and without coordinates. (MP 3, 8)*	Measurability: "Make and examine conjectures about attributes of dilations" does not specify acceptable conjectures, reasoning, or evidence.	Use dilations and rigid transformations to define and justify similarity of figures, and describe how dilations affect side lengths, angle measures, and coordinates. Looking for feedback
8.G.3 — Measurabilit	*Ask questions to determine the difference between congruence and*	Measurability: "Ask questions" and "clearly communicate" are not	Compare congruent and similar figures in terms of

y: 1	*similarity in terms of transformations. Clearly communicate the distinction between congruent and similar figures. (MP 1, 3)*	operationalized with criteria.	transformations, and explain the distinction using side lengths, angle measures, and transformation sequences. This is another case of trying to add MP to the standard instead of creating a clear standard. Questions are a great instructional practice for this standard but is it what the focus needs to be in the standard or is it the math concept?
8.D.1 — Measurability: 1; Clarity & Accessibility: 1	*~~Ask~~ formulate statistical questions about bivariate data sets (quantitative and categorical) to investigate patterns of associations between two quantities or categories. (MP 1)*	Measurability and clarity: "Ask questions" and "investigate patterns of associations" are broad and do not specify question type, evidence, or whether students conduct the investigation.	
8.D.2 — Measurability: 1	*Select and use ~~tools~~ appropriate~~ly and strategically~~ tools ~~to~~ identify existing data sets or generate, collect, and organize data to investigate associations between two quantities. (MP 5)*	Measurability: "Select and use tools appropriately and strategically" is subjective without criteria.	
8.D.3 — Measurabilit	*~~Explore~~, creat~~ing~~ scatter plots by describing and comparing variability in*	Measurability: "Explore" is not directly	In this case students are

y: 1	*bivariate data for quantitative variables ~~by creating scatter plots~~. For scatter plots that suggest a linear association, represent the relationship with a linear equation, and informally assess the line of fit by judging the closeness of the data points to the line. (MP 7)*	measurable.	ask to explore by creating.
8.D.6 — Measurability: 1	~~*Explore,*~~ *constructing ~~-~~ two-way tables by describing and comparing variability in bivariate data for categorical variables ~~by constructing two-way tables.~~ Calculate and interpret relative frequencies for rows or columns in a two-way table. Attend to precision and reasonableness. (MP 6)*	Measurability: "Explore" and "attend to precision and reasonableness" are not observable without criteria.	
8.D.7 — Measurability: 1; Clarity & Accessibility: 1	*Construct, analyze, and communicate clear and reasonable arguments to answer ~~investigative~~ statistical questions about the association between categorical bivariate data. Use the relative frequencies calculated for rows or columns as evidence to justify and describe possible associations between the two variables. (MP 3)*	Measurability and clarity: "Analyze" is vague, and "investigative questions" needs examples or clarification.	
Secondary I	*Notes for the upper grades* *Mike Spencer: as you know many of*	Could we make sure this comment is at least discussed and addressed? "Secondary II and III were denoted as	My recommended change in this colum. These can be moved to another location for

	the standards are duplicated. So a lot of these recommendations are going to be on here twice and some even more times. Thank you for all of your time and efforts to make math great in Utah. *I am open to feedback on any of these suggestions. I have only included suggestions from the comments submitted by Wested. I am open to and welcome additional feedback or even leaving the standard as written.*	extended standards; while not developmentally inappropriate, these standards typically appeared one to two years earlier than in most other states." In the high-school pathways, reviewers noted that content that was denoted as extended topics standards in year 1 (matrices and matrix algebra) and 2(vector and vector algebra, some complex number topics, and conic sections) courses, while not developmentally inappropriate, appeared one to two years earlier than in most other states. For students who intend to go on to Calculus in year 4 of high school, these topics are an important part of the necessary preparation for that course and are typically taught in honors versions of year 1 and 2 courses. Importantly, these observations do not suggest that the content itself is inappropriate for high school mathematics, but rather that teachers should take special care regarding developing prerequisite knowledge and ensuring that students are prepared for these topics and appropriately supported when the topics are introduced.	notes.

S1.A.2 — Clarity & Accessibility: 1; Math Practice Integration: 1	*Build symbolic models of linear equations and inequalities, and use them to solve problems in and out of context. (MP 3, 4)*	"Build symbolic models of linear equations and inequalities" is redundant; linear equations and inequalities ARE the symbolic models of situations involving linear relationships.	Create and use linear equations and inequalities to model situations and solve real-world context, and explain how the equation or inequality represents the situation. Need feedback
S1.A.4 — Clarity & Accessibility: 1	*Solve linear equations and inequalities using algebraic tools, starting from the assumption that a solution exists. Communicate clear arguments for equations that do not have one unique solution and justify the results. Interpret solutions and use both inequality and interval notation. (MP 3, 5)*	Clarity: “Communicate clear arguments for equations” is not grammatically or mathematically precise and is redundant with “justify the results.”	Solve linear equations and inequalities using algebraic tools, identify cases with no solution or infinitely many solutions, justify the conclusion, and interpret solutions using inequality and interval notation. Need feedback
S1.A.6 — Clarity & Accessibility: 1	*Interpret whether a solution of a system of linear equations and inequalities is viable or non-viable using graphic and analytic models. Use models of systems of linear equations and inequalities to interpret whether a solution is viable or non-viable. (MP 4)*	Clarity: The phrasing is grammatically awkward and repetitive. Suggested intent is to determine or interpret whether a solution is viable in context.	Use graphical and analytical models of systems of linear equations and inequalities to determine whether solutions are viable in context. Need feedback
S1.F.2 —	*Understand the structure of function*	Measurability: “Understand” is	Apply the properties of integer

Measurability: 1; Math Practice Integration: 0	*notation, 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). (MP 7)*	non-observable, so the performance expectation is unclear. MP7 is not fully integrated because the observable student action is not specified.	exponents to rewrite and evaluate expressions with rational exponents, and explain how the exponent properties support the equivalence of the expressions. (MP 7) Need feedback
S1.F.5 — Measurability: 1;	*~~Understand and~~ interpret key ~~the~~ features of a function represented graphically, numerically and symbolically using interval notation and inequalities by applying and removing context. Focus on these key features: domain, range, intervals of increase and/or decreasing, location of absolute maximum and/or absolute minimum, and intercepts. Build graphic models that satisfy given key features. (MP 2, 4)*	Measurability: "Understand" is non-observable and does not specify what students should demonstrate	
S1.F.6 — Measurability: 1; Clarity & Accessibility: 0	*Build representations that show key features of linear and exponential functions expressed symbolically. Select and use appropriate tools to model with and without technology. (MP 4, 5)*	Clarity: The first expectation is ambiguous: it is unclear whether students are building symbolic representations or other representations from symbolic functions. "Select and use appropriate tools to model with and without technology" is also vague.	Create graphs, tables, or other representations of linear and exponential functions from symbolic forms, identify key features, and use appropriate tools, including technology when useful, to support the representation.

			Need feedback
S1.F.10 — Measurability: 1	*Use structures and patterns to identify the effect of k on the graph when replacing f(x) by f(x) + k. Explore specific values of k for linear and exponential functions in and out of context. (MP 7)*	Measurability: "Use" and "explore" are broad or non-observable without a stated product or evidence.	Identify and describe how replacing f(x) with f(x) + k changes the graph of a linear or exponential function. Use tables, graphs, or equations to compare several values of k and explain the effect in context and without context. (MP 7) Need feedback Same as A1.BF.4
S1.F.11 — Measurability: 1; Clarity & Accessibility: 1	*Communicate clear and reasonable arguments to distinguish between situations that can be modeled with linear functions, exponential functions, or neither. Connect the structure of linear and exponential functions with their parameters, (y=mx+b, y=bx(a)). Justify that a quantity increasing exponentially eventually exceeds a quantity increasing linearly. (MP 3, 7)*	Measurability: Contains multiple expectations. Clarity: The first sentence is grammatically awkward. The relationship among the expectations should be clearer.	Distinguish between situations that can be modeled by linear functions, exponential functions, or neither, and justify the conclusion using features of the situation and the function. Connect the parameters of linear and exponential functions to their meanings, and justify why exponential growth eventually exceeds linear growth. (y=mx+b, y=bx(a)). (MP 3, 7)

			Same as A1.BF.6 Need feedback
S1.G.2 — Measurability: 1; Clarity & Accessibility: 1; Math Practice Integration: 0	*Construct and clearly communicate definitions of the rigid transformations to show that these transformations are functions that take points in the plane as inputs and give corresponding points as outputs. (MP 3)*	Measurability and clarity: "Construct definitions" is vague and may not be appropriate if students are expected to generate formal definitions. MP3 is not integrated because communicating a definition is not the same as communicating an argument.	Describe rigid transformations as functions that assign each point in the plane to a corresponding image point. Use examples to communicate how translations, rotations, and reflections preserve distance and angle measure. (MP 1, 7) Need feedback same as G.CO.2
S1.G.3 — Measurability: 0; Clarity & Accessibility: 0	*Select and use tools to strategically perform rigid transformations. Attend to precision when identifying and describing the transformation or the sequence of transformations to determine whether or not two figures are congruent. Understand that the image created from a rigid transformation or a sequence of rigid transformations is congruent to the pre-image. (MP 5, 6)*	Measurability: "Strategically," "attend to precision," and "understand" are poorly specified or non-observable. Clarity: The performance expectations are unclear because of the language used.	Perform rigid transformations using appropriate tools, and identify and describe the transformation or sequence of transformations used. Determine whether two figures are congruent by showing that one can be mapped onto the other through a sequence of rigid transformations. (MP 5, 6) Need feedback G.CO.3
S1.G.4 —	*Construct and communicate clear and*	Measurability and clarity: "Clear and	Use reflections and rotations

Measurability: 0; Clarity & Accessibility: 0	*reasonable arguments about reflection and rotational symmetries of parallelograms and regular polygons. Use reflections and rotations to informally justify attributes of parallelograms including rhombus, rectangles and squares. (MP 3)*	reasonable" is subjective; the arguments, attributes, and meaning of "informally" are not specified.	to identify and justify specific symmetry properties of parallelograms and regular polygons. Explain how these transformations support selected attributes of rectangles, rhombi, squares, and parallelograms. (MP 3). Need feedback Same as G.CO.4 clearer
S1.G.5 — Measurability: 1; Clarity & Accessibility: 1	*Precisely construct geometric objects including equilateral triangle, rhombus, square, parallel line, perpendicular bisector, and angle bisector. Communicate clearly about the use of geometric construction tools and analyze the underlying structure of geometric objects as revealed by the tools. (MP 3)*	Measurability and clarity: The standard does not specify which tools students should use or what underlying structure they should analyze or communicate.	Use compass, straightedge, or dynamic geometry tools to construct an equilateral triangle, rhombus, square, parallel line, perpendicular bisector, and angle bisector. Explain how the construction steps rely on geometric properties. (MP5), 7 Need feedback G.CO.5 feedback
S1.D.1 —	*Ask statistical questions to investigate*	Measurability: The standard combines	Formulate statistical questions

Measurability: 1; Clarity & Accessibility: 1	*situations that can be explored using random samples from populations to make inferences about differences between two populations or associations between two quantitative variables. Explain and justify the distinction between correlation and causation. (MP 1, 3)*	distinct expectations. Clarity: More guidance is needed for "ask statistical questions," and "justify the distinction between correlation and causation" is unclear.	that can be investigated using random samples to compare populations or study associations between two quantitative variables, and justify whether a conclusion describes correlation, causation, or neither.
S1.D.2 — Measurability: 1; Clarity & Accessibility: 1	*Select the appropriate statistical tools to create a data collection plan. Collect and organize primary data for the statistical investigative question of interest or determine the validity that the data collected is useful to answer the statistical question of interest when using secondary data. (MP 5)*	Measurability: The standard is broad and contains multiple expectations. Clarity: The second sentence is unclear.	Select statistical tools to create a data collection plan, collect and organize primary data, or evaluate whether secondary data are valid and useful for answering a statistical question.
S1.D.3 — Measurability: 1	*Compare two or more distributions with precision by selecting graphical displays (dot plots, histograms, and modified box plots to show outliers) that highlight features of interest. Analyze data by comparing measures of center (mean and median) and measures of variability (range, inter-quartile range and standard deviation) that are appropriate for the shape (skew, symmetry, outliers, modes) of the data distribution. Recognize how standard deviation*	Measurability: Contains multiple expectations, and "recognize" is non-observable.	Compare two or more distributions using appropriate graphical displays and measures of center and variability, and explain how standard deviation describes variation in a distribution feedback.

	builds on the mean absolute deviation and is another measure of how data values vary in a distribution. (MP 6)		
S1.D.4 — Measurability: 1	*Analyze data to explore the association between two quantitative variables by using a scatterplot to determine and describe patterns of association such as clustering, positive or negative association, linear or nonlinear association, and effects of outliers. Use technology to find and interpret the correlation coefficient and use it to assess the strength of the linear relationship. Attend to precision and reasonableness with calculations. (MP 6)*	Measurability: Contains multiple expectations, and "to explore the association" is non-observable.	Use scatterplots to describe patterns of association between two quantitative variables, including clustering, direction, form, and outliers; use technology to find and interpret the correlation coefficient and assess the strength of a linear relationship.
S1.D.5 — Measurability: 0; Clarity & Accessibility: 1	*Analyze and use statistical evidence to evaluate results and answer statistical investigative questions about the differences between two or more population parameters. Identify ways to refine the question, data collection, visualization, or analysis. (MP 8)*	Measurability: Very general and poorly specified; "population parameters" and refinement expectations are broad. Clarity: More detail is needed for the performance expectation.	Use statistical evidence to answer investigative questions comparing two or more populations, evaluate the strength of the evidence, and identify a specific improvement to the question, data collection, visualization, or analysis. Feedback
S1.D.6 — Measurabilit	*Justify statistical reasoning to evaluate results from analyses to answer the*	Measurability: Contains multiple expectations, and "justify statistical	For quantitative bivariate data with a roughly linear

y: 1	*statistical investigative question about associations between two quantitative variables. For scatter plots that suggest a linear association, represent the relationship with a line of best fit and use the model of the linear equation to solve problems, including interpreting the slope and intercept in the context of the data. Justify statistical reasoning and results to others in a variety of formats including verbal, written, and visual. (MP 3, 8)*	reasoning" is very broad.	association, fit a line to the data, use the linear model to solve problems, interpret slope and intercept in context, and justify conclusions using statistical evidence in written, verbal, or visual form.
S1.M.2 — Measurability: 1; Clarity & Accessibility: 1	*Use matrices to represent and manipulate data (e.g., to represent payoffs or incidences relationships in a network). Multiply matrices by scalars to produce new matrices and make sense of this product by connecting it with and without a context. (MP 2, 4)*	Measurability: "Make sense" is not observable. Clarity: "Connecting it with and without a context" is not linguistically clear.	Use matrices to represent and manipulate data in contexts such as payoffs or incidence relationships in a network. Multiply a matrix by a scalar and interpret how the scalar changes the represented quantities in context. (MP 2, 4) Need Feedback Same as A1.M.2
S1.M.3 Math Practice Integration: 0 Math	*Communicate understanding that, unlike multiplication of numbers, matrix multiplication for square matrices is not a commutative operation, but still satisfies the associative and*	The standard does not address MP3; communicating understanding is not the same as communicating an argument.	Explain, using examples or counterexamples, that matrix multiplication for square matrices is not generally commutative, while still

Practice Appropriateness: 0	*distributive properties. (MP 3)*		satisfying the associative and distributive properties. (MP 7) Need feedback Same as A1.M.2
S1.M.4 Math Practice Integration: 0 Math Practice Appropriateness: 0	*Communicate understanding that the zero and identity matrices play a role in matrix addition and multiplication similar to the role of 0 and 1 in the real numbers. The determinant of a square matrix is nonzero if and only if the matrix has a multiplicative inverse. (MP 3)*	The standard does not address MP3; communicating understanding is not the same as communicating an argument.	Explain how zero and identity matrices function in matrix addition and multiplication in ways analogous to 0 and 1 in the real numbers. Determine whether a square matrix has a multiplicative inverse by using its determinant. (MP 7) Need Feedback A1.M.4
Secondary II			
S2.A.1 — Math Practice Integration: 1; Math Practice Appropriateness: 1	*Use the structure of quadratic and exponential expressions by identifying parts of the expression and interpret in context. (ie. Use vertex form of a quadratic to identify the maximum height of an object flying through the air) Use algebraic tools to produce equivalent forms that reveal different properties. (MP 2, 5, 7)*	MP2 is not integrated because the standard does not ask students to make sense of mathematics by adding or removing context. This red added is a similar standard in A1.SSE.2 but didn't have the example	
S2.A.2 —	*Use addition, subtraction and*	MP4 is not integrated because the	Use addition, subtraction, and

