

Kentucky Academic Standards for Mathematics

Appendix: Public Feedback Trends and Comments Received

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Introduction

The appendix to the Public Feedback Survey and Summary includes all comments received for each mathematics standard. Standards that were flagged for review and included in the initial report, as well as standards that received no comments, are not included in the appendix. Note that the standards included in the appendix were overwhelmingly approved by the public as they are currently written. The intention of including all comments in this document is to aid the committees in identifying trends in feedback for the standards overall and across grade bands. Below, some trends have been identified for consideration during the standards revisions process.

Overall Feedback Trends

Across all grade bands, the most common feedback themes were:

- **Clarification Needed:** Many comments requested clearer, more specific wording, more examples, or additional explanation for standards. Respondents provided frequent notes that certain standards or language were confusing or too vague.
- **Streamline:** Comments provided suggestions to remove, reduce, or simplify standards that were seen as unnecessary, redundant, or developmentally inappropriate. Other comments suggested merging overlapping standards.
- **Age Appropriateness:** Respondents raised concerns about whether content was suitable for the grade level.
- **Visuals/Examples:** Respondents suggested adding more visual aids, anchor charts, or concrete examples to support understanding.

K-5 Feedback Trends

- **Clarification:** Respondents requested that expectations, ranges (e.g., numbers to count to), and distinctions between similar standards be clarified.
- **Developmental Appropriateness:** Respondents raised concerns about whether certain concepts (e.g., fractions, place value, algorithms) are suitable for young learners.
- **Streamline:** Respondents noted overlap between standards, with suggestions to combine or streamline.
- **Visuals and Examples:** Respondents requested more concrete examples and visual supports.
- **Simplification:** Respondents called to simplify language and expectations and to focus on foundational skills.

- **Foundational Skills:** Compared to the other grade bands, this grade band received more comments about the need to build foundational skills.

6-8 Feedback Trends

- **Too Abstract/Complex:** Many standards were seen as too abstract or advanced for middle school students.
- **Specificity, Clarification and Examples:** Respondents requested a need for more specific guidance on what students should know and be able to do. Respondents also requested more clarity and concrete examples, especially for statistical and algebraic concepts.
- **Restructure:** Respondents suggested to move certain topics (e.g., probability, advanced statistics, complex geometry) to higher grades.
- **Visuals:** Respondents requested more visual models and anchor charts to support understanding.

High School Feedback Trends

- **Clarification and Specificity:** High school feedback focused on the need for precise definitions, examples, and breakdowns of complex concepts.
- **Remove or Make Optional:** Some standards (especially advanced topics like matrices, complex numbers, and proofs) were suggested to be optional or reserved for advanced courses.
- **Vague or Redundant Standards:** Some respondents identified vague wording and overlap with other standards.
- **Visuals and Examples:** Continued requests for visual aids and concrete examples, especially for abstract concepts.
- **Progression and Coherence:** Compared to the other grade bands, this grade band received more comments about strengthening progressions and ensuring coherence across courses.

Kindergarten Standards Feedback

Counting and Cardinality Standards Feedback

KY.K.CC.1.a Count to 100 by ones and by tens.

Response
When counting they need to be able to count by 10's anywhere. 42, 52, 62
Seperate into a, b, then count backwards as c. Helps with standard clarity
Count to 100 by tens and to 50 by ones
50
Count to 50
Clarify by tens is on decade

KY.K.CC.1 Count

Response
This standard has so many sub categories. It would be beneficial to split this standard up and specify specific expectations within.

KY.K.CC.1.b Count backwards from 30 by ones.

Response
Make it from 50
Count backwards from 50 by ones
from 20
Count backwards from 20. Not sure why 30?
Backward from 20
Count backwards from 20 by ones.
Count backwards from 20 by ones.

Count backwards from 20 by ones.
to 20
Reduce range to 20 so that it aligns to numeral ID expectations. (So these skills can be worked on together.)
Count backwards from a given by ones.

KY.K.CC.2 Count forward beginning from a given number within the known sequence within 100 (instead of having to begin at 1).

Response
Known sequence within 50
everything else is to 20
within 50

KY.K.CC.3 Represent numbers.

Response
Specify within what range?

KY.K.CC.3.a Write numbers from 0 to 20.

Response
write numbers from 0 to 100
Are students expected the write the numbers in sequential order? This needs clarification in the standard or within the clarification section.
Write numbers from 0-50.
Raise to 50
Clarification needed as to whether reversals should be accepted at the kindergarten level
Change to "Read and write numbers 0 to 20"

KY.K.CC.3.b Represent a number of objects with a written numeral 0-20 (with 0 representing a count of no objects).

Response
There is a lot of overlap between K.CC.3b, K.CC.4, and K.CC.5. Add clarity to the difference between these standards. (Example: K.CC.4 and K.CC.5 refer to representation cardinality through a written form etc.)
Clarification needed as to whether reversals should be accepted at the kindergarten level

KY.K.CC.4 Understand the relationship between numbers and quantities; connect counting to cardinality.

Response
seems redundant
Specify a range for this standard or in the cluster heading.

KY.K.CC.4.a When counting objects, say the number names in the standard order, pairing each object with one and only one number name and each number name with one and only one object.

Response
Specify range
These standards can all fall under KY.K.CC.4

KY.K.CC.4.b Understand that the last number name said tells the number of objects counted. The number of objects is the same regardless of their arrangement or the order in which they were counted.

Response
Specify range

combine with a
These standards can all fall under KY.K.CC.4
Include the word "cardinality" in this expectation.

KY.K.CC.4.c Understand that each successive number name refers to a quantity that is one larger.

