

Final Exam Review for AZ High School Mathematics Teachers – DRAFT Jan. 2019

This analysis works in tandem with the spreadsheet available at <https://goo.gl/BhKPma>.

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Step 1: Determine the targeted standards.

Course-specific standards may be found in the state standards, district curriculum guides, or state assessment frameworks. Some standards are of major importance while others are supporting, though frameworks for this distinction may vary by state or district.

List the targeted standards in the “Course Standards” column of the spreadsheet. Enter an “x” in the “Major” column if the standard aligns to major work. For example:

Course Standards	Major	Item	pts	Aligned Standard 1	Aligned Standard 2	Prac	Rigor	Comp	HQ
A1.N-RN.B.3		1							
A1.N-Q.A.1	x	2							
A1.N-Q.A.2	x	3							
A1.N-Q.A.3	x	4							
A1.A-SSE.A.1	x	5							
A1.A-SSE.A.2	x	6							
A1.A-SSE.B.3	x	7							
A1.A-APR.A.1		8							
A1.A-APR.B.3	x	9							

Step 2: Examine each item.

There are six aspects to consider when reviewing an item: point value, alignment to standards, reflection of mathematical practices, aspects of rigor, complexity of rigor, and quality.

Point Value: Entering the point value will clear the shading across the row.	Enter the point value in the “pts” column.
Alignment to standards: Each test item should align to a part of a standard, a standard, or a collection of standards. To be aligned an item must match the intent of the standard and provide evidence of meeting that standard. A topic match is insufficient. Verbs matter, as does the intent of the cluster. If a student can answer an item by some other means, then it does not provide evidence of meeting the standard.	Select the aligned standard(s) in the “Aligned Standard” columns.
Mathematical Practices: The practices are standards. They should be an essential part of the exam. (See the look-for questions at the end of this document.)	Use an “x” in the “Prac” column to indicate if the item reflects the mathematical practices.
Aspects of rigor: Each item targets either procedural skill and fluency or conceptual understanding, or a mix of both. Additionally, an item may or may not include an application. The Aspects of Rigor matrix describes the possible relationships (P, P-C, P-A, P-C-A, C, C-A).	Determine the aspects of rigor targeted by the item and enter the corresponding code into the “Rigor” column
Complexity of rigor: Each aspect of rigor in the item also has a corresponding level of complexity. The complexity matrix describes these levels.	Indicate Level 2 or Level 3 Conceptual items by selecting C2 or C3 in the “Comp” column. Do the same for App 2 and 3.
Quality: All items should be high-quality and free from issues of bias and readability, and they should not have unintended correct answers. The scoring keys should be clear and accurate. Items should be mathematically precise and mathematically correct.	Use an “x” in the “HQ” column to indicate high quality items.

Step 3: Check for Balances

After all items have been reviewed, analyze the results.

When the item review is complete you will have something that looks like this:

Course Standards	Major	Item	pts	Aligned Standard	Prac	Rigor	Comp	HQ
A1.N-RN.B.3		1	5	A1.N-RN.B.3	x	P		x
A1.N-Q.A.1	x	2	5	A1.A-APR.A.1		P		x
A1.N-Q.A.2	x	3	5	A1.A-SSE.A.2		C	C2	x
A1.N-Q.A.3	x	4	5			PA		x
A1.A-SSE.A.1	x	5	5	A1.A-REI.B.3	x	PC		x
A1.A-SSE.A.2	x	6	5	A1.A-REI.B.4		PCA		x
A1.A-SSE.B.3	x	7	5	A1.A-REI.B.4		PC		x
A1.A-APR.A.1		8	5	A1.A-CED.A.4		CA		x
A1.A-APR.B.3	x	9	5		x	CA		
A1.A-CED.A.1	x	10	5	A1.N-Q.A.1		PA	A2	x
A1.A-CED.A.2	x	11	5	A1.N-Q.A.3		PA		x
A1.A-CED.A.3	x	12	5	A1.A-CED.A.4	x	PCA		x
A1.A-CED.A.4	x	13	5	A1.A-CED.A.3	x	CA		x
A1.A-REI.A.1	x	14	5	A1.N-Q.A.1	x	PC		x
A1.A-REI.B.3		15	5	A1.A-CED.A.4	x	P		
A1.A-REI.B.4		16	5	A1.N-Q.A.1	x	PC		x
A1.A-REI.C.5		17	5	A1.A-SSE.A.2		C		x
A1.A-REI.C.6		18	5	A1.A-SSE.A.2		CA		x
A1.A-REI.D.10		19	5			PA		x
A1.A-REI.D.11		20	5	A1.N-RN.B.3		CA		x

Total # Items 20

Total # Points 100

percent of items that align 85.0%

items aligned, practices 35.0%

percent of points major 55.0%

Aspect of Rigor points

Procedural (P) 15.0%

Conceptual (C,PC) 30.0%

Application (PA,PCA,CA) 55.0%

Complexity C2 1

Complexity C3 0

Complexity A2 1

Complexity A3 0

High quality items 90.0%

Color intensity indicates frequency of use.

This section highlights the percent of items that align (target is 90%), the percent of items that reflect the practices and are aligned to standards (target is 33%), and the percent of points connected to major work standard (target is 70% for AZ).

This section highlights the distribution of points for the aspects of rigor. The target here is 15-35% P, 25-50% PC or C, 25-50% PA, CA, PCA.

Indicates the presence of higher complexity conceptual and application items.

Indicates the percent of high quality items. The target is 95%.

Ask and discuss the following questions:

- Do at least 90% of items align to the standards?
- Do at least 33% of the items reflect the practices while also being aligned to a content standard?
- Do at least 70% of the score points align to major content?
- Do the score points for the Aspects of Rigor fall within reasonable bounds? (15-35% P, 25-50% PC or C, 25-50% PA, CA, PCA)
- Is there at least one conceptual item (C, P-C, P-C-A, C-A) at Level 2 and one at Level 3?
- Is there at least one application item (P-A, P-C-A, C-A) at Level 2 and one at Level 3?
- Are at least 95% of the items high quality?

Think about what your test is telling you about your students by discussing the following:

- Your exam exists to make some claim(s) about your students. What do you think that is? (Be as specific as possible.) Are you confident the exam does that?
- How well do exam grades describe students meeting *all* the course standards? (See the green indicators on the far left of the spreadsheet to see which standards were addressed.)
- How will the results of the exam inform instruction?

Sample questions to help determine if items reflect the practices: Does the item...

- require problem solving by interpreting novel situations without hints or key words?
- require the use of meanings of quantities to make sense of problems?
- require students to actually construct or critique arguments or develop counterexamples?
- require students to identify quantities on their own and enact the modeling process without scaffolds?
- give an advantage to the strategic selection of tools?
- require students to interpret and use definitions or to communicate with precision?
- allow students to more quickly solve a problem when they spot an underlying structure?
- require students to formulate a generalization based on repeated reasoning?