Math Practice Integration: 0; Math Practice Appropriateness: 0	*multiplication to build new linear and quadratic functions. (MP 4)*	standard does not address modeling.	multiplication of functions to create new linear and quadratic functions, and describe how the operation changes the resulting function. Need feedback
S2.A.3 — Math Practice Integration: 1; Math Practice Appropriateness: 1	*Build symbolic models of linear and quadratic equations and inequalities, and use them to solve problems in and out of context. (MP 3, 4)*	MP3 is not integrated because the standard does not require justification or communication of an argument. Does MP alignment make this too complex?	Create and use linear and quadratic equations and inequalities to model situations and solve problems in and out of context. Represent solutions using appropriate models and justify how the representation supports the solution. (MP 4) Need Feedback
S2.NS.1 — Measurability: 0; Clarity & Accessibility: 1; Math Practice Integration: 0; Math Practice Appropriaten	*Extend understanding of the structure of integer exponent properties to rational exponents. (MP 8)*	Measurability: “Understanding” is non-observable, and the expected performance is poorly specified. MP8 is not integrated; MP7 may be a better fit.	Apply the properties of integer exponents to rewrite and evaluate expressions with rational exponents, and explain how the exponent properties support the equivalence of the expressions. (MP 7)

ess: 0			
S2.F.1 — Measurability: 1; Clarity & Accessibility: 1	*Understand and interpret the features of a function represented graphically, numerically and symbolically using interval notation and inequalities by applying and removing context. Focus on these key features: domain, range, intervals of increase and/or decrease, location of absolute maximum and/or absolute minimum, and intercepts. Build graphic models that satisfy given key features. (MP 2, 4)*	Measurability: "Understand" is non-observable and the standard does not specify what students should show about function features. Clarity: Performance expectations are difficult to identify.	Interpret key features of functions represented graphically, numerically, symbolically, and in context, including domain, range, intervals of increase or decrease, maximum and minimum values, and intercepts; create graphs that match specified key features.
S2.F.2 — Math Practice Integration: 1; Math Practice Appropriateness: 1	*Determine the average rate of change of a function over a closed interval while attending to precision and reasonableness. Connect the average rate of change with context appropriately. (MP 2, 6)*	MP2 is not integrated because the standard mentions context but does not require students to add or remove context to make sense of mathematics.	Determine the average rate of change of a function over a closed interval, interpret it in context when applicable, and use precise notation and units to explain whether the result is reasonable.
S2.F.3 — Measurability: 1; Clarity & Accessibility: 0	*Build graphic representations that show key features of quadratic, linear, exponential, absolute value and piecewise functions expressed symbolically. Select and use appropriate tools to model with and without technology. (MP 4, 5)*	Clarity: It is unclear whether students are building symbolic representations or creating graphical representations from symbolic forms. "Model with and without technology" is vague.	Create graphs of quadratic, linear, exponential, absolute value, and piecewise functions from symbolic forms, identify key features, and use appropriate tools, including technology when useful.
S2.F.5 —	~~*Select and use algebraic tools to*~~	Measurability and clarity are reduced	Use specified algebraic

Measurability: 1; Clarity & Accessibility: 1	~~*create different but*~~ *Use specified algebraic techniques, such as factoring, completing the square, or rewriting exponential expressions to create equivalent forms of functions that highlight different properties of the function. Contextualize and decontextualize these functions to interpret these properties. (MP 2, 5)*	because the algebraic tools or techniques are not specified.	techniques, such as factoring, completing the square, or rewriting exponential expressions, to create equivalent forms of functions and interpret the properties revealed by each form in mathematical or contextual settings.
S2.F.6 — Measurability: 1	*Build a function that models a quadratic relationship. Use structures and patterns to build an equation that models explicit reasoning, or a recursive process. Attend to the precision of notation and labeling while building and using these models. (MP 4, 6, 7)*	Measurability: The relationship among the sentences is unclear, and "models explicit reasoning" is vague.	Build quadratic functions to model relationships, write equations using explicit or recursive descriptions when appropriate, and use precise notation and labels when representing the model.
S2.F.7 — Measurability: 1; Clarity & Accessibility: 1	*Identify the effect on the graph when replacing f(x) by f(x) + k, kf(x), f(x+k) by exploring specific values of k for quadratic and absolute value functions in and out of context. Attend to precision of language and notation while constructing arguments and carefully evaluate whether the ideas and processes observed during exploration are reasonable. (MP 3, 6)*	Measurability and clarity are reduced because the second sentence is wordy, vague, and does not specify the evidence of proficiency.	Identify and describe how replacing f(x) with f(x) + k, kf(x), or f(x + k) changes the graph of quadratic and absolute value functions. Use specific values of k to compare graphs, and justify the observed changes using precise mathematical language and notation. (MP 3, 6)

			Feedback same as A1.BF.5
S2.F.8 — Measurability: 1; Clarity & Accessibility: 1	*Communicate clear and reasonable arguments to distinguish between situations that can be modeled with quadratic, exponential, and linear functions. Interpret the structure of quadratic functions written in different forms with the features of their graphs. (MP 3, 7)*	Measurability: Contains multiple expectations. Clarity: The first sentence is grammatically awkward, and the relationship between the expectations should be clearer.	Distinguish between situations that can be modeled by quadratic, exponential, or linear functions, and justify the conclusion using features of the situation and the function. Interpret how different equivalent forms of a quadratic function reveal features of its graph. (MP 3, 7) Need feedback same as A1.BF.7
S2.G.1 — Measurability: 1	*Construct, justify and communicate clear and reasonable arguments to prove geometric theorems. Support refinement of reasoning by asking questions. Develop flexibility in creating logical arguments and proofs of various formats, including narrative paragraphs, flow diagrams, two-column format, and diagrams without words. (MP 1, 3)*	Measurability: “Develop flexibility” is not observable.	Construct, justify, and communicate proofs of specified geometric theorems using narrative paragraphs, flow diagrams, two-column proofs, or diagrams. Ask questions to clarify assumptions, relationships, and logical steps in the proof. (MP 1, 3) Need feedback Same as G.CO.8

S2.G.3 — Measurability: 1; Clarity & Accessibility: 1	*Build and use models that include congruence and similarity criteria for triangles to solve problems and to prove relationships in geometric figures. Construct, justify and communicate a clear and reasonable proof of the Pythagorean Theorem using triangle similarity. (MP 3, 4)*	The first sentence is poorly specified, making the expected student performance unclear.	Use congruence and similarity criteria for triangles to solve problems and prove relationships in geometric figures. Construct and communicate a proof of the Pythagorean Theorem using triangle similarity. (MP 3, 7) Need feedback Same as G.SRT.2
S2.G.4 — Measurability: 1; Clarity & Accessibility: 1	*Describe and represent side ratios in right triangles based upon the underlying structure of similarity. Connect consistency across similar right triangles to definitions of trigonometric ratios for acute angles. (MP 7)*	The first sentence is not clear enough to identify the expected performance. Suggested intent is to connect similarity to trigonometric ratios.	Explain that, by similarity, side ratios in right triangles depend only on the measure of the acute angle. Use this relationship to define sine, cosine, and tangent ratios for acute angles. (MP 7) Need feedback Same as G.SRT.3
S2.G.6 — Math Practice Integration: 1; Math Practice	*Flexibly, accurately, and efficiently use trigonometric ratios and the Pythagorean Theorem to solve real-world and mathematical problems that can be modeled with right*	MP2 is not integrated because the standard mentions real-world problems but does not require students to add or remove context.	Use trigonometric ratios and the Pythagorean Theorem to solve real-world and mathematical problems modeled by right triangles. Represent the situation with a

Appropriateness: 1	*triangles. (MP 2, 4)*		diagram, equation, or other model and interpret the solution in context. (MP 4) Need feedback Same as B.SRT.5
S2.G.7 — Measurability: 1; Clarity & Accessibility: 1	*Construct, justify and communicate a clear and reasonable argument that all circles are similar. Connect the underlying structures of similarity to relationships between angles, segments and arcs within circles. (MP 3, 7)*	The second sentence is poorly specified; the intended performance appears to involve using circle similarity to describe relationships among angles, segments, and arcs.	Construct an argument and use evidence to justify that all circles are similar. Use circle similarity to identify and describe relationships among central angles, inscribed angles, chords, secants, tangents, arcs, and segments. (MP 3, 7) Need feedback Same as G.C.1
S2.G.9 — Measurability: 0; Clarity & Accessibility: 1	*Describe and represent, using similarity, the definition of a radian as the ratio of arc length to radius. Create a distinction between arc length and arc measure and be able to attend to precisions while relating each of these to radian measure or the formula for the area of a sector. (MP 6, 7)*	Measurability and clarity are reduced by vague wording, “create a distinction,” and the typo “precisions.”	Use similarity to derive the definition of a radian as the ratio of arc length to radius. Explain the distinction between arc length and arc measure, and use precise language and notation to relate each to radian measure and the formula for sector area. (MP 6, 7)

			Need feedback Same as G.C.3
S2.G.10 — Measurability: 1; Clarity & Accessibility: 1	*Use structures and patterns to work with equations of circles, find different forms of the equations and different defining features of the circle, including the center, radius, and points located on the circle. Use right triangles with the same hypotenuse length, and the Pythagorean Theorem to derive the equation of a circle. (MP 7)*	Measurability and clarity are reduced because "work with" and "use structures and patterns" are vague.	Write and interpret equations of circles in forms that reveal the center, radius, and points on the circle. Derive the equation of a circle by applying the Pythagorean Theorem to right triangles formed by the radius. (MP 7) Need Feedback Same as G.C.4
S2.G.11 — Measurability: 0; Clarity & Accessibility: 1	*Attend to precision and reasonableness with respect to area and volume formulas by applying informal arguments about how area and volume scale under similarity transformations. When scale factor k is applied to a figure, area scales by k^2 and volume scales by k^3. (MP 6)*	Measurability: "Attend to precision and reasonableness" is vague, and the second sentence contains no performance expectation.	Use informal arguments to explain how circumference, area, and volume formulas (circumference of a circle, area of a circle, volume of a cylinder, pyramid, and cone) relate to scaling under similarity transformations. Show that when a figure is scaled by factor k, lengths scale by k, areas scale by k^2, and volumes scale by k^3, and apply these relationships to

S2.D.1			solve problems. (MP 6, 7) Need feedback Examples are included in G.GMC.1 which this standard is the same as.
Secondary III IA			
CS3.A.5 — Clarity & Accessibility: 1; Math Practice Integration: 0	*Create equations and inequalities in one variable to model a ~~context~~ situation and use them to solve problems. Include equations arising from polynomial, exponential, rational and radical functions. (MP ~~3~~, 4)*	Clarity: "Model a context" may confuse readers; "model a situation" is clearer. Math Practice: MP3 is not integrated; MP4 appears to be the intended practice.	
CS3.A.7 — Measurability: 1	*Understand the inverse relationship between exponents and logarithms. Use this relationship to solve problems involving exponents and logarithms. (MP 7)*	Measurability: "Understand" is non-observable; the observable performance is using the inverse relationship to solve problems.	Use the inverse relationship between exponential and logarithmic functions to solve problems involving exponents and logarithms. (MP 7) Need feedback Same as CA2.A.7
CS3.A.12 — Clarity & Accessibility: 1	*Expand and simplify polynomial sums, products, and powers using structures and patterns. (MP 7)*	Clarity: "Simplify" is ambiguous because different polynomial forms may be useful depending on the mathematical purpose.	Expand polynomial sums, products, and powers using algebraic structure and patterns. Write equivalent

			polynomial expressions in forms appropriate to the purpose, such as factored form or standard form. (MP 7) Need feedback Same as CA2.A.12
CS3.F.9 — Measurability: 1; Clarity & Accessibility: 1	*Understand and interpret the features of polynomial, radical, rational or logarithmic functions represented graphically using interval notation and inequalities by applying and removing context. Focus on these key features: domain, range, intervals of increase and/or decreasing, location of absolute maximum and/or absolute minimum, intercepts, asymptotes, and end behavior. Build graphic models that satisfy given key features. (MP 2, 4)*	Measurability: "Understand" is non-observable. Clarity: The phrase about applying and removing context is poorly specified, and the expected performance is hard to identify.	Interpret key features of polynomial, radical, rational, or logarithmic functions represented graphically, including domain, range, intervals of increase or decrease, maximum or minimum values, intercepts, asymptotes, and end behavior. Use interval notation and inequalities to describe these features and create graphs that match specified key features. (MP 2, 7) Need feedback Same as CA2.F.9
CS3.F.10 — Measurability: 0; Clarity &	*Build and use models of periodic phenomena with trigonometric functions that connect real world contexts with amplitude, frequency,*	Measurability: Includes two distinct performance expectations, and "support understanding" is non-observable. Clarity: It is unclear what kind of model is	Use trigonometric functions to model periodic phenomena in real-world contexts, identifying amplitude, frequency, and

Accessibility: 1	*and midline. Use structures and patterns to support understanding of a domain extended beyond 0 to 90 degrees, or 0 to π/2 radians. (MP 4, 7)*	expected.	midline; describe how structure and patterns extend the domain beyond 0 to 90 degrees or 0 to π/2 radians. Need feedback Same as CA2.F.10
CS3.F.11 — Measurability: 1	*Understand and interpret key features (period, midline and amplitude/asymptote) of trigonometric functions represented graphically. Build graphic models that satisfy the given key features. (MP 4)*	Measurability: "Understand" is non-observable; interpreting features and building graphs are the observable actions.	Interpret key features of trigonometric functions represented graphically, including period, midline, amplitude, and asymptotes when applicable, and create graphs that match specified key features. (MP 4.7) Need feedback Same as CA2.F.11
CS3.F.13 — Measurability: 1; Clarity & Accessibility: 1	*Identify the effect on the graph when replacing f(x) by f(x) + k, kf(x), f(kx), f(x+k) by exploring specific values of k for polynomial, radical, exponential, logarithmic, rational, and trigonometric functions in and out of context. Attend to precision of language and notation while constructing arguments and carefully evaluate whether the ideas and processes observed during exploration are reasonable. (MP 3, 6)*	Measurability and clarity are reduced because the second sentence is difficult to parse and does not specify the evidence of proficiency. MP6 may align if rewritten more clearly.	Identify and describe how replacing f(x) with f(x)+k, kf(x), f(kx), or f(x+k) affects graphs of polynomial, radical, exponential, logarithmic, rational, and trigonometric functions in mathematical and contextual settings, and justify conclusions using precise language and notation.

			Need feedback CS2.F.13
CS3.F.17 — Math Practice Integration: 0; Math Practice Appropriateness: 0	*Verify by composition that one function is the inverse of another function. Build an invertible function from a non-invertible function by restricting the domain. (MP ~~4~~, 3, 7~~)~~*	Math Practice: Modeling is not addressed in the language or content of the standard; MP3 or MP7 may be better aligned.	3=construct justify and communicate clear and reasonable arguments 7=describe and represent structures, patterns and relationships
CS3.G.4 — Measurability: 1	~~*Understand and*~~ *apply the Law of Sines and the Law of Cosines to find unknown measurements in right and non-right triangles with and without context. (MP 2)*	Measurability: "Understand" is non-observable; applying the Law of Sines and Law of Cosines is the observable behavior.	Same as CA2.G.1
CS3.G.5 — Measurability: 1	*Use special triangles as tools to construct the unit circle with degrees and radians.* *Describe and represent patterns in the unit circle and use them as tools to evaluate the trigonometric functions at multiples of π/4 and π/6. (MP 5, 7)*	Measurability: The two performance expectations are significant enough that they should be assessed through different tasks.	This is an assessment question. Same as CA2.G.2

Secondary III C			

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Algebra I			
A1.SSE.2 / S2.A.1 Math Practice Integration: 1 Math Practice Appropriateness: 1	*Use the structure of quadratic and exponential expressions by identifying parts of the expression and interpret in context (ie. Use vertex form of a quadratic to identify the maximum height of an object flying through the air).Use algebraic tools to produce equivalent forms that reveal different properties. (MP ~~2~~, 5, 7)*	MP2 not integrated; this standard does not ask students to make sense of mathematical content by adding or removing a context.	
A1.CE.1 / S1.A.2 Clarity & Accessibility: 1 Math Practice Integration: 1	*Build symbolic models of linear equations and inequalities, and use them to solve problems in and out of context. (MP 3, 4)*	"Build symbolic models of linear equations and inequalities" is redundant; linear equations and inequalities are the symbolic models. MP3 is not integrated.	Create and use linear equations and inequalities to model situations and solve real-world context, and explain how the equation or inequality represents the situation.
A1.CE.2 / S2.A.3 Math Practice Integration: 1 Math Practice Appropriateness: 1	*Build symbolic models of linear and quadratic equations and inequalities, and use them to solve problems in and out of context. (MP 3, 4)*	MP3 is not integrated; the standard does not address justification or communicating an argument.	Create and use linear and quadratic equations and inequalities to model situations and solve problems in and out of context. Represent solutions using appropriate models and justify how the representation supports the solution. (MP 4) This addressed the MP

			portion. Is it too complex now?
A1.CE.4 / S1.A.6 Clarity & Accessibility: 1	*Interpret whether a solution of a system of linear equations and inequalities is viable or non-viable using graphic and analytic models. Use models of systems of linear equations and inequalities to interpret whether a solution is viable or non-viable. (MP 4)*	The phrase "Interpret whether a solution of a system of linear equations and inequalities is viable or non-viable" is not grammatically correct. Suggested intent: determine whether a solution is viable or interpret solutions as viable or non-viable options.	Use graphical and analytical models of systems of linear equations and inequalities to determine whether solutions are viable in context.
A1.CE.5 / S2.A.2 Math Practice Integration: 0 Math Practice Appropriateness: 0	*Use addition, subtraction and multiplication to build new linear and quadratic functions. (MP 4)*	Does not address modeling at all.	Use addition, subtraction, and multiplication of functions to create new linear and quadratic functions, and describe how the operation changes the resulting function.
A1.REI.1 / S1.A.4 Clarity & Accessibility: 1	*Solve linear equations and inequalities using algebraic tools, starting from the assumption that a solution exists. Communicate clear arguments for equations that do not have one unique solution and justify the results. Interpret solutions and use both inequality and interval notation. (MP 3, 5)*	"Communicate clear arguments for equations" is not grammatically or mathematically clear and is redundant with "justify the results." Suggested intent: identify linear equations and inequalities that do not have one unique solution and justify the claim.	Solve linear equations and inequalities using algebraic tools, identify cases with no solution or infinitely many solutions, justify the conclusion, and interpret solutions using inequality and interval notation.
A1.NS.1 / S2.NS.1	*Extend understanding of the structure of integer exponent properties to*	"Understanding" is non-observable. Because "understanding of the structure	Apply the properties of integer exponents to rewrite and