Response
To add in and one less , and specify range
These standards can all fall under KY.K.CC.4
Possibly make this its own standard instead of tied in with the other K.CC.4 components.

KY.K.CC.5 Given a number from 1-20, count out that many objects.

Response
0-20
This standard seems to contradict with part a and b. This standard suggests you give students a number and they count out the objects. The next parts a and b suggest the opposite: give students the object and they tell you the quantity (see more below)
Change to "Count objects", then make part a "Given a number 1-20, count out that many objects". Shift the remaining two parts to "b" and "c".

KY.K.CC.5.a Count to answer “how many?” questions with as many as 20 things arranged in a line, a rectangular array, or a circle.

Response
It would be beneficial to separate these for standards clarity
Count to answer "How many?" questions with as many as 20 things in a scattered configuration
It is okay if students have to do both, count to answer and represent with a number, but again there is a lot of overlap between this standard, K.CC.4, and K.CC.3

KY.K.CC.5.b Count to answer “how many?” questions with as many as 10 things in a scattered configuration.

Response
to 20
See more of my response above with K.CC.5.a and K.CC.5. There is a lot of overlap with this standard, K.CC.3 and K.CC.4. Make clearer distinctions between these.

KY.K.CC.6 Identify whether the number of objects in one group is greater than, less than, or equal to the number of objects in another group.

Response
Specify range of within what numbers 0-10, 0-20, 0,100?
Either clarify within this text that the number of objects for each collection is within 10 or change cluster heading to "Compare numbers within 10".

Operations and Algebraic Thinking Standards Feedback

KY.K.OA.1 Represent addition and subtraction with objects, fingers, mental images, drawings, sounds, acting out situations, verbal explanations, expressions, or equations.

Response
This would be beneficial to separate for standard clarity. Add range
The clarification indicates "Students flexibly model or represent" but in the standard only mentions represent. Table 1 is referenced and the pathway for MP4 -- more explicit connections may be needed for teachers.

KY.K.OA.2 Solve addition and subtraction word problems and add and subtract within 10 by using objects or drawings to represent the problem.

Response
Split into 2a: Solve addition word problems.

story problems need to be given to students orally, not written and expected for them to be able to read-- or show in pictures only getting more or leaving or popping etc/

Within 5

Table 1 is mentioned here in this standard - seeing a connection to the standard and tables, but no mention to SMP4 as the pathway for this one.
--

KY.K.OA.3 Decompose numbers less than or equal to 10.

Response

Add in what strategies could be used, such as in k.oa.1

Double clarification on note about drawings

KY.K.OA.3.a Decompose numbers into two groups in more than one way by using objects or drawings and record each decomposition by a drawing or equation.

Response

Equation only

KY.K.OA.3.b Use objects or drawings to demonstrate equality as the balancing of quantities.

Response

Within what range?

unclear

KY.K.OA.5 Fluently add and subtract within 5.

Response

Fluently add and subtract within 10.
define fluent
Fuently add and subtract within 10
Fluently add and subtract within 5 in the absence of supports.
LOVE that fluently is defined and that it is an on-going process! Clarification might include the strategies students at K should be using within 5 for teachers to formatively assessed understanding/mastery. See standard KY.1.OA.6, page 33 for more strats

Number and Operations in Base Ten Standards Feedback

KY.K.NBT.1 Compose and decompose numbers from 11 to 19 using quantities (numbers with units) of ten ones and some further ones. Understand that these numbers are composed of ten ones and one, two, three, four, five, six, seven, eight, or nine ones.

Response
Within 5
"further" - more or extra (kid friendly language)
Note in some manner how this is not a critical area/domain/cluster but students should still be taught but may not master skills
Need to change some futher ones to a number- may up to 100?
Focus K on composing and decomposing quantities to 10.

Measurement and Data Standards Feedback

KY.K.MD.2 Directly compare two objects with a measurable attribute in common, to see which object has “more of”/ “less of” the attribute and describe the difference.

Response
Range
May want to add example words like shorter/longer, taller, smaller, bigger

Either here or as it's own standard - include something about sequencing events in time or comparing if an event happens before or after (e.g. students put on shoes BEFORE getting on the school bus)

KY.K.MD.3 Classify and sort objects or people by attributes. Limit objects or people in each category to be less than or equal to 10.

Response
Why did sorting by count ever go away?
Include "count the number of objects" listed in the cluster description in the content standard. The content standard & Attending to SMPs focus on classifying and sorting, but the clarification seems to just be about ordering objects?

KY.K.MD.4 Recognize and identify coins by name (penny, nickel, dime, quarter).

Response
remove penny since it isn't being minted anymore
And tell how much the coins are worth? Using them to add/subtract?
penny, nickel and dime
Since they're already counting to 100 by the end of the year, I feel like kindergarten students should also be able to count pennies too.
Note how this is not a critical area/domain/cluster but students should be exposed to the content.
Memorizing the look of coins for 5-6 in this culture where we don't use coins, is not the most efficient use of building sense of number in Kindergarten.
remove dime and quarter; include value of penny and nickel
Recognize and identify pennies by name and the their value of 1 cent.
Recognize and identify coins by name (nickel, dime, quarter).

Geometry Standards Feedback

KY.K.G.1 Name and describe shapes in the environment.

Response
Hexagon is a 2d shape that Kindergarteners are supposed to identify. Octagons are a more age appropriate shape as children learn this shape early in life through environmental print/familiarity. Hexagons are not as common when teaching.
This is the same as KY.K.G.1.a (only one of these is needed)

KY.K.G.1.a Describe objects in the environment using names of shapes.

Response
1a and 1 go hand in hand- the two standards sound redundant.
This is the same as KY.K.G.1 (only one of these is needed)

KY.K.G.1.b Describe the relative positions of these objects using terms above, below, in front of, behind and next to.

Response
Make this its own standard instead of being a component of K.G.1

KY.K.G.2 Correctly name shapes regardless of orientations or overall size.

Response
aren't those in the environment
This could be a component of K.G.1 instead of its own stand alone standard.
Include which shapes to identify
What shapes?

KY.K.G.3 Identify shapes as two-dimensional or three-dimensional.

Response

Is this really an important concept? How relevant to a K student? When use as far as needing to know those terms?

KY.K.G.4 Describe the similarities, differences and attributes of two and three dimensional shapes using different sizes and orientations.

Response
And tell how many sides/corners/points , use vocabulary to describe the shape by its attributes
remove the words "similarities" and "differences". Just describe the attributes of...
restore the language "using informal language" so that teachers have more guidance on the appropriate received and expressive language.
omit and focus on 2-D in K.

KY.K.G.5 Model shapes in the world by building figures from components and drawing shapes.

Response
Do Kindergarten students need to draw 3D shapes? The standard says construct AND draw.
Model shapes in the world by building figures (in 2-D) from components and drawing shapes.

KY.K.G.6 Compose simple shapes to form larger shapes.

Response
Using manipulatives and drawing
What shapes?
Remove
Compose simple shapes (2-D) to form larger (2-D) shapes.

1st Grade Standards Feedback

Operations and Algebraic Thinking Standards Feedback

KY.1.OA.1 Use addition and subtraction within 20 to solve word problems involving situations of adding to, taking from, putting together, taking apart and comparing, with unknowns in all positions.

Response
SMP 4 pathway?;

KY.1.OA.2 Solve word problems that call for addition of three whole numbers whose sum is less than or equal to 20, by using objects, drawings and equations with a symbol for one unknown number to represent the problem.

Response
Solve word problems that call for addition of three whole numbers whose sum is less than or equal to 30, by using objects, drawings and equations with a symbol for one unknown number to represent the problem.
Let's remove this standard to lessen the number of things taught. If students can do OA.1, that's great.

KY.1.OA.3 Apply properties of operations as strategies to add and subtract.

Response
clarification says students are not responsible for formal language of properties so instead of teaching the actual name teachers use phrases like the flip flop property. Just teach them the names of the properties so the common language is established.
Which properties
Note Appendix for Table of Properties.
Apply counting strategies to add and subtract.
Expand clarifications to communicate what applying properties of operations looks like.

KY.1.OA.4 Understand subtraction as an unknown-addend problem.

Response
Solve unknown addend problems. Add a standard about understanding the relationship between addition and subtraction.

KY.1.OA.5 Relate counting to addition and subtraction.

Response
Include wording on the importance of students understanding subtraction as the "difference" between 2 numbers and how addition plays into that
Clarification needs more than the inverse operation; additional example(s) as to how this concept might be approached
Remove- done in 1.OA.3
Should the chart in the clarifications be viewed as a progression for addition & a progression for subtraction? Should it include figurative counting (e.g. Counting all without objects)

KY.1.OA.6 Add and subtract within 20.

Response
I think it would be advantageous to be familiar with multiple layers of 10. Recognizing the similarities between 10-19 and 20-29 should be approachable at this age.
Add and subtract within 30.
confusing for teachers the overall standard says 20 and then part a is 10 and b is 20. May need to separate or provide further clarity. Since a is a FLUENCY standard and b is not.
Remove so that 1.OA.6a and 6b are separate standards

KY.1.OA.6.a Fluently add and subtract within 10.

Response
Fluently add and subtract within 20.
Make this its own standalone standard instead of combining it with add and subtract within 20. This is because other grade levels have this standard as stand alone.
within 20

Fluently add and subtract within 10 in the absence of supports.
Examples in clarification are strategies for fluency within 20, but this component of the standard is for 10 - can be confusing for teachers
Seperate from 6b
collapse the 1.OA.6a, 1.OA.6b into one 1.OA.6 standard

KY.1.OA.6.b Add and subtract within 20, demonstrating fluency for addition and subtraction within 10. Use strategies such as counting on; making 10; decomposing a number leading to a 10; using the relationship between addition and subtraction; creating equivalent but easier or known sums.

Response
Add and subtract within 50, demonstrating fluency for addition and subtraction within 20. Use strategies such as counting on; making 10; decomposing a number leading to a 10; using the relationship between addition and subtraction; creating equivalent but
I think at least introducing the concept of adding past 20 to see the patterns would be useful.
confusing when fluency has to be reached for 10, but skill is within 20
Seperated from 6a
collapse the 1.OA.6a, 1.OA.6b into one 1.OA.6 standard

KY.1.OA.7 Understand the meaning of the equal sign and determine if equations involving addition and subtraction are true or false.

Response
This might also include algebraic equations with variables, such as: $a+3=b+3 \Rightarrow a=b$.
If using the equal sign, ensure there is a variable or ? on the other side of the equation. Otherwise we are teaching kids that expressions are equations which becomes confusing in middle school
This is the only place for explicitly developing the idea of the = being a balance. Equivalence is everywhere, but the actual understanding of = is a first grade standard only.
Clarification -- fix true/false answers to indicate correct/incorrect answers. Additionally had a graphic of of number balance to show equivalency and not.
Really understanding the concept of equals either needs to be developed more in k and 1 or in a different (additional) way than true or false.
Understand the meaning of the equal sign and determine if equations involving addition and subtraction are equal..