Measurability: 0 Clarity & Accessibility: 1 Math Practice Integration: 0 Math Practice Appropriateness: 0	*rational exponents. (MP 8)*	of integer exponents" is poorly specified, it is not clear what the performance expectation would be. MP7 is a better aligned practice.	evaluate expressions with rational exponents, and explain how the exponent properties support the equivalence of the expressions. (MP 7)
A1.IF.2 / S1.F.2 Measurability: 1 Math Practice Integration: 0	*Understand the structure of function notation, 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). (MP 7)*	"Understand" is a non-observable verb; it is not clear what the performance expectation is for proficiency. MP7 is not fully integrated because the lack of an observable verb means there is not a clear measurable performance expectation.	Interpret function notation by identifying the input, output, domain value, and corresponding graph point for a function. Explain that f(x) represents the output of f for input x and that the graph of f is the set of points satisfying y = f(x). (MP 7)
A1.IF.3 / S1.F.3 Math Practice Integration: 1	*Evaluate functions for inputs in their domains and interpret statements that use function notation in terms of a context. (MP 2)*	The second part of the standard is close to MP2 but is not fully integrated.	Evaluate functions for inputs in their domains and interpret statements using function notation in context. Translate between contextual descriptions and function notation to explain what inputs

			and outputs represent. (MP 2)
A1.IF.5 / S1.F.5 Measurability: 1	~~*Understand and*~~ *interpret key* ~~*the*~~ *features of a function represented graphically, numerically and symbolically using interval notation and inequalities by applying and removing context. Focus on these key features: domain, range, intervals of increase and/or decreasing, location of absolute maximum and/or absolute minimum, and intercepts. Build graphic models that satisfy given key features. (MP 2, 4)*	"Understand" is non-observable and the standard does not specify what a student should understand. The.	
A1.IF.6 / S2.F.5 Measurability: 1 Clarity & Accessibility: 1	~~*Select and use algebraic tools to create different but*~~ *Use specified algebraic techniques, such as factoring, completing the square, or rewriting exponential expressions to create equivalent forms of functions that highlight different properties of the function. Contextualize and decontextualize these functions to interpret these properties. (MP 2, 5)*	The particular algebraic tools or techniques need to be specified; otherwise the performance expectation will not be clear.	
A1.IF.7 / S2.F.2 Math Practice Integration: 1 Math	*Determine the average rate of change of a function over a closed interval while attending to precision and reasonableness. Connect the average rate of change with context*	MP2 is not integrated. The standard mentions contextual problems but does not require students to make sense of mathematics by adding or removing a context.	Determine the average rate of change of a function over a closed interval, interpret it in context when applicable, and use precise notation and units to explain whether the result is

Practice Appropriateness: 1	*appropriately. (MP 2, 6)*		reasonable. Clearer expectations
A1.IF.8 / S2.F.3 Measurability: 1 Clarity & Accessibility: 0	*Build graphic representations that show key features of quadratic, linear, exponential, absolute value and piecewise functions expressed symbolically. Select and use appropriate tools to model with and without technology. (MP 4, 5)*	The first performance expectation is unnecessarily wordy and ambiguous. It is unclear whether students should build symbolic representations or generate other representations from symbolic forms. “Select and use appropriate tools to model with and without technology” is also vague.	Create graphs of quadratic, linear, exponential, absolute value, and piecewise functions from symbolic forms, identify key features, and use appropriate tools, including technology when useful. (MP 4, 5)
A1.BF.1 / S1.F.8 Measurability: 1	*Build a function that models linear or exponential relationships. Appropriately use explicit and recursive rules to model these relationships and translate between the two forms. (MP 4)*	The standard includes distinct performance expectations that should be assessed separately.	Build a linear or exponential function to model a relationship between two quantities. Write the function using an explicit rule or a recursive rule, and translate between explicit and recursive forms when both are appropriate for the relationship. (MP 4) Original
A1.BF.2 / S2.F.6 Measurability: 1	*Build a function that models a quadratic relationship. Use structures and patterns to build an equation that models explicit reasoning, or a recursive process. Attend to the precision of notation and labeling while*	The relationship between the first two sentences is unclear. “Models explicit reasoning” is unclear.	Build quadratic functions to model relationships, write equations using explicit or recursive descriptions when appropriate, and use precise notation and labels when

	building and using these models. (MP 4, 6, 7)		representing the model. (MP 4, 6, 7) Looking for some feedback
A1.BF.4 / S1.F.10 Measurability: 1	*Use structures and patterns to identify the effect of k on the graph when replacing f(x) by f(x) + k. Explore specific values of k for linear and exponential functions in and out of context. (MP 7)*	"Explore" is non-observable; the standard does not specify what structures and patterns students should use to identify the effect of k on the graph, or how.	Identify and describe how replacing f(x) with f(x) + k changes the graph of a linear or exponential function. Use tables, graphs, or equations to compare several values of k and explain the effect in context and without context. (MP 7)
A1.BF.5 / S2.F.7 Measurability: 1 Clarity & Accessibility: 1	*Identify the effect on the graph when replacing f(x) by f(x) + k, kf(x), f(x+k) by exploring specific values of k for quadratic and absolute value functions in and out of context. Attend to precision of language and notation while constructing arguments and carefully evaluate whether the ideas and processes observed during exploration are reasonable. (MP 3, 6)*	The second sentence is extremely wordy and vague; it is unclear what behaviors a teacher would look for to assess proficiency.	Identify and describe how replacing f(x) with f(x) + k, kf(x), or f(x + k) changes the graph of quadratic and absolute value functions. Use specific values of k to compare graphs, and justify the observed changes using precise mathematical language and notation. (MP 3, 6)
A1.BF.6 / S1.F.11	*Communicate clear and reasonable arguments to distinguish between*	"Communicate clear and reasonable arguments to distinguish between	Distinguish between situations that can be modeled by linear

Measurability: 1 Clarity & Accessibility: 1	*situations that can be modeled with linear functions, exponential functions, or neither. Connect the structure of linear and exponential functions with their parameters, (y=mx+b, y=bx(a)). Justify that a quantity increasing exponentially eventually exceeds a quantity increasing linearly. (MP 3, 7)*	situations that can be modeled…" is not grammatically correct. Suggested intent: distinguish between situations modeled by linear, exponential, or neither and justify the conclusion.	functions, exponential functions, or neither, and justify the conclusion using features of the situation and the function. Connect the parameters of linear and exponential functions to their meanings, and justify why exponential growth eventually exceeds linear growth. (y=mx+b, y=bx(a)). (MP 3, 7) feedback
A1.BF.7 / S2.F.8 Measurability: 1 Clarity & Accessibility: 1	*Communicate clear and reasonable arguments to distinguish between situations that can be modeled with quadratic, exponential, and linear functions. Interpret the structure of quadratic functions written in different forms with the features of their graphs. (MP 3, 7)*	"Communicate clear and reasonable arguments to distinguish between situations that can be modeled…" is not grammatically correct. Suggested intent: distinguish between situations modeled by quadratic, exponential, or linear functions and justify the conclusion.	Distinguish between situations that can be modeled by quadratic, exponential, or linear functions, and justify the conclusion using features of the situation and the function. Interpret how different equivalent forms of a quadratic function reveal features of its graph. (MP 3, 7) Need feedback
A1.M.2 / S1.M.2	*Use matrices to represent and manipulate data (e.g., to represent*	"Make sense" is not observable. It is also unclear what is meant by "connecting it	Use matrices to represent and manipulate data in contexts

Measurability: 1 Clarity & Accessibility: 1 Math Practice Integration: 1	*payoffs or incidences relationships in a network). Multiply matrices by scalars to produce new matrices and make sense of this product by connecting it with and without a context. (MP 2, 4)*	with and without a context"; "connecting it without a context" is not linguistically clear or mathematically precise.	such as payoffs or incidence relationships in a network. Multiply a matrix by a scalar and interpret how the scalar changes the represented quantities in context. (MP 2, 4) Need Feedback
A1.M.3 / S1.M.3 Math Practice Integration: 0 Math Practice Appropriateness: 0	*Communicate understanding that, unlike multiplication of numbers, matrix multiplication for square matrices is not a commutative operation, but still satisfies the associative and distributive properties. (MP 3)*	The standard does not address MP3; communicating understanding is not the same as communicating an argument.	Explain, using examples or counterexamples, that matrix multiplication for square matrices is not generally commutative, while still satisfying the associative and distributive properties. (MP 7) Need Feedback
A1.M.4 / S1.M.4 Math Practice Integration: 0 Math Practice Appropriateness: 0	*Communicate understanding that the zero and identity matrices play a role in matrix addition and multiplication similar to the role of 0 and 1 in the real numbers. The determinant of a square matrix is nonzero if and only if the matrix has a multiplicative inverse. (MP 3)*	The standard does not address MP3; communicating understanding is not the same as communicating an argument.	Explain how zero and identity matrices function in matrix addition and multiplication in ways analogous to 0 and 1 in the real numbers. Determine whether a square matrix has a multiplicative inverse by using its determinant. (MP 7) Need Feedback

Geometry			
G.CO.2 / S1.G.2 Measurability: 1 Clarity & Accessibility: 1 Math Practice Integration: 0	*Construct and clearly communicate definitions of the rigid transformations to show that these transformations are functions that take points in the plane as inputs and give corresponding points as outputs. (MP 3)*	. Measurability and clarity: "Construct definitions" is vague and may not be appropriate if students are expected to generate formal definitions. MP3 is not integrated because communicating a definition is not the same as communicating an argument.	Describe rigid transformations as functions that assign each point in the plane to a corresponding image point. Use examples to communicate how translations, rotations, and reflections preserve distance and angle measure. (MP 1, 7) Need feedback
G.CO.3 / S1.G.3 Measurability: 0 Clarity & Accessibility: 0	*Select and use tools to strategically perform rigid transformations. Attend to precision when identifying and describing the transformation or the sequence of transformations to determine whether or not two figures are congruent. Understand that the image created from a rigid transformation or a sequence of rigid transformations is congruent to the pre-image. (MP 5, 6)*	"Strategically," "attend to precision," and "understand" are not observable or sufficiently specified; the performance expectations are unclear.	Perform rigid transformations using appropriate tools, and identify and describe the transformation or sequence of transformations used. Determine whether two figures are congruent by showing that one can be mapped onto the other through a sequence of rigid transformations. (MP 5, 6) Need feedback
G.CO.4 / S1.G.4	*Construct and communicate clear and reasonable arguments about reflection and rotational symmetries of*	"Clear and reasonable" is subjective; the arguments and attributes students should address are not specified.	Use reflections and rotations to identify and justify specific symmetry properties of

Measurability: 0 Clarity & Accessibility: 0	*parallelograms and regular polygons. Use reflections and rotations to informally justify attributes of parallelograms including rhombus, rectangles and squares. (MP 3)*	"Informally" is unclear.	parallelograms and regular polygons. Explain how these transformations support selected attributes of rectangles, rhombi, squares, and parallelograms. (MP 3). Need feedback clearer
G.CO.5 / S1.G.5 Measurability: 1 Clarity & Accessibility: 1	*Precisely construct geometric objects including equilateral triangle, rhombus, square, parallel line, perpendicular bisector, and angle bisector. Communicate clearly about the use of geometric construction tools and analyze the underlying structure of geometric objects as revealed by the tools. (MP 3)*	It is not clear what tools students are expected to use or what revealed underlying structure they should communicate about.	Use compass, straightedge, or dynamic geometry tools to construct an equilateral triangle, rhombus, square, parallel line, perpendicular bisector, and angle bisector. Explain how the construction steps rely on geometric properties. (MP 5, 7)
G.CO.8 / S2.G.1 Measurability: 1	*Construct, justify and communicate clear and reasonable arguments to prove geometric theorems. Support refinement of reasoning by asking questions. Develop flexibility in creating logical arguments and proofs of various formats, including: narrative paragraphs, flow diagrams, two-column format, and diagrams without words. (MP 1, 3) Proofs should*	"Develop flexibility" is not observable; the evidence of proficiency is unclear.	Construct, justify, and communicate proofs of specified geometric theorems using narrative paragraphs, flow diagrams, two-column proofs, or diagrams. Ask questions to clarify assumptions, relationships, and logical steps in the proof.

	focus on:		(MP 1, 3) Need feedback
G.SRT.2 / S2.G.3 Measurability: 1 Clarity & Accessibility: 1	*Build and use models that include congruence and similarity criteria for triangles to solve problems and to prove relationships in geometric figures. Construct, justify and communicate a clear and reasonable proof of the Pythagorean Theorem using triangle similarity. (MP 3, 4)*	The first sentence is not measurable due to clarity issues; it is unclear what "models that include congruence and similarity criteria" means.	Use congruence and similarity criteria for triangles to solve problems and prove relationships in geometric figures. Construct and communicate a proof of the Pythagorean Theorem using triangle similarity. (MP 3, 7) Need feedback
G.SRT.3 / S2.G.4 Measurability: 1 Clarity & Accessibility: 1	*Describe and represent side ratios in right triangles based upon the underlying structure of similarity. Connect consistency across similar right triangles to definitions of trigonometric ratios for acute angles. (MP 7)*	The first sentence is not clear enough to understand what is expected of students. Suggested intent: explain that by similarity, side ratios in right triangles are properties of the angles.	Explain that, by similarity, side ratios in right triangles depend only on the measure of the acute angle. Use this relationship to define sine, cosine, and tangent ratios for acute angles. (MP 7) Need feedback
G.SRT.5 / S2.G.6 Math	*Flexibly, accurately, and efficiently use trigonometric ratios and the Pythagorean Theorem to solve*	MP2 is not integrated. The standard mentions real-world problems but does not require students to make sense of	Use trigonometric ratios and the Pythagorean Theorem to solve real-world and

Practice Integration: 1 Math Practice Appropriateness: 1	*real-world and mathematical problems that can be modeled with right triangles. (MP 2, 4)*	mathematics by adding or removing a context.	mathematical problems involving right triangles. Represent the situation with a diagram, equation, or other model and interpret the solution in context. (MP 4)
G.C.1 / S2.G.7 Measurability: 1 Clarity & Accessibility: 1	*Construct, justify and communicate a clear and reasonable argument that all circles are similar. Connect the underlying structures of similarity to relationships between angles, segments and arcs within circles. (MP 3, 7)*	The second sentence is not specific enough. Suggested intent: using similarity of all circles, identify and describe relationships between angles, segments, and arcs within circles.	Construct an argument and use evidence to justify that all circles are similar. Use circle similarity to identify and describe relationships among central angles, inscribed angles, chords, secants, tangents, arcs, and segments. (MP 3, 7)
G.C.3 / S2.G.9 Measurability: 0 Clarity & Accessibility: 1	*Describe and represent, using similarity, the definition of a radian as the ratio of arc length to radius. Create a distinction between arc length and arc measure and be able to attend to precisions while relating each of these to radian measure or the formula for the area of a sector. (MP 6, 7)*	"Describe and represent" creates confusion where "derive" would be clearer. "Create a distinction" is unclear. "Attend to precisions" is grammatically incorrect and unclear.	Use similarity to derive the definition of a radian as the ratio of arc length to radius. Explain the distinction between arc length and arc measure, and use precise language and notation to relate each to radian measure and the formula for sector area. (MP 6, 7) Need feedback
G.C.4 /	*Use structures and patterns to work*	"Work with" is vague and poorly	Write and interpret equations

S2.G.10 Measurability: 1 Clarity & Accessibility: 1	*with equations of circles, find different forms of the equations and different defining features of the circle, including the center, radius, and points located on the circle. Use right triangles with the same hypotenuse length, and the Pythagorean Theorem to derive the equation of a circle. (MP 7)*	specified. “Use structures and patterns” should also be specified.	of circles in forms that reveal the center, radius, and points on the circle. Derive the equation of a circle by applying the Pythagorean Theorem to right triangles formed by the radius. (MP 7) Need feedback
G.GMD.1 / S2.G.11 Measurability: 0 Clarity & Accessibility: 1	*Attend to precision and reasonableness with respect to area and volume formulas (circumference of a circle, area of a circle, volume of a cylinder, pyramid, and cone) by applying informal arguments about how area and volume scale under similarity transformations. When scale factor k is applied to a figure, area scales by k^2 and volume scales by k^3. (MP 6)*	“Attend to precision and reasonableness” is vague; the second sentence contains no performance expectation. The standard may intend to include informal arguments for area and volume formulas but does not currently include those performance expectations.	Use informal arguments to explain how circumference, area, and volume formulas (circumference of a circle, area of a circle, volume of a cylinder, pyramid, and cone) relate to scaling under similarity transformations. Show that when a figure is scaled by factor k, lengths scale by k, areas scale by k^2, and volumes scale by k^3, and apply these relationships to solve problems. (MP 6, 7) Need feedback
G.GMD.2 / S3.G.1	*Use geometric shapes, their measures, and their properties to model real world*	”Ask targeted questions” is poorly specified and high inference; assessors	Use geometric shapes, measures, and properties to

Measurability: 1 Clarity & Accessibility: 1	*objects and solve design problems (e.g., designing an object or structure to satisfy physical constraints or minimize cost). Use these models to ask targeted and probing questions with respect to area and volume in context. (MP 1, 2, 4)*	must use judgment to decide whether questions are targeted.	model real-world objects and solve design problems (e.g., designing an object or structure to satisfy physical constraints or minimize cost). Use the model to answer and pose specific questions about area, volume, constraints, or optimization in context. (MP 1, 4) Need feedback
G.GMD.3 / S3.G.2 Clarity & Accessibility: 1	*Apply concepts of density based on area and volume in modeling situations. (MP4)*	The phrase "concepts of density" may be confusing or unclear for some readers.	Apply area density and volume density to model situations, such as population per unit area or mass per unit volume, and interpret the results in context. (MP 4)
Algebra II IA			
A2.A.2 / S3.A.2 Math Practice Integration: 0	*Create equations and inequalities in one variable to model a context and use them to solve problems. Include equations arising from linear, quadratic, simple cubic (e.g., f(x)=2x^3), simple exponential, square root and cube root functions. (MP~~3~~ 4)*	Looks like this was a typo and that MP 4 is the practice that was intended.	
A2.A.3 / S3.A.3 Math	*For exponential models, express as a logarithm the solution to f(t)=ab^ct = d where a, c, and d are numbers, and*	MP 2 could be appropriate, but the standard language does not suggest that MP 2 is the focus; MP 4 and MP 5 are	