KY.1.OA.8 Determine the unknown whole number in an addition or subtraction equation relating three whole numbers.

Response
If using the equal sign, ensure there is a variable or ? on the other side of the equation. Otherwise we are teaching kids that expressions are equations which becomes confusing in middle school
Include wording on the importance of students understanding subtraction as the "difference" between 2 numbers and how addition plays into that
Let's remove this standard to reduce the number of standards we need to master.
In the example include an empty box in exchange for the ? in one of the examples as this is what is often used in the math resource for teachers

Number and Operations in Base Ten Standards Feedback

KY.1.NBT.1 Count and represent numbers.

Response
Count and represent numbers to 120.
Include an example of the UPSIDE-DOWN 100s Chart here and/or in 1.NBT.2
add to 120.

KY.1.NBT.1.a Count forward to and backward from 120, starting at any number less than 120.

Response
Count forward and backward to 100; Count to 1000 by hundreds
Not sure why 120?
Count forward to and backward from 120 by tens and by ones, starting at any number less than 120.
Count forward to and backward from a given 3-digit number, starting at any number less than a given 3-digit number.

KY.1.NBT.2 Understand the two-digits of a two-digit number represent amounts of tens and ones. Understand the following as special cases:

Response
tens, ones, and hundreds

KY.1.NBT.2.a 10 can be thought of as a bundle of ten ones — called a “ten.”

Response
graphic in clarification of 10 single stick and a 1 bundle of 10

KY.1.NBT.2.b The numbers from 11 to 19 are composed of a ten and one, two, three, four, five, six, seven, eight or nine ones.

Response
Clarification on why this is confusing for multi-lingual learners as the language is awkward

KY.1.NBT.3 Compare two two-digit numbers based on meanings of the tens and ones digits, recording the results of comparisons with the symbols $>$, $=$, and $<$.

Response
In clarification note "number paths"
Remove "place value charts" form clarifications - students should not need place value charts to appropriately compare two collections of objects. In addition to or in place of "number lines", have other linear reps such as number paths.

KY.1.NBT.4 Add within 100 including adding a two-digit number and a one-digit number. Add a two-digit number and a multiple of 10.

Response
Clarify this standard. Are we adding a two-digit number and a two-digit number that is not a multiple of 10? Or only a 2 digit number with a one-digit number or multiple of 10?
Break this into 2 seperate standards
Clarify if students are ONLY working with these two cases or working with all 2-digit addition & subtraction with attention to these cases.

KY.1.NBT.4.a Add within 100 using... concrete models or drawings; strategies based on place value; properties of operations; the relationship between addition and subtraction.

Response
Include the word "or" so that students can use the most helpful or efficient strategy, depending on the situation.
Examples of each in the clarifications -- particularly misconceptions around place value and properties of operations strategies and what they are meaning
This standard is only about addition. Why is the relationship between addition & subtraction included?
Collapse 1.NBT. 4a and 1.NBT.4b into one standard 1.NBT.4

KY.1.NBT.4.b Relate the addition strategy to a written method and explain the reasoning used. Understand that in adding two-digit numbers, one adds tens and tens, ones and ones; and sometimes it is necessary to compose a ten.

Response
Note: that the standard algorithm should not be taught here
I think that acutally composing a ten or thinking about regrouping language to not developmentally appropriate for first grade. So adding tens and some ones is sufficient for the progression, but not enough of a quantity to "regroup".
Remove first sentence. No need to introduce standard algorithm in 1st grade
Remove "Understand that in adding two-digit numbers..." part. Jumping strategies (where one number is kept whole and the other is added in parts) work too.
Collapse 1.NBT. 4a and 1.NBT.4b into one standard 1.NBT.4

KY.1.NBT.6 Subtract multiples of 10 in the range 10-90 from multiples of 10 in the range 10-90 (positive or zero differences).

Response
Expand this standard to include subtracting a one-digit number.

KY.1.NBT.6.a Subtract using: concrete models or drawings; strategies based on place value; properties of operations; the relationship between addition and subtraction

Response
If students are to use concrete models or drawings, the ones they can use need to be specified. The wording of this part of the standard is too broad.
Include the word "or" so that students can use the most helpful or efficient strategy, depending on the situation.
Give an example of finding the difference/distance not just take away in the clarifications
In clarifications, include "groupable" base ten manipulatives such as bundles and sticks.
Collapse these standards into one 1.NBT.6 standard

KY.1.NBT.6.b Relate the subtraction strategy to a written method and explain the reasoning used.

Response
These are first graders, that's a little too extensive at this age of an expectation
Relate a subtraction strategy to a written method and explain the strategy used.

Measurement and Data Standards Feedback

KY.1.MD.1 Order three objects by length; compare the lengths of two objects indirectly by using a third object.

Response
Add definition of principle of transitivity and interating (maybe a graphic) to explain

KY.1.MD.3 Assign values to time and money.

Response
Students should also be taught the sign for dollars (\$) comes before the given amount.
Note that this is not a critical standard for mastery
Remove- and make 3a and 3b different standards.
remove part b of this standard. The 2nd grade standard is more than sufficient in preparing students to be proficient in this skill.

KY.1.MD.3.a Tell and write time in hours and half-hours using analog and digital clocks.

Response
Students at this age should be required to tell and write any time from an analog clock.
Note that this is not a critical standard for mastery
using a simple clock model to begin. A regular analog clock model is not developmentally appropriate model to begin with all the ticks and lines, etc.

KY.1.MD.3.b Identify the coins by values (penny, nickel, dime, quarter).

Response
Remove penny as it is no longer being minted.
Students should also be able to count nickels independently and dimes independently since they can count by 5s and 10s.
Note that this is not a critical standard for mastery
and count like-coin combinations of all pennies, all nickels, or all dimes.
Remove this standard.

KY.1.MD.4 Investigate questions involving categorical data.

Response
Note that this is not a critical standard for mastery

KY.1.MD.4.a Pose a question that can be answered by gathering data.

Response
I think this standard is okay however the resources for this part of the standard are limited. Since many other states do not have this as part of their standard, there is a need for more resources.
Note that this is not a critical standard for mastery
remove
Move the example of this in the "SMP" section to the clarifications.

KY.1.MD.4.b Determine strategy for gathering data from peers.

Response
Note that this is not a critical standard for mastery
remove

KY.1.MD.4.c Organize and represent data in a table/chart with up to three categories.

Response
Standard should be moved up to a higher grade level.
What type of table/chart
Note that this is not a critical standard for mastery

KY.1.MD.4.d Interpret data to answer questions about the table/chart that connects to the question posed, including total number of data points, how many in each category and how many more or less are in one category than in another.

Response
Standard should be moved up to a higher grade level.
What type of table/chart
Note that this is not a critical standard for mastery

Geometry Standards Feedback

KY.1.G.1 Distinguish between defining attributes versus non-defining attributes; build and draw shapes to possess defining attributes.

Response
Make this into a part a and part b. The main standard could be something like "Understand the attributes of shapes."

KY.1.G.2 Compose shapes.

Response
What shapes?

KY.1.G.2.a Compose two-dimensional shapes to create rectangles, squares, trapezoids, triangles, half-circles, quarter-circles and composite shapes to compose new shapes from the composite shapes.

Response

This is confusion. Are students using simple shapes to form composite shapes (i.e a square and triangle to make a house) and then using those composite shapes to form new shapes (use the house to then add a driveway from a rectangle?)

Collapse into one standard

KY.1.G.2.b Use three-dimensional shapes (cubes, right rectangular prisms, right circular cones and right circular cylinders) to create a composite shape and compose new shapes from the composite shapes.

Response

collapse into one standard

KY.1.G.3 Partition circles and rectangles into two and four equal shares, describe the shares using the words halves, fourths and quarters, and use the phrases half of, fourth of and quarter of. Describe the whole as two of or four of the shares. Understand for these examples that decomposing into more equal shares creates smaller shares.

Response

Clarify that students should not yet be seeing the numerical symbol for fractions but only the word form

Partition rectangles into two and four equal shares, describe the shares using the words halves, fourths and quarters, and use the phrases half of, fourth of and quarter of. Describe the whole as two of or four of the shares. Understand for these examples

I wonder about the word "quarters" at this age. I think fourths is sufficient for 5-6 year olds.

2nd Grade Standards Feedback

Operations and Algebraic Thinking Standards Feedback

KY.2.OA.1 Use addition and subtraction within 100 to solve one- and two-step word problems involving situations of adding to, taking from, putting together, taking apart and comparing, with unknowns in all positions, by using drawings and equations with a symbol for the unknown number to represent the

problem.

Response
Children need to learn basic maths in order to confidently succeed before bringing algebra into requirements at this age
Separate into 2 standards - one-step word problems and two-step word problems. This will encourage teachers to better scaffold and progress learning appropriately.
Seperate into 1a and 1b - 1a. One step problems 1b. 2 step problems

KY.2.OA.2 Fluently add and subtract within 20 using mental strategies.

Response
Fluently add and subtract within 30 using mental strategies.
Should be changed to require the standard algorithm.

KY.2.OA.3 Determine whether a group of objects (up to 20) has an odd or even number of members; write an equation to express an even number as a sum of two equal addends.

Response
Remove the "write an equation to express an even number as a sum of two e

KY.2.OA.4 Use addition to find the total number of objects arranged in rectangular arrays with up to 5 rows and up to 5 columns; write an equation to express the total as a sum of equal addends.

Response
Extend array pattern to 10 rows and 10 columns ADD statement: Grade 2 does not work on multiplication
change to 10 rows and 10 columns

Number and Operations in Base Ten Standards Feedback

KY.2.NBT.1 Understand that the three digits of a three-digit number represent amounts of hundreds, tens and ones. Understand the following as special cases:

Response
Clarify this isn't just spending a day by plotting a number on a place value chart. Students need to also understand that 631 is also 63 tens or 631 ones etc.
Not sure if this would go best with NBT.1 or NBT.3. Add examples of equivalent representations to clarification part and give ex of how to decompose-321 could be 3 hundreds, 2 tens, 1 one OR 2 hundreds, 12 tens, 1 one OR 3 hundreds, 1 ten & 11 ones

KY.2.NBT.1.a 100 can be thought of as a bundle of ten tens — called a “hundred.”

Response
3rd grade is supposed to round numbers to 10s and 100s. I feel like 2nd grade should learn what half of 10 and half of 100 is.

KY.2.NBT.2 Count forwards and backwards within 1000; skip-count by 5s, 10s and 100s.

Response
Count forwards and backwards within 1000; skip-count by 5s, 10s and 100s. Count on from 1000 to 10000 by thousands.
clarify the first statement by "Counting forwards and backwards beginning at any point within 1000. Counting should include moving over 10's and 100's. Skip count by 5's 10's and 100's
Include skip counting by 2s.

KY.2.NBT.3 Read and write numbers to 1000 using base-ten numerals, number names and expanded form.

Response
Read and write numbers to 10000 using base-ten numerals, number names and expanded form.