Practice Integration: 0	*the base b is 2 or 10; evaluate the logarithm using technological tools and interpret the result in relation to the model. (MP 4, 5).* ~~*(MP 2)*~~	more obvious choices.	
A2.F.1 / S3.F.1 Measurability: 1 Clarity & Accessibility: 1	*Understand and interpret the features of polynomial, radical or logarithmic functions represented graphically using interval notation and inequalities by applying and removing context. Focus on these key features: domain, range, intervals of increase and/or decrease, location of absolute maximum and/or absolute minimum, intercepts and end behavior. Build graphic models that satisfy given key features. (MP 2, 4)*	"Understand" is non-observable. The phrase "by applying and removing context" is poorly specified and unclear as a performance expectation.	Interpret key features of polynomial, radical, and logarithmic functions represented graphically, including domain, range, intervals of increase or decrease, maximum or minimum values, intercepts, and end behavior. Use interval notation and inequalities to describe these features and create graphs that match specified key features. (MP 2, 7) Clearer Need feedback
A2.F.2 / S3.F.2 Measurability: 0 Clarity & Accessibility: 1	*Build and use models of periodic phenomena with sine and cosine functions that connect real world contexts with amplitude, frequency, and midline. Use structures and patterns to support understanding of a domain extended beyond 0 to 90 degrees, or 0 to π / 2 radians. (MP 4,*	The standard includes two distinct performance expectations. "Model" is broad, and "support understanding" is unobservable. It is unclear what kind of model is expected.	Build and use tables, graphs, equations, or contextual models of periodic phenomena using sine and cosine functions. Interpret amplitude, frequency,

	7)		period, and midline in context, and use patterns in the graph or unit circle to extend the domain beyond 0 to 90 degrees or 0 to π/2 radians. (MP 4, 7) Could be two different standards depending on how we assess. Need feedback
A2.F.3 / S3.F.3 Measurability: 1	~~*Understand and*~~ *interpret key features (period, midline and amplitude) of sine and cosine functions represented graphically. Build graphic models that satisfy the given key features. (MP 4,7)*	"Understand" is a non-observable verb. Consider removing it because interpreting features is the observable behavior.	
A2.F.5 / S3.F.5 Measurability: 1 Clarity & Accessibility: 1 Math Practice Integration: 1	*Identify the effect on the graph when replacing f(x) by f(x) + k, kf(x), f(x+k) by exploring specific values of k for polynomial, square root, cube root, exponential, logarithmic, and trigonometric functions in and out of context. Attend to precision of language and notation while constructing arguments and carefully evaluate whether the ideas and processes observed during exploration are reasonable. (MP 3, 6)*	The second sentence is unclear and difficult to parse. It is not clear what "attend to precision" or "carefully evaluate whether the ideas and processes observed during exploration are reasonable" means as a performance expectation. MP 6 may align if rewritten.	Identify and describe how replacing f(x) with f(x)+k, kf(x), f(kx), or f(x+k) changes graphs of polynomial, radical, exponential, logarithmic, and trigonometric functions. Use specific values of k to compare representations and justify the observed transformations using precise notation and mathematical language. (MP 3, 6, 7)

			Do you want to specifically state square root and cube or will radical work?
A2.D.1 / S3.D.1 Measurability: 1 Clarity & Accessibility: 1	*Describe and represent structures and patterns of data on two categorical variables. Attend to precision and reasonableness when summarizing categorical data in two-way frequency models, and construct, justify, and communicate clear and reasonable arguments about possible associations and trends in the data. (MP 3, 6, 7)*	"Attend to precision and reasonableness" is poorly specified. The phrase "structures and patterns of data on two categorical variables" is difficult to parse.	Describe and represent patterns in data involving two categorical variables using two-way frequency tables or related displays. Summarize categorical data accurately and construct arguments about possible associations and trends using evidence from the data. (MP 3,6) Need feedback
A2.D.3 / S3.D.3 Measurability: 1 Clarity & Accessibility: 1 Math Practice Integration: 0	*Use multiple representations as tools to describe and represent structure to build understanding of the addition rule, $P(A \cup B) = P(A) + P(B) - P(A \cap B)$. Understand the conditional probability of A given B as $P(A \cap B)/P(B)$. Interpret independence of A and B as saying that the conditional probability of B given A is the same as the probability of B. (MP 7)*	"Understand" is non-observable. The opening clause is difficult to parse. MP 7 may align, but the clarity and measurability issues make it difficult to determine whether MP 7 is meaningfully integrated.	Use tables, diagrams, or formulas to explain and apply the addition rule $P(A \cup B)=P(A)+P(B)-P(A \cap B)$. Calculate and interpret conditional probability using $P(A \cap B)/P(B)$, and determine whether events are independent by comparing conditional and marginal probabilities. (MP 3, 7)

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A2.D.4 / S3.D.4 Measurability: 1	*Use the mean and standard deviation of a data set to fit it a normal distribution and to estimate population percentages. Recognize that there are data sets for which such a procedure is not appropriate. Select and use physical and/or tech tools to estimate areas under the normal curve. (MP 5)*	The first two performance expectations are closely related, but the third is a separate skill. "Recognize" is non-observable; use "Identify" instead.	Use the mean and standard deviation of a data set to model the data with a normal distribution and estimate population percentages. Identify data sets for which a normal model is not appropriate, and use physical or technological tools to estimate areas under the normal curve. (MP 5, 6) Need feedback
A2.D.6 / S3.D.6 Measurability: 1 Clarity & Accessibility: 1	*Select appropriate statistical tools to implement a data collection plan for primary data related to an investigative question. When using secondary data, assess its validity and relevance to answering the question. Construct an argument justifying the chosen data collection method (survey, observational study or experiment). Understand and apply best practices for designing sample surveys, experiments, and observational studies. (MP 3, 5)*	"Understand" is non-observable. Additional guidance is needed regarding best practices so educators and assessors can determine proficiency.	Select appropriate statistical tools to implement a data collection plan for an investigative question. Assess the validity and relevance of secondary data, justify the chosen data collection method, and describe and apply specified best practices for designing surveys, experiments, or observational studies. (MP 3, 5) Clearer Need Feedback

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A2.D.7 / S3.D.7 Measurability: 1 Clarity & Accessibility: 1	*Attend to precision and reasonableness when summarizing and organizing collected data to answer an investigative question using tables, graphs, and numerical summary statistics. Use models from sample data to estimate population means or proportions. Employ simulation models for random sampling to determine approximate sampling distributions and compute p-values from those distributions. (MP 4, 6)*	"Attend to precision and reasonableness" is poorly specified. "Use models from sample data" is mathematically imprecise because sample data can be used to create a model but is not itself the model.	Summarize and organize collected data using tables, graphs, and numerical summary statistics to answer an investigative question. Use sample data to estimate population means or proportions, and use simulation models for random sampling to approximate sampling distributions and compute p-values. (MP 4, 6) Need feedback
A2.D.8 / S3.D.8 Measurability: 1	*Use statistical evidence from the analyses to evaluate results and answer questions. Identify ways to refine investigative questions, data collection, visualization, or analysis. Justify outcomes or estimates of population characteristics, considering their plausibility compared to chance variation, in a variety of formats (verbal, written, visual). Communicate the interpretation of simulated p-values and determine statistical significance. (MP 3, 8)*	The standard contains multiple distinct performance expectations. A student could be proficient in one part without being proficient in the others, making it difficult to assess with a single performance.	Use statistical evidence to answer investigative questions and evaluate results. Justify outcomes or estimates of population characteristics by considering chance variation, communicate interpretations of simulated p-values, and determine statistical significance. Identify refinements to the question, data collection, visualization, or analysis when supported by the evidence. (MP 3, 8)

			Should this be split into two standards? Feedback
CA2.A.5 / CS3.A.5 Clarity & Accessibility: 1 Math Practice Integration: 0	*Create equations and inequalities in one variable to model a ~~context~~ situation and use them to solve problems. Include equations arising from polynomial, exponential, rational and radical functions. (MP ~~3~~ 4)*	"Model a context" may cause confusion; "model a situation" is clearer. MP 4 appears to be the intended practice.	Create equations and inequalities in one variable to model a situation and use them to solve problems, including equations arising from polynomial, exponential, rational, and radical functions. (MP 4)
CA2.A.6 / CS3.A.6 Math Practice Integration: 1 Math Practice Appropriateness: 1	*For exponential models, express as a logarithm the solution to f(t)=ab^ct = d where a, b, c, and d are numbers, b>0; evaluate the logarithm using technological tools. Justify and use the properties of logarithms to generate equivalent expressions, connecting them to the properties of exponents. (MP ~~2~~,5, 3)*	MP 2 could be appropriate, but the standard language does not suggest that MP 2 is the focus; MP 5 appears to be intended.	For exponential models, express the solution to f(t)=ab^ct=d as a logarithm where a, b, c, and d are numbers and b>0. Evaluate logarithms using technological tools, and justify equivalent logarithmic expressions using properties of logarithms and their connection to exponent properties. (MP 3, 5, 7)
CA2.A.7 / CS3.A.7 Measurability: 1	*Understand the inverse relationship between exponents and logarithms. Use this relationship to solve problems involving exponents and logarithms. (MP 7)*	"Understand" is non-observable. Consider removing the first sentence and focusing on use of the inverse relationship.	Use the inverse relationship between exponential and logarithmic functions to solve problems involving exponents and logarithms. (MP 7)

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			Need feedback
CA2.A.12 / CS3.A.12 Clarity & Accessibility: 1	*Expand and simplify polynomial sums, products, and powers using structures and patterns. (MP 7)*	"Simplify" is ambiguous in mathematics and should be avoided unless the intended form is specified.	Expand polynomial sums, products, and powers using algebraic structure and patterns. Write equivalent polynomial expressions in forms appropriate to the purpose, such as factored form or standard form. (MP 7)
CA2.F.9 / CS3.F.9 Measurability: 1 Clarity & Accessibility: 1	*Understand and interpret the features of polynomial, radical, rational or logarithmic functions represented graphically using interval notation and inequalities by applying and removing context. Focus on these key features: domain, range, intervals of increase and/or decreasing, location of absolute maximum and/or absolute minimum, intercepts, asymptotes, and end behavior. Build graphic models that satisfy given key features. (MP 2, 4)*	"Understand" is non-observable. The phrase "by applying and removing context" is unclear as a performance expectation.	Interpret key features of polynomial, radical, rational, or logarithmic functions represented graphically, including domain, range, intervals of increase or decrease, maximum or minimum values, intercepts, asymptotes, and end behavior. Use interval notation and inequalities to describe these features and create graphs that match specified key features. (MP 2, 7)
CA2.F.10 / CS3.F.10 Measurabilit	*Build and use models of periodic phenomena with trigonometric functions that connect real world contexts with amplitude, frequency,*	This standard includes two performance expectations. "Model" is broad and "support understanding" is unobservable; it is unclear what kind of model is	Use trigonometric functions to model periodic phenomena in real-world contexts, identifying amplitude, frequency, and

y: 0 Clarity & Accessibility: 1	*and midline. Use structures and patterns to support understanding of a domain extended beyond 0 to 90 degrees, or 0 to π /2 radians. (MP 4, 7)*	expected.	midline; describe how structure and patterns extend the domain beyond 0 to 90 degrees or 0 to π/2 radians. Need Feedback
CA2.F.11 / CS3.F.11 Measurability: 1	*Understand and interpret key features (period, midline and amplitude/asymptote) of trigonometric functions represented graphically. Build graphic models that satisfy the given key features. (MP 4)*	"Understand" is non-observable. Consider removing it because interpreting features is the observable behavior.	Interpret key features of trigonometric functions represented graphically, including period, midline, amplitude, and asymptotes when applicable, and create graphs that match specified key features. (MP 4,7) Need feedback
CA2.F.13 / CS3.F.13 Measurability: 1 Clarity & Accessibility: 1 Math Practice Integration: 1	*Identify the effect on the graph when replacing f(x) by f(x) + k, kf(x), f(kx), f(x+k) by exploring specific values of k for polynomial, radical, exponential, logarithmic, rational, and trigonometric functions in and out of context. Attend to precision of language and notation while constructing arguments and carefully evaluate whether the ideas and processes observed during exploration are reasonable. (MP 3, 6)*	The second sentence is unclear and difficult to parse. It is not clear what "attend to precision" or "carefully evaluate whether the ideas and processes observed during exploration are reasonable" means as a performance expectation.	Identify and describe how replacing f(x) with f(x)+k, kf(x), f(kx), or f(x+k) affects graphs of polynomial, radical, exponential, logarithmic, rational, and trigonometric functions in mathematical and contextual settings, and justify conclusions using precise language and notation. (MP 3, 6) Need feedback
CA2.F.17 /	*Verify by composition that one function*	Modeling is not addressed in the	3 construct justify and

CS3.F.17 Math Practice Integration: 0 Math Practice Appropriateness: 0	*is the inverse of another function. Build an invertible function from a non-invertible function by restricting the domain. (MP ~~4~~, 3, 7~~)~~*	language or content of this standard. MP 3 and MP 7 are better aligned.	communicate clear and reasonable arguments 7 describe and represent structures, patterns and relationships
CA2.G.1 / CS3.G.4 Measurability: 1	~~*Understand and*~~ *apply the Law of Sines and the Law of Cosines to find unknown measurements in right and non-right triangles with and without context. (MP 2)*	"Understand" is non-observable. Applying the Law of Sines and Law of Cosines is the observable behavior.	
CA2.G.2 / CS3.G.5 Measurability: 1	*Use special triangles as tools to construct the unit circle with degrees and radians.* *Describe and represent patterns in the unit circle and use them as tools to evaluate the trigonometric functions at multiples of π / 4 and π / 6. (MP 5, 7)*	The two performance expectations are significant enough that they should be assessed through different tasks.	This is an assessment question?
Algebra II C			
A2.A.2 / S3.A.2 Math Practice	*Create equations and inequalities in one variable to model a context and use them to solve problems. Include equations arising from linear, quadratic, simple cubic (e.g.,*	Looks like this was a typo and that MP 4 is the practice that was intended.	

Integration: 0	*f(x)=2x^3), simple exponential, square root and cube root functions. (MP ~~3~~ 4)*		
A2.A.3 / S3.A.3 Math Practice Integration: 0	*For exponential models, express as a logarithm the solution to f(t)=ab^ct = d where a, c, and d are numbers, and the base b is 2 or 10; evaluate the logarithm using technological tools and interpret the result in relation to the model. (MP 4, 5).* ~~*(MP 2)*~~*.*	MP 2 could be appropriate, but the standard language does not suggest that MP 2 is the focus; MP 4 and MP 5 are more obvious choices.	Need feedback
A2.F.1 / S3.F.1 Measurability: 1 Clarity & Accessibility: 1	*Understand and interpret the features of polynomial, radical or logarithmic functions represented graphically using interval notation and inequalities by applying and removing context. Focus on these key features: domain, range, intervals of increase and/or decrease, location of absolute maximum and/or absolute minimum, intercepts and end behavior. Build graphic models that satisfy given key features. (MP 2, 4)*	"Understand" is non-observable. The phrase "by applying and removing context" is poorly specified and unclear as a performance expectation.	Interpret key features of polynomial, radical, and logarithmic functions represented graphically, including domain, range, intervals of increase or decrease, maximum or minimum values, intercepts, and end behavior. Use interval notation and inequalities to describe these features and create graphs that match specified key features. (MP 2, 7) Clearer Need feedback A2.F.1
A2.F.2 / S3.F.2	*Build and use models of periodic phenomena with sine and cosine functions that connect real world*	The standard includes two distinct performance expectations. "Model" is broad, and "support understanding" is	Build and use tables, graphs, equations, or contextual models of periodic

Measurability: 0 Clarity & Accessibility: 1	*contexts with amplitude, frequency, and midline. Use structures and patterns to support understanding of a domain extended beyond 0 to 90 degrees, or 0 to π / 2 radians. (MP 4, 7)*	unobservable. It is unclear what kind of model is expected.	phenomena using sine and cosine functions. Interpret amplitude, frequency, period, and midline in context, and use patterns in the graph or unit circle to extend the domain beyond 0 to 90 degrees or 0 to π/2 radians. (MP 4, 7) Could be two different standards depending on how we assess. Need feedback
CA2.A.5 / CS3.A.5 Clarity & Accessibility: 1 Math Practice Integration: 0	*Create equations and inequalities in one variable to model a ~~context~~ situation and use them to solve problems. Include equations arising from polynomial, exponential, rational and radical functions. (MP ~~3~~, 4)*	"Model a context" may cause confusion; "model a situation" is clearer. MP 4 appears to be the intended practice.	
CA2.A.7 / CS3.A.7 Measurability: 1	*Understand the inverse relationship between exponents and logarithms. Use this relationship to solve problems involving exponents and logarithms. (MP 7)*	"Understand" is non-observable. Consider removing the first sentence and focusing on use of the inverse relationship.	Use the inverse relationship between exponential and logarithmic functions to solve problems involving exponents and logarithms. (MP 7)

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			Need feedback
CA2.G.1 / CS3.G.4 Measurability: 1	~~*Understand and*~~ *apply the Law of Sines and the Law of Cosines to find unknown measurements in right and non-right triangles with and without context. (MP 2)*	"Understand" is non-observable. Applying the Law of Sines and Law of Cosines is the observable behavior.	
CA2.G.2 / CS3.G.5 Measurability: 1	*Use special triangles as tools to construct the unit circle with degrees and radians. Describe and represent patterns in the unit circle and use them as tools to evaluate the trigonometric functions at multiples of π / 4 and π / 6. (MP 5, 7)*	The two performance expectations are significant enough that they should be assessed through different tasks.	This is an assessment question. Should these be divided into two standards?
Algebra II DS			
A2.A.2 / S3.A.2 Math Practice Integration: 0	~~*Create equations and inequalities in one variable to model a context and use them to solve problems. Include equations arising from linear, quadratic, simple cubic (e.g., f(x)=2x^3), simple exponential, square root and cube root functions. (MP 3 4)*~~	Looks like this was a typo and that MP 4 is the practice that was intended.	
A2.F.2 / S3.F.2 Measurability: 0 Clarity &	~~*Build and use models of periodic phenomena with sine and cosine functions that connect real world contexts with amplitude, frequency, and midline. Use structures and patterns to support understanding of a*~~	The standard includes two distinct performance expectations. "Model" is broad, and "support understanding" is unobservable. It is unclear what kind of model is expected.	Build and use tables, graphs, equations, or contextual models of periodic phenomena using sine and cosine functions.