Not sure if this would go best with NBT.1 or NBT.3. Add examples of equivalent representations to clarification part and give ex of how to decompose-321 could be 3 hundreds, 2 tens, 1 one OR 2 hundreds, 12 tens, 1 one OR 3 hundreds, 1 ten & 11 ones

KY.2.NBT.5 Fluently add and subtract within 100 using strategies based on place value, properties of operations and/or the relationship between addition and subtraction.

Response
Even with the definition of fluency in the clarification many teacher just look at the standard and believe this means students should use the standard algorithm, perhaps using another verb besides fluently would be best: Efficiently and appropriately
Require the use of the standard algorithms for addition and subtraction.
Fluently add and subtract within 1000 using strategies based on place value, properties of operations and/or the relationship between addition and subtraction.
Ideas of strategies students may use for fluency in the clarifications
Either here or in a different standards (or as a new standard) students need to flexibly use equal sign with larger numbers (e.g. extend Ky.1.OA.7)

KY.2.NBT.6 Add up to four two-digit numbers using strategies based on place value and properties of operations.

Response
Require the use of the standard algorithms for addition and subtraction.
clarifications say "students are not expected to know a standard algorithm until grade 4 but grade 4 does not require a standard algorithm is required. change clarification to show examples of strategies to use.
Remove this standard to reduce the number of standards we need to teach.
Mentioning of the standard algorithm in grade 4 -- but NOT mentioned in grade 4

KY.2.NBT.7 Add and subtract within 1000.

Response
By 5's, 10's and hundreds
add to end- using a strategy based on place value.

KY.2.NBT.7.a Represent and solve addition and subtraction problems using... concrete models or drawings; strategies based on place value; properties of operations; the relationship between addition and subtraction and; relate drawings and strategies to expressions or equations.

Response
The concrete models or drawings allowed to be used should be specified.
Make the last bullet point (relate drawings...) its own part (i.e. part b) instead of including it in that list (similar to other grade level equivalent standards)
Use and/or
Collapse into one 2.NBT.7 standard

KY.2.NBT.7.b Understand that in adding or subtracting three-digit numbers, one adds or subtracts hundreds and hundreds, tens and tens, ones and ones; and sometimes it is necessary to compose or decompose tens or hundreds.

Response
This I believe is based more on core math which info not agree with for several reasons. Many children and you adults can not process simple subtraction and addition since teaching core math has been instituted. Example counting back change.
Need to be able to use the standard algorithm for this. (Borrowing for example, for subtraction.)
Remove this part- 7a explains the strategies- this leads to 2nd grade teachers drilling the standard algorithm
This is one way to add or subtraction. But "jumping" strategies also work, where one number is kept whole and the other is added or removed in parts.
Collapse into one 2.NBT.7 standard

KY.2.NBT.9 Explain why addition and subtraction strategies work, using place value and the properties of operations.

Response
You could make this a part of 2.NBT.7 instead of a standalone standard since it is typically that way in other grade levels

Explain why addition and subtraction strategies work, using place value and the properties of operations. Describe the relationship between the value of digits in each place.
Remove this standard to reduce the number of standards we need to assess.
Need more clarifications to help teachers avoid teaching a procedure or the standard algorithm
Use the relation of addition and subtraction to solve equations. (ex. $8 - 4 = 4$ because $4 + 4 = 8$)
It would be helpful to have a example of an explanation in the clarification.
KY.2.NBT.9 Explain how and why addition and subtraction strategies work, using place value and the properties of operations.

Measurement and Data Standards Feedback

KY.2.MD.1 Measure the length of an object by selecting and using appropriate tools such as rulers, yardsticks, meter sticks and measuring tapes.

Response
Choose either US Customary Units or Metric...not both
Clarification add trundle wheel since it is measured in the attending to the SMPs
Is it necessary for 7-8 year old's to know and use meters?
Extend this to situations where students can't actually measure, but can think about the appropriate unit. For example, their drive to school measured in miles.

KY.2.MD.3 Estimate lengths using units of inches, feet, yards, centimeters and meters.

Response
choose us customary units or metri
What is an exact good placement grade for metric measures? Are they necessary for 7-8 year olds?

KY.2.MD.4 Measure to determine how much longer one object is than another, expressing the length difference in terms of either a customary or metric standard length unit.

Response
choose us customary units or metric
Consider placement of metric later.

KY.2.MD.5 Use addition and subtraction within 100 to solve word problems involving lengths that are given in the same units by using drawings and equations with a symbol for the unknown number to represent the problem.

Response
It could be part of the
Should the common situation table be referenced here?

KY.2.MD.6 Represent whole numbers as lengths from 0 on a number line with equally spaced points corresponding to the numbers 0, 1, 2, ... and represent whole-number sums and differences within 100 on a number line.

Response
Separate the 2 parts of this standard. Represent whole numbers as lengths
Add clarifications that emphasize the first part of this standard, e.g. students use a physical unit to determine the location of given numbers.
The standard as written is good. The clarification goes straight to the operations part of the standard without clarifying the importance of understanding the whole numbers on the number line. Need more about numbers on number line before operations.

KY.2.MD.7 Tell and write time from analog and digital clocks to the nearest five minutes, using a.m. and p.m.

Response
Note not a critical standard

KY.2.MD.8 Solve word problems with adding and subtracting within 100, (not using dollars and cents simultaneously) using the \$ and ¢ symbols appropriately (not including decimal notation).

Response
What purpose does doing this serve? Refer back to previous revision answer please.
Specify the placement of the \$ symbol in front of values.
Note not a critical standard
Add - Identify coins and their values.

KY.2.MD.9 Investigate questions involving measurements

Response
Note not a critical standard

KY.2.MD.9.a Identify a statistical question focused on measurements.

Response
I'm not sure what this is asking? Perhaps add vocabulary/terms or other detail to this standard.
Add examples within the clarification of types of questions they might focus on. Teachers have a hard time understanding a "statistical" question.
Note not a critical standard
Remove
A statistical question requires students to either calculate the center or spread of a distribution (descriptive statistics) or make an inference about a population based on a sample (inferential statistics). Should read "a question that requires data. d

KY.2.MD.9.b Generate measurement data by measuring lengths of several objects to the nearest whole unit, or by making repeated measurements of the same object.

Response
Note not a critical standard

KY.2.MD.9.c Show the measurements by making a dot plot, where the horizontal scale is marked off in whole-number units.

Response
Can we just call it line plot like most other states? Please?
Dot plots are not realistic! REMOVE THIS STANDARD in all grade levels!
Note not a critical standard
remove

KY.2.MD.10 Create a pictograph and a bar graph (with single-unit scale) to represent a data set with up to four categories. Solve simple put together, take-apart and compare problems using information presented in a bar graph.

Response
Remove the pictograph from this standard. It is not essential that 2nd grade students be able to create a pictograph.
Note not a critical standard

Geometry Standards Feedback

KY.2.G.2 Partition a rectangle into rows and columns of same-size squares and count to find the total number of them.

Response
Is there a way to better show the connection between this standard and 2.OA.4? Maybe one of them could move to the other domain? I think that connection is often missed.

KY.2.G.3 Partition circles and rectangles into two, three, or four equal shares; describe the shares using the words halves, thirds, half of, a third of, etc.; and describe the whole as two halves, three thirds, four fourths. Recognize that equal shares of identical wholes need not have the same shape.

Response
Add statement: Grade 2 does not use fraction numerals
Clarify that the numerical symbol for fractions should not yet be introduced yet. Word form only.

3rd Grade Standards Feedback

Operations and Algebraic Thinking Standards Feedback

KY.3.OA.1 Interpret and demonstrate products of whole numbers.

Response
This should be a fluency standard at least requiring up to 12x12.
Suggest revising in tandem with KY.4.OA.5. For this one, something like: [As is] and use knowledge of even and odd sums and products to support this correct answers and identify incorrect answers. Link in standards document to KY.3.OA.9.
within 100.
Add to clarification that 5x7 can also be thought of a 5 repeated 7 times.

KY.3.OA.2 Interpret and demonstrate whole-number quotients of whole numbers, where objects are partitioned into equal shares.

Response
within 100
What does "demonstrate" mean?

KY.3.OA.3 Use multiplication and division within 100 to solve word problems in situations involving equal groups, arrays and measurement quantities, by using drawings and equations with a symbol for the unknown number to represent the problem.

Response
Remove "by using drawings". Students should be able to draw to solve problems if they want, but it shouldn't be required of every 3rd grade student.

KY.3.OA.4 Determine the unknown whole number in a multiplication or division equation relating three whole numbers.

Response
Maybe not but is there a better way to write this so that teachers understand this goes beyond just teaching fact families?

KY.3.OA.5 Apply properties of operations as strategies to multiply and divide.

Response
clarification says students are not responsible for formal language of properties so instead of teaching the actual name teachers use phrases like the flip flop property. Just teach them the names of the properties so the common language is established.
Reinforcing multiplication time tables will better benefit children at this age instead of using properties methods.
The clarification states "Students need not use formal terms for these properties." But I think it would be a good thing to go ahead and use the correct vocabulary.
Note the Properties table in the appendix
Should a range be specified here?

KY.3.OA.6 Understand division as an unknown-factor problem.

Response
Could be written more clearly
Could this standard, 3.OA.4, and 3.OA.2 be condensed to better help teachers understand these connections?

KY.3.OA.7 Fluently multiply and divide within 100, using strategies such as the relationship between multiplication and division or properties of operations.

Response
Emphasize strategies and students will not be fluent in multiplication by the end of 3rd grade. They should have experiences with multiplication not focusing on memorizing facts because this is not fluency. Many 3rd/4th grade teachers struggle here.
Consider changing "fluently" to "use mental strategies to"...fluently might be misinterpreted if teachers don't read/consider the full definition of fluency.
Strategies that are appropriate? Such as those used in previous fluency standards
Move to 4th grade. It is too much to expect 3rd graders to become fluent in one year.
Many people interpret this as limited to factors up to 10. But technically, 15×3 is "within 100". Clarify which is meant.
I believe that the clarifications should indicate that this is expected to be completed by the end of the school year. We see teachers attempt to assess this too early (often in the fall).

KY.3.OA.8 Use various strategies to solve two-step word problems using the four operations (involving only whole numbers with whole number answers). Represent these problems using equations with a letter standing for the unknown quantity. Assess the reasonableness of answers using mental computation and estimation strategies including rounding.

Response
Algebra operations should not be incorporated at this age
Define estimation strategies
break into 3 different parts. 8a-8c

KY.3.OA.9 Identify arithmetic patterns (including patterns in the addition table or multiplication table) and explain them using properties of operations.

Response

Identify arithmetic patterns (including patterns in addition and multiplication. Explain patterns to numbers up to 1,000,000 using place value and the properties of operations.
Incorporate examples into the attending or the clarifications for patterns to find in multiplication and addition tables
Remove

Number and Operations in Base Ten Standards Feedback

KY.3.NBT.1 Use place value understanding to round whole numbers to the nearest 10 or 100.