Accessibility: 1	~~*domain extended beyond 0 to 90 degrees, or 0 to π / 2 radians. (MP 4, 7)*~~		Interpret amplitude, frequency, period, and midline in context, and use patterns in the graph or unit circle to extend the domain beyond 0 to 90 degrees or 0 to π/2 radians. (MP 4, 7) Could be two different standards depending on how we assess. Need feedback Same as A2.F.2
A2.D.1 / S3.D.1 Measurability: 1 Clarity & Accessibility: 1	~~*Describe and represent structures and patterns of data on two categorical variables. Attend to precision and reasonableness when summarizing categorical data in two-way frequency models, and construct, justify, and communicate clear and reasonable arguments about possible associations and trends in the data. (MP 3, 6, 7)*~~	"Attend to precision and reasonableness" is poorly specified. The phrase "structures and patterns of data on two categorical variables" is difficult to parse.	Describe and represent patterns in data involving two categorical variables using two-way frequency tables or related displays. Summarize categorical data accurately and construct arguments about possible associations and trends using evidence from the data. (MP 3, 6) Need feedback Same as A2.D.1

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DA2.D.9 / DS3.D.9 Measurability: 1 Clarity & Accessibility: 1 Math Practice Integration: 0 Math Practice Appropriateness: 0	~~*Represent categorical and quantitative information in organized tables suitable for analysis. Attend to precision in data processing by filtering through logical statements, and transforming data with a detailed set of ordered tasks that are repeatable by others or a computer. (MP 6, 7)*~~	The clause "Attend to precision in data processing by filtering through logical statements…" is unclear. The second sentence is poorly specified. Language does not reflect MP7, and clarity issues make MP6 alignment difficult to determine.	Represent categorical and quantitative information in organized tables suitable for analysis. Filter, sort, and transform data using clearly defined logical rules and ordered steps that can be repeated by another person or a computer. Document the steps used to support accuracy and reproducibility. (MP 6) Need feedback
DA2.D.10 / DS3.D.10 Measurability: 1 Clarity & Accessibility: 1	~~*Describe univariate displays of large sets of data using technology. Ask targeted questions about the displays, including shape (skewed, symmetric), center, variability, and unusual outcomes. (MP 1)*~~	"Ask targeted questions" is poorly specified and high inference.	Use technology to create and describe univariate displays of large data sets, including shape, center, variability, and unusual outcomes. Ask specific questions about the display that can be answered using these features. (MP 1, 5) Need feedback
DA2.D.12 / DS3.D.12 Clarity & Accessibility:	~~*Build and use models to describe relationships between two continuous variables using linear regression. Explain which variable(s) should be*~~	The phrase "construct reasonable arguments for appropriate and inappropriate use of the model" is unclear; it is not clear what it means to	Build and use linear regression models to describe relationships between two continuous variables. Identify

1	~~*used for prediction. Construct reasonable arguments for appropriate and inappropriate use of the model for practical decision making. (MP 3, 4)*~~	argue for inappropriate use.	the variable used for prediction and justify when the model is appropriate or inappropriate for practical decision making. (MP 3, 4) Need feedback
DA2.D.15 / DS3.D.15 Measurability: 1 Clarity & Accessibility: 1	~~*Use statistical tools to validate the appropriateness and usefulness of a model, including visual and numeric assessments of model fit. Use hypothesis testing and simulation to develop and assess conjectures about the model. (MP 5, 8)*~~	The standard includes two distinct performance expectations. The first is an example of the second, which makes it challenging to assess whether a student has met the full standard.	Need feedback on this one.
DA2.D.16 / DS3.D.16 Measurability: 0 Clarity & Accessibility: 0	~~*Evaluate results reached from data analysis. Identify ways to refine investigative questions, data collection, visualization, or analysis. Justify and communicate clear and reasonable conclusions. (MP 3)*~~	The standard is so broad that the performance expectations are unclear. “Evaluate results” and “identify ways to refine” could mean many things, making assessment difficult.	Use results from a data analysis to answer an investigative question. Justify conclusions with evidence from the analysis, communicate the conclusion clearly, and identify one or more specific refinements to the question, data collection, visualization, or analysis based on limitations in the evidence. (MP 3)

			Need feedback
DA2.D.17 / DS3.D.17 Measurability: 1 Clarity & Accessibility: 1 Math Practice Integration: 0 Math Practice Appropriateness: 0	~~*Determine the appropriate scope of generalization based on the method of sampling. Contextualize the implications through data storytelling. (MP 2)*~~	The standard could refer to a wide range of statistical techniques and is difficult to assess with a single performance. "Contextualize the implications through data storytelling" is unclear.	Determine the appropriate population or context to which results may be generalized based on the sampling method. Communicate the implications of the results using a clear data-based explanation that connects the findings to the context and acknowledges limitations. (MP 3, 6) Clearer with limitations and connections to the findings Need feedback
DA2.D.18 / DS3.D.18 Measurability: 1	~~*Understand the role of random assignment in experiments and the implications for cause-and-effect interpretations. Justify conclusions. (MP 3)*~~	"Understand" is non-observable.	Explain the role of random assignment in experiments and use it to determine when cause-and-effect conclusions are appropriate. Justify conclusions using features of the experimental design. (MP 3) Add more clarity

DA2.D.19 / DS3.D.19 Measurability: 1 Clarity & Accessibility: 1	~~*Construct reasonable arguments regarding the issues of data bias and confounding variables in observational studies and their implications for interpretation. (MP 3)*~~	The lack of specificity may make it difficult for educators and assessors to know which issues of data bias, confounding variables, or implications students are expected to address.	Construct arguments that identify specific sources of data bias or confounding variables in an observational study. Explain how these issues affect the interpretation of the study's results. (MP 3) Need feedback
DA2.D.20 / DS3.D.20 Measurability: 0 Clarity & Accessibility: 0 Math Practice Integration: 0 Math Practice Appropriateness: 0	~~*Use precision in practices for handling large sets of data that enhance reproducibility and ensure ethical use, including descriptions of alterations, and understand when data may contain sensitive information. (MP 6)*~~	"Use precision in practices for handling large sets of data" is broad and vague. "Understand when data may contain sensitive information" is non-observable and vague. It is unclear what practices are intended.	Use documented procedures for handling large data sets that support reproducibility and ethical use, including recording data cleaning, filtering, transformations, and alterations. Identify when a data set may contain sensitive information and describe appropriate safeguards for use or reporting. (MP 6)
Secondary III DS			
S3.A.2 *Math*	Create equations and inequalities in one variable to model a context and	Looks like this was a typo and that MP 4	A2.A.2

Practice Integration: 0	use them to solve problems. Include equations arising from linear, quadratic, simple cubic (e.g., f(x)=2x^3), simple exponential, square root and cube root functions. (MP ~~3~~ 4)	is the practice that was intended.	
S3.A.3 Math Practice Integration: 0	For exponential models, express as a logarithm the solution to f(t)=ab^ct = d where a, c, and d are numbers, and the base b is 2 or 10; evaluate the logarithm using technological tools and interpret the result in relation to the model. (MP 4, 5). ~~(MP 2)~~	MP 2 could be appropriate, but the standard language does not suggest that MP 2 is the focus; MP 4 and MP 5 are more obvious choices.	Same as A2.A.3 Need Feedback
S3.F.1 *Measurability: 1* *-Clarity & Accessibility: 1*	Understand and interpret the features of polynomial, radical or logarithmic functions represented graphically using interval notation and inequalities by applying and removing context. Focus on these key features: domain, range, intervals of increase and/or decrease, location of absolute maximum and/or absolute minimum, intercepts and end behavior. Build graphic models that satisfy given key features. (MP 2, 4)	"Understand" is non-observable. The phrase "by applying and removing context" is poorly specified and unclear as a performance expectation.	Interpret key features of polynomial, radical, and logarithmic functions represented graphically, including domain, range, intervals of increase or decrease, maximum or minimum values, intercepts, and end behavior. Use interval notation and inequalities to describe these features and create graphs that match specified key features. (MP 2, 7) Clearer Need feedback A2.F.1

S3.F.2 *Measurability: 0* *Clarity & Accessibility: 1*	Build and use models of periodic phenomena with sine and cosine functions that connect real world contexts with amplitude, frequency, and midline. Use structures and patterns to support understanding of a domain extended beyond 0 to 90 degrees, or 0 to π / 2 radians. (MP 4, 7)	The standard includes two distinct performance expectations. "Model" is broad, and "support understanding" is unobservable. It is unclear what kind of model is expected.	Build and use tables, graphs, equations, or contextual models of periodic phenomena using sine and cosine functions. Interpret amplitude, frequency, period, and midline in context, and use patterns in the graph or unit circle to extend the domain beyond 0 to 90 degrees or 0 to π/2 radians. (MP 4, 7) Could be two different standards depending on how we assess. Need feedback Same as A2.F.2
S3.F.3 *Measurability: 1*	~~Understand and~~ interpret key features (period, midline and amplitude) of sine and cosine functions represented graphically. Build graphic models that satisfy the given key features. (MP 4,7)	"Understand" is a non-observable verb. Consider removing it because interpreting features is the observable behavior.	Same as A2.F.3
S3.F.5 *Measurability: 1*	Identify the effect on the graph when replacing f(x) by f(x) + k, kf(x), f(x+k) by exploring specific values of k for polynomial, square root, cube root,	The second sentence is unclear and difficult to parse. It is not clear what "attend to precision" or "carefully evaluate whether the ideas and	Identify and describe how replacing f(x) with f(x)+k, kf(x), f(kx), or f(x+k) changes graphs of polynomial, radical,

Clarity & Accessibility: 1 *Math Practice Integration: 1*	exponential, logarithmic, and trigonometric functions in and out of context. Attend to precision of language and notation while constructing arguments and carefully evaluate whether the ideas and processes observed during exploration are reasonable. (MP 3, 6)	processes observed during exploration are reasonable" means as a performance expectation.	exponential, logarithmic, and trigonometric functions. Use specific values of k to compare representations and justify the observed transformations using precise notation and mathematical language. (MP 3, 6, 7) Do you want to specifically state square root and cube or will radical work? Need feedback Same as A2.F.5
S3.G.1 *Measurability: 1* *Clarity & Accessibility: 1*	Use geometric shapes, their measures, and their properties to model real world objects and solve design problems (e.g., designing an object or structure to satisfy physical constraints or minimize cost). Use these models to ask targeted and probing questions with respect to area and volume in context. (MP 1, 2, 4)	"Ask targeted questions" is poorly specified and high inference; assessors must use judgment to decide whether questions are targeted.	Use geometric shapes, measures, and properties to model real-world objects and solve design problems (e.g., designing an object or structure to satisfy physical constraints or minimize cost). Use the model to answer and pose specific questions about area, volume, constraints, or optimization in context. (MP 1, 4) Need feedback

			Same as G.GMD.2
S3.G.2 Clarity & Accessibility: 1	Apply concepts of density based on area and volume in modeling situations. (MP4)	The phrase "concepts of density" may be confusing or unclear for some readers.	Apply area density and volume density to model situations, such as population per unit area or mass per unit volume, and interpret the results in context. (MP 4) Added examples any feedback? Same as G.GMC.3
S3.G.3 *Measurability: 1 Clarity & Accessibility: 1 Math Practice Integration: 0 Math Practice Appropriateness: 0*	Attend to precision and reasonableness while using volume formulas for cylinders, pyramids, cones, and spheres to solve problems. (MP 6)	"Attend to precision and reasonableness" is poorly specified as a performance expectation; it is difficult to tell what evidence assessors should look for. MP 6 is not meaningfully integrated.	Use volume formulas for cylinders, pyramids, cones, and spheres to solve problems. Show calculations with appropriate units and explain whether the solution is reasonable in the context of the problem. (MP 4, 6, 7)
S3.D.1 *Measurability: 1*	Describe and represent structures and patterns of data on two categorical variables. Attend to precision and reasonableness when summarizing	"Attend to precision and reasonableness" is poorly specified. The phrase "structures and patterns of data on two	Describe and represent patterns in data involving two categorical variables using two-way frequency tables or

Clarity & Accessibility: 1	categorical data in two-way frequency models, and construct, justify, and communicate clear and reasonable arguments about possible associations and trends in the data. (MP 3, 6, 7)	categorical variables" is difficult to parse.	related displays. Summarize categorical data accurately and construct arguments about possible associations and trends using evidence from the data. (MP 3, 6) Need feedback Same as A2.D.1
S3.D.3 *Measurability: 1* *Clarity & Accessibility: 1* *Math Practice Integration: 0*	Use multiple representations as tools to describe and represent structure to build understanding of the addition rule, P(A ∪ B) = P(A) + P(B) – P(A ∩ B). Understand the conditional probability of A given B as P(A ∩ B)/P(B). Interpret independence of A and B as saying that the conditional probability of B given A is the same as the probability of B. (MP 7)	"Understand" is non-observable. The opening clause is difficult to parse. MP 7 may align, but clarity and measurability issues make integration difficult to determine.	Use tables, diagrams, or formulas to explain and apply the addition rule P(A ∪ B)=P(A)+P(B)−P(A ∩ B). Calculate and interpret conditional probability using P(A ∩ B)/P(B), and determine whether events are independent by comparing conditional and marginal probabilities. (MP 3, 7) Need feedback Same as A2.D.3
S3.D.4 *Measurability: 1*	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	The first two performance expectations are closely related, but the third is a separate skill. "Recognize" is non-observable.	Use the mean and standard deviation of a data set to model the data with a normal distribution and estimate

	data sets for which such a procedure is not appropriate. Select and use physical and/or tech tools to estimate areas under the normal curve. (MP 5)		population percentages. Identify data sets for which a normal model is not appropriate, and use physical or technological tools to estimate areas under the normal curve. (MP 5, 6) Need feedback Same as A2.D.4
S3.D.6 *Measurability: 1* *Clarity & Accessibility: 1*	Select appropriate statistical tools to implement a data collection plan for primary data related to an investigative question. When using secondary data, assess its validity and relevance to answering the question. Construct an argument justifying the chosen data collection method (survey, observational study or experiment). Understand and apply best practices for designing sample surveys, experiments, and observational studies. (MP 3, 5)	"Understand" is non-observable. Additional guidance is needed regarding best practices so educators and assessors can determine proficiency.	Select appropriate statistical tools to implement a data collection plan for an investigative question. Assess the validity and relevance of secondary data, justify the chosen data collection method, and describe and apply specified best practices for designing surveys, experiments, or observational studies. (MP 3, 5) Clearer Need Feedback Same as A2.D.6
A2.D.7 /	Attend to precision and	"Attend to precision and reasonableness"	Summarize and organize

S3.D.7 *Measurability: 1* *Clarity & Accessibility: 1*	reasonableness when summarizing and organizing collected data to answer an investigative question using tables, graphs, and numerical summary statistics. Use models from sample data to estimate population means or proportions. Employ simulation models for random sampling to determine approximate sampling distributions and compute p-values from those distributions. (MP 4, 6)	is poorly specified. "Use models from sample data" is mathematically imprecise because sample data can be used to create a model but is not itself the model.	collected data using tables, graphs, and numerical summary statistics to answer an investigative question. Use sample data to estimate population means or proportions, and use simulation models for random sampling to approximate sampling distributions and compute p-values. (MP 4, 6) Need feedback Same as A2.D.7
DS3.D.9 *Measurability: 1* *Clarity & Accessibility: 1* *Math Practice Integration: 0* *Math Practice Appropriateness: 0*	Represent categorical and quantitative information in organized tables suitable for analysis. Attend to precision in data processing by filtering through logical statements, and transforming data with a detailed set of ordered tasks that are repeatable by others or a computer. (MP 6, 7)	The clause "Attend to precision in data processing by filtering through logical statements…" is unclear. The second sentence is poorly specified. Language does not reflect MP7, and clarity issues make MP6 alignment difficult to determine.	Represent categorical and quantitative information in organized tables suitable for analysis. Filter, sort, and transform data using clearly defined logical rules and ordered steps that can be repeated by another person or a computer. Document the steps used to support accuracy and reproducibility. (MP 6) Need feedback

			Same as DA2.D.9
DS3.D.10 *Measurability: 1* *Clarity & Accessibility: 1*	Describe univariate displays of large sets of data using technology. Ask targeted questions about the displays, including shape (skewed, symmetric), center, variability, and unusual outcomes. (MP 1)	"Ask targeted questions" is poorly specified and high inference.	Use technology to create and describe univariate displays of large data sets, including shape, center, variability, and unusual outcomes. Ask specific questions about the display that can be answered using these features. (MP 1, 5) Need feedback Same as DA2.D.10
DS3.D.12 *Clarity & Accessibility: 1*	Build and use models to describe relationships between two continuous variables using linear regression. Explain which variable(s) should be used for prediction. Construct reasonable arguments for appropriate and inappropriate use of the model for practical decision making. (MP 3, 4)	The phrase "construct reasonable arguments for appropriate and inappropriate use of the model" is unclear; it is not clear what it means to argue for inappropriate use.	Build and use linear regression models to describe relationships between two continuous variables. Identify the variable used for prediction and justify when the model is appropriate or inappropriate for practical decision making. (MP 3, 4) Need feedback Same as DS3.D.12

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DS3.D.15 *Measurability: 1* *Clarity & Accessibility: 1*	Use statistical tools to validate the appropriateness and usefulness of a model, including visual and numeric assessments of model fit. Use hypothesis testing and simulation to develop and assess conjectures about the model. (MP 5, 8)	The standard includes two distinct performance expectations. The first is an example of the second, which makes it challenging to assess whether a student has met the full standard.	Need feedback on this one. DS3.D.15
DS3.D.16 *Measurability: 0* *Clarity & Accessibility: 0*	Evaluate results reached from data analysis. Identify ways to refine investigative questions, data collection, visualization, or analysis. Justify and communicate clear and reasonable conclusions. (MP 3)	The standard is so broad that performance expectations are unclear. “Evaluate results” and “identify ways to refine” could mean many things, making assessment difficult.	Use results from a data analysis to answer an investigative question. Justify conclusions with evidence from the analysis, communicate the conclusion clearly, and identify one or more specific refinements to the question, data collection, visualization, or analysis based on limitations in the evidence. (MP 3) Need Feedback Same as DA2.D.16
DS3.D.17 *Measurability: 1* *Clarity & Accessibility: 1*	Determine the appropriate scope of generalization based on the method of sampling. Contextualize the implications through data storytelling. (MP 2)	The standard could refer to a wide range of statistical techniques and is difficult to assess with a single performance. “Contextualize the implications through data storytelling” is unclear.	Determine the appropriate population or context to which results may be generalized based on the sampling method. Communicate the implications of the results using a clear data-based

Math Practice Integration: 0 *Math Practice Appropriateness: 0*			explanation that connects the findings to the context and acknowledges limitations. (MP 3, 6) Clearer with limitations and connections to the findings Need feedback DS3.D.17
DS3.D.18 *Measurability: 1*	Understand the role of random assignment in experiments and the implications for cause-and-effect interpretations. Justify conclusions. (MP 3)	"Understand" is non-observable.	Explain the role of random assignment in experiments and use it to determine when cause-and-effect conclusions are appropriate. Justify conclusions using features of the experimental design. (MP 3) Needs Feedback Adds more clarity Same as DA2.D.18
DS3.D.19 *Measurability: 1*	Construct reasonable arguments regarding the issues of data bias and confounding variables in observational studies and their implications for	The lack of specificity may make it difficult for educators and assessors to know which issues of data bias, confounding variables, or implications	Construct arguments that identify specific sources of data bias or confounding variables in an observational

Clarity & Accessibility: 1	interpretation. (MP 3)	students are expected to address.	study. Explain how these issues affect the interpretation of the study's results. (MP 3) Need feedback DA2.D.19
DS3.D.20 *Measurability: 0* *Clarity & Accessibility: 0* *Math Practice Integration: 0* *Math Practice Appropriateness: 0*	Use precision in practices for handling large sets of data that enhance reproducibility and ensure ethical use, including descriptions of alterations, and understand when data may contain sensitive information. (MP 6)	"Use precision in practices for handling large sets of data" is broad and vague. "Understand when data may contain sensitive information" is non-observable and vague. It is unclear what practices are intended.	Use documented procedures for handling large data sets that support reproducibility and ethical use, including recording data cleaning, filtering, transformations, and alterations. Identify when a data set may contain sensitive information and describe appropriate safeguards for use or reporting. (MP 6) Need Feedback Same as DA.2.D.20
Secondary IIIC *I think these are listed somewhere else but I will relist them*			

just in case.			
S3.A.2 *Math Practice Integration: 0* *Done*	Create equations and inequalities in one variable to model a context and use them to solve problems. Include equations arising from linear, quadratic, simple cubic (e.g., f(x)=2x^3), simple exponential, square root and cube root functions. (MP 3)	Looks like this was a typo and that MP 4 is the practice that was intended.	Previously addressed in Algebra II IA/C. For Secondary III C, revise the practice connection to MP 4: Create equations and inequalities in one variable to model a situation and use them to solve problems, including equations arising from linear, quadratic, simple cubic, simple exponential, square root, and cube root functions. (MP 4)
S3.F.1 *Measurability: 1* *Clarity & Accessibility: 1* *Done*	Understand and interpret the features of polynomial, radical or logarithmic functions represented graphically using interval notation and inequalities by applying and removing context. Focus on these key features: domain, range, intervals of increase and/or decrease, location of absolute maximum and/or absolute minimum, intercepts and end behavior. Build graphic models that satisfy given key features. (MP 2, 4)	"Understand" is non-observable. "Applying and removing context" is poorly specified as a performance expectation.	Interpret key features of polynomial, radical, and logarithmic functions represented graphically, including domain, range, intervals of increase or decrease, maximum or minimum values, intercepts, and end behavior. Use interval notation and inequalities to describe these features and create graphs that match specified key features. (MP 2, 7)
S3.F.2	Build and use models of periodic	The standard includes two distinct	Build and use tables, graphs,

Measurability: 0 *Clarity & Accessibility: 1* *Done*	phenomena with sine and cosine functions that connect real world contexts with amplitude, frequency, and midline. Use structures and patterns to support understanding of a domain extended beyond 0 to 90 degrees, or 0 to π / 2 radians. (MP 4, 7)	performance expectations. “Model” is broad, and “support understanding” is unobservable.	equations, or contextual models of periodic phenomena using sine and cosine functions. Interpret amplitude, frequency, period, and midline in context, and use patterns in the graph or unit circle to extend the domain beyond 0 to 90 degrees or 0 to π/2 radians. (MP 4, 7)
CS3.F.16 *Math Practice Integration: 0* *Math Practice Appropriateness: 1* *Done*	Verify by composition that one function is the inverse of another function. Build an invertible function from a non-invertible function by restricting the domain. (MP 3, 4)	MP 3 is appropriate, but modeling is not addressed in the language or content of this standard.	Verify by composition that one function is the inverse of another function. Restrict the domain of a non-invertible function to create an invertible function, and justify why the restriction produces an inverse. (MP 3, 7) Need feedback
CS3.G.6 *Math Practice note* *Done*	Prove the addition and subtraction formulas for sine, cosine and tangent and use them as tools to solve problems. (MP 5)	MP3 was identified as a better aligned practice because the standard requires proving formulas.	Prove the addition and subtraction formulas for sine, cosine, and tangent, and use the formulas to solve problems. Justify each step of the proof using trigonometric identities and relationships.

			(MP 3, 5) Need feedback. The original is simpler but may align better.

Amanda Bollinger

Additional Board Member Suggested Amendments

Utah State Board of Education

Date: August 2026

Standard Code (e.g 1.OA.1)	Step 11 Draft Standard	Suggested Amendment based on WestEd Review	Notes
Overall Thoughts			I really appreciate the time that our board members have spent trying to provide feedback addressing the WestEd review of our standards. This is such extensive work, that we need to make sure all of the WestEd suggestions are considered and applied. We paid $80K for WestEd to review our standards. Instead of sending the current standards to the S&A committee as they are, I believe that we should have our math specialists and a few others take the WestEd recommendations and update the standards to ensure age appropriateness, clarity, and rigor. One week is not enough time for individual Board members to review ALL of the standards and apply WestEd recommendations for feedback. I realize that this is outside the normal standards revision process, but we have already veered from the process by having a formal review of the standards. We could maybe even bring smaller grade level bands to the Board for feedback once the WestEd recommendations are applied by staff and then send them to S&A. This would allow us to move forward while also utilizing the specific and detailed feedback from WestEd.

Matt Hymas

Additional Board Member Suggested Amendments

Utah State Board of Education

Date: August 2026

These amendments were copied from the introduction tab and from MH's attached document.

Other smaller changes throughout included here

Standard Code (e.g 1.OA.1)	Step 11 Draft Standard	Suggested Amendment based on WestEd Review	Notes
Included in the introduction before the section entitled Organization of the Standards	This addition establishes the relationship among content, fluency, and practice for the entire P-12 document. It does not prescribe a particular curriculum; it defines how the standards are to be interpreted. Foundational Knowledge, Fluency, and Mathematical Practice Mathematical reasoning depends upon a foundation of knowledge and skill. Students are best prepared to solve problems, recognize relationships, and communicate mathematical ideas when they have		Staff response: The importance of focusing on procedural fluency and conceptual understanding, the purpose of the competencies, and the introduction to the mathematical practices each have a section already included in the introduction. Staff does not recommend including these statements in their entirety because they are somewhat repetitive of what the writing committee has already written. WestEd said the following about the writers focus on fluency in the introduction:

	acquired the relevant vocabulary, facts, representations, concepts, and procedures. Essential Competencies identify the foundational knowledge and skills upon which subsequent mathematics depends. These competencies warrant sustained instructional attention, deliberate practice, cumulative review, and evidence of durable proficiency. Students should be able to recall, represent, explain, and apply them accurately, efficiently, and flexibly, as appropriate. Mathematical Practices deepen, connect, and apply mathematical content. They do not replace content knowledge, accurate computation, or procedural fluency. The practices should not be interpreted as requiring students to discover unfamiliar mathematical concepts or procedures without sufficient preparation, instruction, and guidance.		*The Utah draft standards define procedural fluency as applying procedures efficiently, flexibly,and accurately, transferring them across contexts, building procedures from other procedures,and recognizing when one strategy or procedure is more appropriate than another, all of which are well supported by research literature. The document then lays out an explicit theory of action by which computational fluency is to be developed (conceptual understanding →reasoning strategies → automatic basic fact retrieval → computational fluency), thus laying the groundwork for more complex procedural fluency through the grade levels.*
Introduction: Essential Competencies	If the "Essential Competencies" are in fact essential, consider replacing the general description for each standard with something more direct. Essential Competencies identify the foundational knowledge and skills upon which subsequent mathematics depends. All grade-level standards are required; however, these competencies warrant sustained instructional attention, deliberate practice,		*Staff recommendation: Essential competencies have been identified at each grade level to represent foundational knowledge and skills upon which subsequent mathematics depends. Students need these competencies to succeed as they continue in future grade levels. The list of competencies is not exhaustive of every standard. Students will engage with all grade-level standards, however, these competencies warrant sustained instructional attention. Educators should prioritize*

	cumulative review, and evidence of durable proficiency. Educators should give these competencies sustained priority and ensure that students demonstrate proficiency by the end of the grade or course. Students should be able to recall, represent, explain, and apply the competencies accurately, efficiently, and flexibly, as appropriate. When proficiency has not been demonstrated, continued instruction, practice, and support should accompany engagement with subsequent grade-level mathematics.		*instructional time and, as needed, provide additional instruction or interventions based on the standards that support these competencies to ensure students are proficient.*
Introduction: Mathematical Practices	. For the Utah Mathematical Practices opening on page 7, consider something that invites questions, discourse, and investigations based off of learned knowledge, not inquiry first instruction. The Mathematical Practices describe how students engage with, reason about, and apply mathematical content. They develop through and depend upon a growing foundation of mathematical knowledge, vocabulary, representations, and procedures. The practices are not standalone substitutes for proficiency in the content standards. Each grade level identifies developmentally appropriate ways students use the practices after or while the necessary content is established. Although specific practices are connected to individual standards, a practice should be used when it supports the content learning identified in that standard. The practices should not be interpreted as requiring students to independently discover unfamiliar		Staff recommendation: In each grade-level core, there is a collection of Mathematical Practices that describe how students engage with, reason about, and apply mathematical content. Each grade level identifies developmentally appropriate ways students engage with these practices as they learn grade level skills.To ensure students develop capacity with these skills, they have been embedded into the standards across all strands and can be identified by the use of italic text and the parenthetical reference at the end of each standard. Although specific practices have been connected to each standard, other practices can be integrated when they support the mathematics identified in that standard.

	concepts or procedures without sufficient preparation, instruction, and guidance		
Amended for Each Grade Level	4. Move the Essential Competencies section after each grade or course introduction and before the grade or course Mathematical Practices. Current Essential Competencies sections begin on draft 4 pages 15, 21, 29, 36, 44, 53, 62, 71, 80, 89, 99, 110, 123, 135, 144, 152, and 160. Add the supporting standard code or code range beneath each competency. • Fluently add and subtract within 20 using accurate, efficient, and flexible strategies. Supporting standards: 1.OA.5-7		Staff Response: The writing committee extensively discussed the recommendation to move the competencies before the standards while reviewing board member feedback during step 7 of the revision process, prior to releasing the draft for public comment. During that step of the process, board members requested that there be less front matter prior to the standards so that the standards themselves were elevated in importance, which was part of the reason that the writers put them at the end of each grade level. The writing committee also felt strongly that the competency list should go after the standards to ensure that educators attend to the full depth and breadth of all of the standards. They worried that moving the competencies first could result in educators only teaching those competencies without fully unpacking the intent of the connected standards.
	Within each content standard, state the knowledge or skill students are expected to acquire before describing how a Mathematical Practice will be used to reason about, apply, or communicate that content.		

Introduction: After Mathematical Tools and Technology	**Instructional Guidance for the Utah Mathematics Core Guides** When students encounter unfamiliar mathematical content, instruction should provide clear explanations, models, worked examples, guided practice, checks for understanding, and cumulative review. Students should have sufficient opportunities to practice essential knowledge and procedures until they can use them accurately, efficiently, and flexibly. Questions, investigations, modeling, discourse, and open-ended problem solving should deepen, connect, or apply learning after students possess sufficient background knowledge to engage productively. These practices should not be used as substitutes for teaching essential mathematical content.		Staff response: In the fourth paragraph on page 3 of the introduction, the writers said, "In Utah State Code 53E-4-202, the State Board is charged with establishing core standards for Utah Public Schools that identify the basic knowledge, skills, and competencies each student is expected to acquire or master as the student advances through the public education system." That code states, "each school may select instructional materials and methods of teaching, that are supported by generally accepted scientific standards of evidence, that the school considers most appropriate to meet the core standards for Utah public schools." Using statements like "instruction should..." could be interpreted as the standards requiring a specific teaching method or curriculum rather than allowing each school to select instructional materials and methods of teaching.
Utah Mathematical Practices	The ~~mathematical practices included in *Utah's P-12 Core Mathematics Standards*~~ Mathematical Practices describe ~~mathematical skills that Utah~~ how students ~~develop throughout their educational experiences. Students become~~		Staff recommendation: The mathematical practices included in *Utah's P-12 Core Mathematics Standards* describe how students engage with, reason about, and apply mathematical content. Each grade level identifies developmentally appropriate ways students engage with these practices as they

	~~proficient in engaging with mathematical content and concepts as they learn, experience,~~ engage with, reason about, and apply ~~these skills.~~ mathematical content. They develop through and depend upon a growing foundation of mathematical knowledge, vocabulary, representations, and procedures. The practices are not standalone substitutes for proficiency in the content standards. Each grade ~~level's standards have a description in their introductory material specifying the~~ level identifies developmentally appropriate ways students ~~will engage with these~~ use the practices ~~as they learn math concepts.~~ after or while the necessary content is established. Although specific ~~Mathematical Practices have been intentionally identified and~~ practices are connected to ~~each standard, instruction and~~ individual standards, a practice ~~of other Mathematical Practices not referenced~~ should be used when it supports the content learning identified in that ~~standard are encouraged. Below, general descriptions are provided for each Mathematical Practice.~~ standard. The practices should not be interpreted as requiring students to independently discover unfamiliar		learn grade level skills. Although specific practices have been identified and connected to each standard, other practices can be integrated when they support the mathematics identified in that standard. Below, general descriptions are provided for each Mathematical Practice.

	concepts or procedures without sufficient preparation, instruction, and guidance.		
	Mathematical Practice 1: ~~Ask~~ Use mathematical knowledge to ask and answer questions ~~to explore mathematical concepts~~ Students ~~examine~~ draw upon relevant vocabulary, facts, representations, concepts, and procedures to ask and answer questions that clarify, connect, or extend mathematical ~~concepts and formulate questions.~~ ideas. During mathematical discourse, students ask ~~probing~~ targeted questions to ~~better understand math concepts.~~ identify relationships, resolve uncertainty, and deepen understanding. Questions and discourse should deepen or apply content learning; they should not substitute for clear instruction in unfamiliar content. ~~Asking questions cultivates students' curiosity about mathematical relationships and helps them refine their understanding. As students build their capacity to ask probing questions,~~		Staff recommendation: Mathematical Practice 1: Ask and answer questions to build mathematical knowledge Students formulate questions about mathematical concepts. They build upon their background knowledge to help them clarify, connect, or extend mathematical ideas. During mathematical discourse, students ask questions to deepen their understanding of mathematics. Asking questions cultivates students' curiosity about mathematical relationships and helps them refine their understanding. As students build their capacity to ask and answer mathematical questions, they engage in more meaningful discourse about mathematics. When students ask and answer their own questions, they develop skills that help them persevere in mathematical problem solving.

	~~they engage in more meaningful discourse about mathematics. When students ask and explore rich questions, it advances the mathematical understanding of all learners.~~		
	Mathematical Practice 3: Construct, justify, and communicate clear and reasonable arguments Students use definitions, known facts, established results, learned procedures, and valid mathematical reasoning to construct arguments ~~using the mathematical reasoning that underlies~~ about a strategy, solution, or conjecture. They justify ~~their conjectures~~ conclusions and clearly communicate their reasoning using ~~concrete referents such as~~ appropriate objects, drawings, diagrams, symbols, words, and actions. ~~They justify~~ Through discourse, students examine arguments, identify errors or unsupported claims, and refine their ~~arguments with peers through discourse, refining their thinking~~ reasoning to create more ~~robust and~~ precise		Staff Recommendation: Mathematical Practice 3: Construct, justify, and communicate clear and reasonable arguments Students construct arguments explaining mathematical reasoning and assumptions by using known facts, definitions, and procedures to justify a strategy, solution, or conjecture. They justify their reasoning using symbols, words, and concrete referents such as objects, drawings, diagrams, and actions. Through discourse with peers, students examine arguments, identify errors or unsupported claims, and refine their reasoning. They listen to or read the arguments of others, decide whether they make sense, ask questions to clarify, improve, or build on their arguments. Constructing, justifying, and communicating arguments fosters a deep understanding of mathematical concepts. By defending their conjectures, and critiquing the reasoning of their peers, students solidify their mathematical

	arguments. Constructing, justifying, and communicating arguments fosters a deep understanding of mathematical concepts. By defending their conjectures, students solidify their mathematical understanding and identify potential flaws in their reasoning. Clear communication enables students to articulate their thoughts effectively, enhancing their ability to explain their reasoning to others. Discourse with peers exposes students to diverse perspectives, promoting critical thinking and collaborative problem-solving.		understanding and identify potential flaws in their reasoning. Clear communication enables students to articulate their thoughts effectively, enhancing their ability to explain their reasoning to others. Discourse with peers exposes students to diverse perspectives, promoting critical thinking and collaborative problem-solving.
	Mathematical Practice 4: Build and use models ~~Mathematical models use structures~~ Students apply learned mathematical concepts and procedures to ~~represent relationships. Students build~~ build, interpret, and use verbal, contextual, visual, symbolic, and physical ~~models to~~ models. Models represent ~~and make sense of the~~ relationships ~~between~~ among quantities in mathematical problems and real-world		Staff recommendation: Mathematical Practice 4: Model with Mathematics Mathematical models use structures to represent relationships. Students build and use verbal, contextual, visual, symbolic, and physical models to represent and make sense of the relationships between quantities in real-world situations and mathematical problems. Students use mathematical models to solve problems in everyday life, society, and the workplace; identifying important quantities; analyzing relationships; drawing conclusions;

	~~situations~~ situations. Students use established knowledge to determine whether a model is appropriate, accurate, and ~~mathematical problems.~~ useful for its intended purpose. Using models enhances student learning by providing students with multiple ways to represent and understand mathematical concepts, connect mathematical concepts to real-world situations, and develop problem-solving skills. Students explore the idea that various models can showcase mathematical thinking in valuable ways. Using multiple models helps students notice the connections between mathematical structures and promotes the development of mathematical generalizations that can be leveraged as tools to make sense of and persevere in solving novel problems.		and revising the model if necessary. This process is distinctive for its cyclic nature, where, starting from a real-world situation, students or modelers formulate a mathematical representation, work through it, and then return to the context to assess the model's validity and applicability. Using models enhances student learning by providing students with multiple ways to represent and understand mathematical concepts, connect mathematical concepts to real-world situations, and develop problem-solving skills. Students explore the idea that various models can showcase mathematical thinking in valuable ways. Using multiple models helps students notice the connections between mathematical structures and promotes the development of mathematical generalizations that can be leveraged as tools to make sense of and persevere in solving novel problems.
	Mathematical Practice 8: ~~Make~~ Use known mathematics to make conjectures and evaluate ~~the~~ results Students ~~make sense of mathematics when they~~		Staff recommendation: Mathematical Practice 8: Make conjectures and evaluate the results Students make mathematical generalizations by observing patterns, proposing conjectures, and testing their validity against known facts,

	~~engage in mathematical investigations. They~~ use ~~their understanding of~~ known facts, definitions, procedures, structures, patterns, and relationships to ~~speculate about the nature of a relationship and then test their conjecture to determine how to proceed. As they test their mathematical hypotheses~~ make conjectures and evaluate results. They test conjectures against examples, established knowledge, and logical consequences; determine whether conclusions are supported; and refine or reject conjectures when warranted. Conjecturing is most productive when students possess sufficient background knowledge to recognize meaningful patterns and evaluate evidence. Mathematical investigations should deepen and apply established learning rather than substitute for the ~~outcomes~~ acquisition of ~~their investigation, they build mathematical generalizations.~~ essential content. ~~Developing and assessing conjectures encourages active engagement and critical thinking. Conjecturing acts as an entry point to exploration for all students. When making conjectures, students have opportunities to continually revise their thinking. Students~~		definitions, and procedures. Making mathematical conjectures involves a rigorous metacognitive process. Students make sense of the mathematical situation, make a claim, monitor and evaluate progress, change course if necessary, persevere when stuck, and check answers using a different method. Developing and assessing conjectures encourages active engagement and critical thinking. Students formulate conjectures, test them, and refine their understanding based on the outcomes. This iterative process fosters a deeper understanding of underlying mathematical principles. It promotes curiosity, students' ownership of their learning, and the development of positive mathematical identities.

	~~formulate conjectures, test them, and refine their understanding based on the outcomes. Students view mistakes as assets that help them better refine their mathematical understanding. This process fosters a deeper understanding of underlying mathematical principles. It promotes curiosity, students' ownership of their learning, and the development of positive mathematical identities.~~		
Amended at all grade levels	*Mathematical Practice 1:~~ Ask~~ Use mathematical knowledge to ask and answer questions~~ to explore mathematical ideas~~* Students draw upon relevant mathematical knowledge, vocabulary, representations, and procedures to ask and answer questions that clarify, connect, or extend the grade- or course-level content. In grades P-2, students ask questions to help them develop understanding of numbers, place value, the properties of addition and subtraction, and the properties of shapes. Students begin to ask questions about data related to the		Staff Response: The writing committee previously included the full explanation for each practice (that is in the introduction) before each set of grade level standards. During step 7 of the process, board members requested that there be less front matter prior to each set of grade level standards so that the standards themselves were elevated in importance. The writers chose to only include the age appropriate examples of how each practice could be implemented through grade level content rather than including the full description. The high level descriptions in the introduction were updated based on board member and WestEd feedback.

	classroom and their day-to-day lives.		
Amended at all grade levels	*Mathematical Practice 3: Construct, justify, and communicate clear and reasonable arguments* Students use definitions, known facts, established results, and learned procedures as the basis for constructing and communicating arguments. In grades P3 and P4, students are learning to communicate their ideas and listen to the ideas of others. They develop strategies to agree and disagree respectfully. Students begin to explain their ideas about mathematics		
Amended at all grade levels	*Mathematical Practice 4: Build and use models* Students apply learned mathematical concepts and procedures when building, interpreting, and using models.		

	In grades P-2, students use a variety of models to build their understanding of numbers with increasing complexity, leading to an understanding of the base ten place value system. They model the actions and comparisons represented by the operations of addition and subtraction. Consistent exposure to these models supports fluency and helps students connect concrete experiences to foundational mathematical ideas.		
Amended at all grade levels	*Mathematical Practice 8: ~~Make~~ Use known mathematics to make conjectures and evaluate ~~the~~ results* Students use known facts, definitions, procedures, structures, patterns, and relationships to make conjectures and evaluate results. In grades P-2, students make and test conjectures related to numbers, place value, the properties of addition and subtraction, and the attributes of shapes. During this process, students learn to evaluate the reasonableness of their solution path and adjust as needed.		

	Providing students opportunities to revise their thinking helps students develop confidence in problem solving.		
P3.D.1	With prompting and support, ~~*ask questions*~~ formulate a question about people or objects in the classroom that ~~lead to data collection.~~ can be answered by collecting data. (MP 1)		*Staff recommendation: Ask questions about people or objects in the classroom and represent the data. (e.g. Build a class pictograph to answer the question "What is our favorite weather?") (MP 1)*
P4.D.1	With prompting and support, ~~*ask questions*~~ formulate a question about a given topic that ~~lead to~~ can be answered by collecting, analyzing, and interpreting ~~data gathered within the classroom.~~ classroom data. (MP 1)		*Staff recommendation: Ask questions* about a given topic that can be answered by collecting data as a class. (MP 1)
K.D.1	~~*Ask questions as*~~ As a ~~class~~ class, formulate a question about a given topic that ~~will lead to~~ can be answered by collecting, analyzing, and interpreting ~~data gathered within the classroom.~~ classroom data. (MP 1)		*Staff recommendation: Ask questions about a given topic that can be answered by collecting data within the classroom. (MP 1)*
1.OA.3	~~*Make*~~ Understand *and* ~~*test conjectures about*~~ apply properties of ~~addition. *Add context* to make sense of these properties~~ addition as strategies to add and subtract. Use examples and established facts to make and test conjectures		*Staff recommendation: Use the properties of addition to examine patterns in addition and subtraction. Test examples and non-examples of these properties in equations and story contexts. (MP 2, 8)*

	about these properties, and add context to explain how the properties support a strategy. (MP 2, 8)		
1.OA.8	~~*Build and use models* to make sense of~~ Understand the meaning of the equal ~~sign. *Make*~~ sign *and* ~~*test conjectures* regarding~~ determine whether addition and subtraction equations are true or false. Use models and established properties to explain and test conclusions. (MP 4, 8)		*Staff recommendation: Build and use models (e.g. objects, drawing, equations) to understand the meaning of the equal sign. Demonstrate that both sides of an equation have equal value. Use evidence to explain whether addition and subtraction equations are true or false. (MP 4, 8)*
1.MG.5	~~*Ask questions* to distinguish between~~ Distinguish defining ~~and~~ from non-defining attributes of shapes. Given defining attribute(s), build and draw shapes that possess the ~~defining attribute(s).~~ attribute(s), and ask questions that clarify the distinction. (MP 1)		JE & Staff recommendation: *Ask questions to distinguish between defining and non-defining attributes of shapes (e.g. number of sides vs. color). Given defining attribute(s), build and draw shapes that possess the defining attribute. (MP 1)*
2.MG.8	~~*Ask questions* to identify~~ Identify and describe shapes having specific attributes. Build and draw shapes that possess specified attributes, and ask questions that clarify the attributes. (MP 1)		*Staff recommendation: Build, draw, and identify shapes that possess specified attributes. Ask and answer questions about attributes to identify and describe shapes (e.g. How many angles does this shape have? How many faces?). (MP 1, 4)*
3.OA.5	~~*Make*~~ Understand *and* ~~*assess conjectures* about the~~ apply properties of ~~multiplication. *Add context* to make sense of these properties~~		

	multiplication as strategies to multiply and divide with products and dividends less than or equal to 100. Use examples and established facts to make and assess conjectures about these properties, and add context to explain how the properties support a strategy. (MP 2, 8)		
3.NF.3	~~*Build*~~ Generate *and* ~~*use models* to make sense of and generate~~ explain equivalent ~~fractions~~ fractions, including whole ~~numbers. *Justify* why~~ numbers, and understand that equivalent fractions must reference the same ~~whole~~ whole. Use models to ~~be equivalent.~~ represent and justify equivalence. (MP 3, 4)		
5.MG.2	~~*Build and use models* to make sense of~~ Understand and apply the formulas for finding the volume of right rectangular prisms. ~~*Add*~~ Use models to explain the formulas, and add *or remove context to solve real-world problems* involving ~~the volume of a~~ right rectangular prisms with whole-number side lengths. (MP 2, 4)		
6.NS.7	~~*Build*~~ Understand absolute value as a number's distance from zero on the number line. Use models *and* ~~*use models*~~ contexts to ~~develop the~~		

	~~definition of~~ represent and apply absolute value. ~~Work with absolute value *in and out of context.*~~ (MP 2, 4)		
8.A.9	~~*Build and use graphic models* to analyze~~ Analyze and solve systems of two linear equations in two ~~variables~~ variables, and interpret their solutions. Identify systems that have zero, one, ~~and infinite solutions~~ or infinitely many solutions, *with or without context.* Use graphical models to represent and justify the analysis. (MP 2, 4)		
8.F.1	~~*Construct and communicate clear arguments* as to~~ Determine whether a relation is a ~~function.~~ function, and construct and communicate a clear argument that justifies the determination. (MP 3)		
8.G.3	~~*Ask questions to determine* the difference between~~ Distinguish congruence ~~and~~ from similarity in terms of transformations. ~~*Clearly*~~ Know that rigid transformations preserve lengths and angle measures, while similarity transformations preserve angle measures and proportional side lengths. Use established definitions and properties to justify and clearly *communicate* the distinction between congruent and similar figures. (MP ~~1, 3)~~ 3, 7)		

8.D.1	~~*Ask*~~ Formulate statistical *questions* about bivariate data sets (quantitative and categorical) to investigate patterns of ~~associations~~ association between two quantities. (MP 1)		
8.D.3	~~Explore, describe~~ Describe and compare variability in bivariate data for quantitative variables by creating scatterplots. For scatterplots that suggest a linear association, *represent the relationship* with a linear equation, and informally assess the line of fit by judging the closeness of the data points to the line. (MP 7)		
8.D.6	~~Explore, describe~~ Describe and compare variability in bivariate data for categorical variables by constructing two-way tables. Calculate and interpret relative frequencies for rows or columns in a two-way table. *Attend to precision and reasonableness.* (MP 6)		
S1.D.1	~~*Ask*~~ Formulate *statistical questions* to investigate situations that can be explored using random samples from populations to make inferences about differences between two populations or associations between two quantitative variables. Explain and *justify* the distinction between		

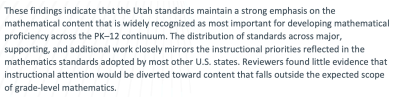
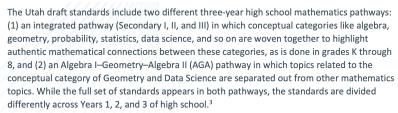
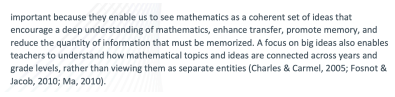
	correlation and causation. (MP 1, 3)		
S2.NS.4	~~*Build and use models to solve*~~ Solve quadratic equations with real coefficients that have complex solutions, rewriting x^2+4 as (x + 2i)(x – 2i). Use models to represent and verify the solutions. (MP 4)		
S2.D.1	~~*Ask*~~ Formulate *statistical questions* to investigate linear, exponential, and quadratic associations between two quantitative variables. (MP 1)		

Cindy Davis

Standard Code (e.g 1.OA.1)	Step 11 Draft Standard	Suggested Amendment based on WestEd Review	Notes
			Dear Friends, Here is some input for math standards following the study report. My preference is that the writing committee make refinements with feedback from individual board members, the public and the West Ed. study in ways that they feel still contributes to excellence in the standards. (If we can't convene the whole writing committee, then maybe a compromise could be our 3 math staff members work with grade-band representatives from the WC.) Then, this Draft 2 will go to the S and A Committee for additional amendments that will then go to the full board as a list of amendments and also with amendments imbedded as a Draft 3. Then the full Board can review the three documents, amend (hopefully minimally,) and then vote. One big amendment to be considered is for the writing team to incorporate more information about the big ideas in grade levels and courses. Pages 25 through page 36 of the review has some excellent insights that could be provided in the standards or supporting documents. This would add clarity for students, educators, and parents.

			The Integrated Approach should be kept in the standards. The review reinforces the value that comes with an integrated approach and the siloing that occurs with a traditional AGA approach. The reviewers , presumably, are educated professionals who know that their report could not directly take a side and that they should be as politically impartial as they could be. However, the amount of insight provided about: big ideas, opportunities in learning progressions, and connections within and between courses provided for integrated courses far outweighs that provided for AGA, 7 pages integrated versus 4 pages for AGA. Additionally, one real strength suggested for AGA is that there will be stronger “within-strand coherence”, however when looked at more carefully the articulation of the coherence and storylines in the review paints a very different picture. On pages 31 and 32 the coherence and storylines for an integrated set of courses that are mentioned are all very positive things. Having “gradual expansion” of topics in a meaningful way for students, having “methodical development” as students move up in course progression towards calculus, “gradual” progression and topics “revisited annually.” Contrast this with the points made about the AGA coherence and storylines on pages 35 and 36. With AGA things are “choppy”, “no longer clear”, “compressed and paused”, “Solving only in two courses”, Geometry in only two years rather than three (which is “more fragile”), statistical investigative cycle is limited to only two courses instead of three. There is an evident shift in the nature of the progression. With a closer read the disadvantages to an AGA organization are more directly mentioned in some of the descriptions. 1.

			Overall, the summary presented in Table 4 shows that 55 percent of standards were rated as Measurable and Well Specified, 42 percent were rated as Partially Measurable/Well Specified, and 3 percent (about 1 or 2 standards in some grades) were rated as Not Measurable or Poorly Specified. In total, 188 standards (about 45%) were rated has having reduced measurability and specificity. Pg. 12 97 percent of the standards are measurable and well specified. Yet, the reviewers suggest that this is an area where additional refinement can be made. The writing team would be best equipped to work on this as they have the best understanding of the original intent of the current draft of the standards. They should focus on the 3% that are not considered measurable and well-specified. 2. Overall, the findings suggest that the Utah mathematics standards are generally written in a manner that supports classroom instruction and assessment development. The relatively small number of measurability concerns identified by reviewers primarily reflect opportunities to improve precision and assessability through clearer wording, more observable performance expectations, and the separation of compound standards into discrete, measurable learning expectations. Pg 13 Again, please focus on the small number of measurability concerns (hopefully addressed by the writing team that wrote the standards as it has the background and understands the intent, so would be best equipped to maintain coherence while making needed refinements. 3.

			 Pg 15 Utah standards address what they need to address. 4.  Pg 24 The reviewers point to the integrated nature of K-8 standards and that an integrated set of high school courses maintains a consistent approach where conceptual categories are woven together to support authentic mathematical connections. Please preserve this benefit for all Utah students. AGA doesn't allow for nice woven connections but rather separates topics into silos for two grades only (assuming we allow the Wasatch model for Secondary 3.) 5.  pg 25 An integrated approach allows for big ideas to be connected in more meaningful and

			thoughtful ways than the AGA organization. One possible amendment/revision/refinement that might be to have a statement at each grade level that outlines the big ideas contained within that grade level or course. 6. Because the individual standards remain the same across both pathways, the same six "mathematical storylines" we saw in the integrated pathway can be traced through the AGA pathway. However, it is important to note that the forced separation of the Algebra and Geometry categories arguably increases **within-strand coherence** at the expense of some of the **cross-grade coherence** that these six storylines provide so well through the integrated sequence: Pg. 35 Cross-grade coherence supports a more meaningful experience throughout a student's experience from beginning to end. The within-strand coherence inhibits a complete meaningful experience in exchange for strong silos. 7. Overall, the findings indicate that the UCS-M provide a strong and coherent framework for mathematics teaching and learning across the PK–12 continuum. The standards demonstrate substantial alignment with nationally recognized mathematics standards, place a strong emphasis on conceptual understanding and mathematical reasoning, and incorporate several distinctive features, including an expanded Data Science progression and explicit integration of the Utah Mathematical Practices, that distinguish them from many existing state mathematics standards. At the same time, the review identified recurring opportunities to improve the precision, clarity, developmental progression, and implementation of selected standards. These observations are intended to support continued refinement of the standards rather than fundamental redesign. Pg 50 We have a strong and coherent set of standards, so let's use some slight refinement, rather than a fundamental redesign.

			As an end note, some of the thinking pieces of the standards may not be measurable like a 2X2= 4 situation but still lend themselves to stronger numeracy skills. There may be some cases where we refine and make more clear the “asses” ability as opposed to exact measurability. I am a big believer in efficient, accurate calculation, but I also see value in the ability to reason and apply mathematical concepts. In an effort to add clarity in all grade levels, please be careful not to remove thinking language, because it is subjective. Adding some more objective criteria to it is fine. A total removal of the language is not. Thank you, all for the extensive work that has been done thus far!

Joann Brinton

Additional Board Member Suggested Amendments

Utah State Board of Education

Date: August 2026

Standard Code (e.g 1.OA.1)	Step 11 Draft Standard	Suggested Amendment based on WestEd Review	Notes
Overall Thoughts	**Clean Up Standards Language (Measurability & Clarity)** ● **Remove Non-Observable Verbs:** Replace internal cognitive phrases like *"understand," "begin to recognize,"* or *"attend to precision"* with observable performance verbs like *"calculate," "identify," "graph," "solve,"* and *"explain"*. PDF ● **Separate Compound Standards:** Split long standards containing multiple distinct tasks (e.g., `5.MG.3` or `1.MG.2`) into clear `a)` and `b)` sub-parts. PDF ● **Uncouple Process Language from Content:** Move pedagogical phrases like *"build and use models to..."* or *"use structures and patterns to..."* into the Core Guides, leaving standard statements focused strictly on the assessable student outcome.	**Summary of Key Recommendations for USBE by WestED** ● **Preserve Structure:** Retain the overall PK–12 structure, instructional focus, and the comprehensive PK–12 Data Science progression. ● **Prioritize Wording Edits:** Focus writing efforts on line-by-line wording revisions that make student performance evidence explicit. ● **Use Reviewer Worksheets:** Utilize the itemized analyst rating worksheets attached to the report as the primary resource for drafting standard-by-standard wording revisions. **Language, Measurability, and Wording Edits** ● **Replace Non-Observable Verbs:** Replace internal cognitive terms like "understand," "recognize," "explore," or "attend to" with	I am summarizing WestEd's Report Here with their recommendations for Clarity. **WestEd Independent Review (2026):** Confirms that while Utah's standards are mathematically sound and coherent, **45% of standards have measurability or clarity concerns** due to compound expectations, non-observable verbs (*"understand," "attend to"*), and embedded practice jargon.

		specific, observable student behaviors (e.g., *explain*, *identify*, *calculate*, *graph*) so teachers and test developers can assess student mastery reliably. ● **Disambiguate Subjective Modifiers:** Clarify vague terms like "flexibly," "efficiently," or "reasonable" by explicitly defining the expected performance criteria. ● **Deconstruct Compound Standards:** Split overly lengthy, multi-expectation statements (standards combining multiple distinct skills into one prompt) into separate, single-expectation standards.	
	Refine the Utah Mathematical Practices (MPs) ● Reframe MP 1 (*"Ask questions..."*) to re-incorporate **perseverance, problem-solving planning, and checking reasonableness**, matching national standards (SMP 1). ● Clarify MP 4 (*"Build and use models"*) and MP 5 (*"Select and*	**Refining Mathematical Practice Integration** ● **Clarify Practice vs. Content Expectations:** Separate embedded "Mathematical Practice" language (e.g., "build and use models," "attend to precision") when it obscures the core mathematical knowledge or skill being assessed. ● **Avoid Diluting "Modeling" and "Tools":** Re-evaluate the broad	See staff recommendations in Member Earl and Member Hymas' tabs.

	use tools") so the word "tool" or "model" is not diluted to mean every mathematical strategy or notation.	definitions of "models" and "tools". The review noted that phrases like "build and use models" appear across hundreds of standards where simple visual representations or manipulatives are used, which risks diluting the disciplinary practice of applied mathematical modeling. ● **Re-examine Specific Practice Shifts:** Restore or strengthen explicit focus on key habits of mind where Utah's mathematical practices diverged from national norms—specifically *perseverance in problem-solving* (MP 1), *critiquing others' reasoning* (MP 3), and *algebraic generalization through repeated reasoning* (MP 8).	
		Developmental Appropriateness & Placement ● **Calibrate Early-Grade Abstract Reasoning:** Adjust a small subset of PK–1 standards where the required level of abstract reasoning or formal conjecture/argumentation exceeds typical early childhood	

		development. ● **Support Early Advanced High School Topics:** Ensure proper prerequisite scaffolding and instructional support for extended high school topics (such as matrices, vectors, complex numbers, and conic sections) that appear 1–2 years earlier in Utah's sequence than in most other states. ● **Address Assessment Challenges for DOK 4:** Reframe or provide assessment guidance for the five standards rated at Depth of Knowledge (DOK) 4 (extended investigation over time in Data Science) so they can be validly measured on statewide assessments.	
	Rebalance Secondary Pathways ● Ensure equal clarity between the **Integrated Pathway (Secondary I–III)** and the **AGA Pathway (Algebra I, Geometry, Algebra II)**. PDF ● Address the "algebra gap" in the Geometry year of the AGA pathway by clearly identifying	**Alignment & Sequence Considerations** ● **Geometry & Measurement Content:** Review localized differences between Utah and benchmark states in K–8 Geometry and Measurement (e.g., multistep conversions, geometric constructions, and line plots) to ensure adequate instructional coverage.	

	maintenance standards.	• **Secondary Pathway Coherence:** Monitor implementation between the *Integrated (Secondary I–III)* and *Algebra-Geometry-Algebra (AGA)* pathways. While both contain the same content, the AGA sequence creates multi-year gaps in algebra and statistics; the report advises ensuring Geometry teachers dedicate adequate time to the embedded Data Science standards so students do not experience a gap in algebraic reasoning.	
At the start of each grade level after the Intro		**Can we move the Competencies to the beginning so parents and teachers can easily find them?** I just ran analysis on 3rd grade looking to clean them up based on West Ed's suggestions and am adding the examples below to consider. I also compared it with a few of the other top math state's standards. I know I am not	Staff Response: The writing committee extensively discussed the recommendation to move the competencies before the standards while reviewing board member feedback during step 7 of the revision process, prior to releasing the draft for public comment. During that step of the process, board members requested that there be less front matter prior to the standards so that the standards themselves were elevated in importance, which

		a math specialist- but as an educator and parent I think clarifying language is so helpful. I know this has been a huge undertaking- thank you for all the work on this!	was part of the reason that the writers put them at the end of each grade level. The writing committee also felt strongly that the competency list should go after the standards to ensure that educators attend to the full depth and breadth of all of the standards. They worried that moving the competencies first could result in educators only teaching those competencies without fully unpacking the intent of the connected standards.
The following are copied over from comments Board Member Brinton made on Board Member Earl's tab			
	Good suggestions- WestEd recommended trimming the wordiness of individual Utah standards by: ~Removing redundant practice phrasing where it adds clutter without clarifying the skill. ~Splitting compound sentences into distinct, concise, single-expectation standards (similar to Florida's design). ~Stripping out subjective modifiers ("flexibly," "efficiently") to shorten		

	statements and make them measurable.		
P3.CC.4	suggestion "Count a group of up to 5 objects using accurate number names, and identify that the last number named tells the total quantity counted (cardinality). (MP 6)"		*Staff recommendation: Count a group of up to 5 objects using accurate number names, and identify that the last number named tells the total quantity counted (cardinality). (MP 6)*
P3.CC.5	P3.CC.5: With prompting and support, compare two groups of up to 4 objects and state whether they have the same number of objects. (MP 6). OR P3.CC.5: Compare two sets of up to 4 objects using matching or counting strategies to identify whether the quantities are equal. (MP 6) which i like better		*Staff recommendation: Identify whether the number of objects in one group is the same as those in another group for sets of up to 4 objects. (MP 6)*
P3.CC.6	P3.CC.6: Identify whether an object is "first" or "second" in a sequence, and use ordinal terms ("first", "second") in everyday classroom activities. (MP 2)		*Staff recommendation: Identify whether an object is "first" or "second" in a sequence. Use ordinal terms (e.g. "first", "second") in everyday contexts. (MP 6)*

3.OA.3	Solve multiplication and division story problems with products or dividends less than or equal to 100 and whole number quotients, using a variety of models. Add or remove context to solve situations involving equal groups, arrays, and measurement quantities. (MP 2, 4)	**Solve word problems involving multiplication and division within 100 involving equal groups, arrays, and measurement quantities.** *(MP 2, 4)*	
3.OA.4	Evaluate the unknown whole number in a multiplication or division equation. Represent division as an unknown-factor problem, and describe the relationship between multiplication and division. (MP 7)	**Determine the unknown whole number in a multiplication or division equation relating three whole numbers.** *(MP 7)*	
3.OA.5	Make and assess conjectures about the properties of multiplication. Add context to make sense of these properties as strategies to multiply and divide with products and dividends less than or equal to 100. (MP 2, 8)	**Apply commutative, associative, and distributive properties of multiplication as strategies to multiply and divide within 100.** *(MP 2, 8)*	
3.OA.6	Multiply and divide flexibly, accurately, and efficiently, with products, dividends, and divisors up to and including 100, and quotients up to and including 10. Know from memory all products of two one-digit numbers. (MP 6)	**Fluently multiply and divide within 100. Know from memory all products of two single-digit numbers (0×0through 9×9) and their corresponding division facts.** *(MP 6)*	

3.OA.7	Build and use models to solve two-step story problems involving whole numbers and having whole-number answers using the four operations, and attend to the reasonableness of answers. Remove context to represent situations as equations with a variable standing in for the unknown quantity. (MP 2, 4, 6)	**Solve two-step word problems involving the four operations with whole numbers. Represent these problems using equations with a letter standing for the unknown quantity.** *(MP 2, 4, 6)*	
3.NBT.1	Describe and represent place value structure by bundling ten 100s to make a thousand. Represent the amount of thousands, hundreds, tens, and ones in a 4-digit number, and describe the value of each. (MP 7)	**Identify the place value of digits in four-digit numbers (thousands, hundreds, tens, and ones) and compose/decompose four-digit numbers using expanded form.** *(MP 7)*	
3.NBT.2	Use models to round 2- or 3-digit whole numbers to the nearest 10 or 100 in and out of context. Determine if rounding is appropriate for a given situation and justify the reasoning. (MP 2, 3, 4)	**Round whole numbers to the nearest 10 or 100.** *(MP 2, 3, 4)*	
3.NBT.3	Determine sums and differences of three-digit whole numbers using numerical strategies flexibly, accurately, and efficiently. Justify a chosen strategy with place value	**Fluently add and subtract three-digit whole numbers within 999 using place value strategies or standard algorithms.** *(MP 3, 6)*	

3.NBT.4	language. (MP 3, 6)~~ Find the product of a one-digit whole number and a multiple of 10 (10-90). Make and test conjectures to generalize patterns that occur when multiplying by a multiple of ten. (MP 8)	**Multiply one-digit whole numbers by multiples of 10 in the range 10–90 using place value strategies.** *(MP 8)*	
3.MG.1 3.MG.2 3.MG.3 3.MG.4 3.MG.4	Make reasonable estimates about length, weight, and liquid volume. Select and use tools appropriately and strategically to find precise measurements. (MP 5, 6)~ Attend to precision when telling and writing time to the nearest minute. (MP 6) Add or remove context to solve one-step story problems involving length, liquid volume, mass, and time. (MP 6) Add or remove context to solve one-step story problems involving length, liquid volume, mass, and time. (MP 6) Recognize area and perimeter as attributes of plane figures. Build and	**Estimate and measure liquid volume, weight, and length using standard units (grams, kilograms, liters, inches, feet).** *(MP 5, 6)* **Tell and write time to the nearest minute and measure elapsed time intervals in minutes.** *(MP 6)* **Solve one-step word problems involving measurement of length, liquid volume, mass, and time.** *(MP 6)* **Solve one-step word problems involving measurement of length, liquid volume, mass, and time.** *(MP 6)*	

	use models to understand the concept of unit squares and area. Select and use tools strategically and appropriately to distinguish between linear (perimeter) and area measures. Use tiling to show that the area of a rectangle is the same as would be found by multiplying side lengths. (MP 4, 5)	**Measure the area of a rectangle by tiling with unit squares and show that the area is equal to multiplying the side lengths.** *(MP 4, 5)*	
3.MG.5	Build and use area models to represent the distributive property and relate the representations to the operations of addition and multiplication. (MP 4)	**Use area models to represent the distributive property by decomposing rectilinear figures into smaller rectangles.***(MP 4)*	
3.MG.6	Add and remove context to solve real-world and mathematical problems involving perimeters of simple polygons and rectangular areas. Make and evaluate conjectures about rectangles with the same perimeter and different areas or with the same area and different perimeters. Describe how area and perimeter are related. (MP 4, 8)~	**Solve real-world problems involving the perimeter of polygons, including finding an unknown side length.** *(MP 4, 8)*	
3.MG.7	Describe and represent shared attributes of shapes in a category, and recognize that the shared attributes define the larger category.	**Classify quadrilaterals by their attributes (e.g., rhombuses, rectangles, and squares as**	

	Build models of quadrilaterals that do not belong to a given subcategory. (MP 4, 7)	**four-sided shapes).** *(MP 4, 7)*	
3.MG.8	Attend to precision when partitioning shapes into parts with equal areas and expressing the area of each part as a unit fraction of the whole. (MP 6)	**Partition shapes into parts with equal areas and express the area of each part as a unit fraction of the whole.** *(MP 6)*	
3.D.1	Determine a topic question and ask investigative questions that will lead to collecting, analyzing, and interpreting data. Identify whether the question asked will result in quantitative or categorical data. (MP 1)	**Formulate questions to collect quantitative and categorical data.** *(MP 1)*	
3.D.2	Select and use tools strategically to collect and organize data. Build data visualizations using scales of 2s, 5s, and 10s. Represent a data set with three or more categories. Ask questions to consider a given data set. Identify data as quantitative or categorical. (MP 1, 5)	**Draw a scaled picture graph and scaled bar graph to represent a data set with several categories (scales of 2, 5, 10).***(MP 1, 5)*	
3.D.3	Analyze data sets and bar graphs and pictographs with scales of 2s, 5s, and 10s. Make and evaluate conjectures about benefits and	**Solve one- and two-step problems using information presented in scaled bar graphs and picture graphs.** *(MP 6, 8)*	

	drawbacks of different visualizations and scales used to analyze a set of data. (MP 6, 8)		
3.D.4	Interpret data, including scaled visualizations, to answer investigative questions. Construct and justify arguments about the data. Identify patterns, trends, and outliers in the data. Identify ways to refine investigative questions, data collection, visualization, or analysis. (MP 3)	**Generate measurement data by measuring lengths using rulers marked with halves and fourths of an inch, and display the data on a line plot.** *(MP 3)*	
3.NF.1	Describe and represent a fraction, a/b, as a numerator and a non-zero denominator, including unit fractions and fractions equal to whole numbers. Compose and decompose a fraction using unit fractions. Identify the meaning of the whole for a given context. (MP 7)	**Represent a fraction ba as a equal parts of size b1, where b1 is a unit fraction.***(MP 7)*	
3.NF.2	Build and use number line models to represent fractions, using unit fractions as intervals. Connect number line models with area models to make sense of fractions. (MP 4)	**Represent and locate fractions on a number line by partitioning the interval from 0 to 1 into equal parts.** *(MP 4)*	

3.NF.3 3.NF.4	Build and use models to make sense of and generate equivalent fractions including whole numbers. Justify why equivalent fractions must reference the same whole to be equivalent. (MP 3, 4) Compare fractions with like numerators or like denominators, and justify the comparisons using models and/or by reasoning about their size. (MP 3, 4)	**Identify and generate simple equivalent fractions (e.g., 21=42, 44=1) using visual models and number lines.** *(MP 3, 4)* **Compare two fractions with the same numerator or the same denominator using symbols (>, =, <) and justify the results using visual models.** *(MP 3, 4)*	