Response
Specify that tricks and chants are not effective. Conceptual understanding MUST be built? Maybe add a part a and b where part a focuses on rounding to the nearest 10 within 100 and then part b focuses on rounding to both play values.
Use place value understanding to round whole numbers to the nearest 10, 100, or 1000.
Either in 2nd or 3rd, knowing half of 10 and half of 100 is important. It's not written in the standards and it needs to be.
Example of vertical number line
whole numbers within 1000.
Expand this standard to include number line use explicitly. For example, "Students estimate the location of numbers on a number line using benchmarks".

KY.3.NBT.2 Fluently add and subtract within 1000 using strategies and algorithms based on place value, properties of operations and/or the relationship between addition and subtraction.

Response
Start with Efficiently and appropriately instead of fluently. The word fluently seems to make teachers think the students must get to the standard algorithm.
Standard algorithm must carry to majority of the standard.
Explain algorithms based on place value - teachers want to teach algorithm in 2nd grade!
How does one fluently add and subtract within 1000 when this is the only standard that applies this fluency and then you move to 1,000,000 in 4th without any progression.
Please clarify that standard algorithm is a place value strategy and that it does not need to be mastered.
Appropriate strategies for this standard

No need for the word "algorithms". Strategies is sufficient. 2nd grade standards say the algorithm in get in 4th grade.

Numbers & Operations-Fractions Standards Feedback

KY.3.NF.1 Understand a fraction $\frac{1}{b}$ as the quantity formed by 1 part when a whole is partitioned into b equal parts; understand a fraction $\frac{a}{b}$ as the quantity formed by a parts of size $\frac{1}{b}$.

Response
Too young yet
Understand a fraction as a division problem such as $a \div b = a/b$
Too confusing
This can be very confusing. Can this be written in simpler terms for better teacher understanding? Maybe include parts. (i.e. Part A - Understand a unit fraction. Part B - Understand that a unit fraction shows one part when the whole is equally...etc.)
wording is confusing to teachers
Fifths ($\frac{1}{5}$) should be fractions that students are expected to name and describe.

KY.3.NF.2 Understand a fraction as a number on the number line; represent fractions on a number line.

Response
Too confusing
Do not limit all of students experiences to denominators 2, 3, 4, 6 and 8. These limits make sense if students have to create the partitions. But if using a manipulative or pre-partitioned, it's helpful to see other denominators.)
Fifths ($\frac{1}{5}$) should be fractions that students represent on number lines.

KY.3.NF.2.a Represent a fraction $\frac{1}{b}$ (unit fraction) on a number line by defining the interval from 0 to 1 as the whole and partitioning it into b equal parts. Recognize each part has size $\frac{1}{b}$. A unit fraction, $\frac{1}{b}$ is located $\frac{1}{b}$ of a whole unit from 0 on the number line.

Response
Too young yet
Too confusing
Same feedback as 3.NF.1 - This is confusing. Rewrite it in simpler terms.
Fifths ($\frac{1}{5}$) should be fractions that students represent on number lines.

KY.3.NF.2.b Represent a non-unit fraction $\frac{a}{b}$ on a number line by marking off a lengths of $\frac{1}{b}$ (unit fractions) from 0. Recognize that the resulting interval has size $\frac{a}{b}$ and that its endpoint locates the non-unit fraction $\frac{a}{b}$ on the number line.

Response
Too young yet
Too confusing
Same feedback as 3.NF.1 - This is confusing. Rewrite it in simpler terms.
Fifths ($\frac{1}{5}$, $\frac{2}{5}$, $\frac{3}{5}$, $\frac{4}{5}$, $\frac{5}{5}$, etc.) should be fractions that students represent on number lines.

KY.3.NF.3 Explain equivalence of fractions in special cases and compare fractions by reasoning about their size.

Response
What does "in special cases" mean?
Too confusing
Fifths ($\frac{1}{5}$) should be fractions for students to reason about with equivalency.

KY.3.NF.3.a Understand two fractions as equivalent (equal) if they are the same size, or same point on a number line.

Response
Kids still do not understand this by 6th or 7th grade, are we trying to push too much at this age and better focus as in 4th and 5th grades?
Too confusing
Fifths ($\frac{1}{5}$) should be fractions for students to reason about with equivalency.
KY.3.NF.3.a Understand two fractions as equivalent (equal) if they have the same point on a number line (same distance from zero)..

KY.3.NF.3.b Recognize and generate simple equivalent fractions. Explain why the fractions are equivalent through writing or drawing.

Response
Kids still do not understand this by 6th or 7th grade, are we trying to push too much at this age and better focus as in 4th and 5th grades?
Too confusing
Recognize and generate equivalent fractions for $\frac{1}{2}$. Explain why the fractions are equivalent through writing or drawing.
Fifths ($\frac{1}{5}$) should be fractions for students to reason about with equivalency.

KY.3.NF.3.c Express whole numbers as fractions and recognize fractions that are equivalent to whole numbers.

Response
Too confusing
Fifths ($\frac{1}{5}$) should be fractions for students to reason about with equivalency.

KY.3.NF.3.d Compare two fractions with the same numerator or the same denominator by reasoning about their size. Recognize that comparisons are valid only when the two fractions refer to the same whole. Record the results of comparisons with the symbols $>$, $=$, or $<$, and justify the conclusions.

Response

Kids still do not understand this by 6th or 7th grade, are we trying to push too much at this age and better focus as in 4th and 5th grades?
Too young
Too confusing
Perhaps provide a visual anchor chart of the key strategies to use when comparing fractions.
Extend reasoning to more denominators and cases where students can reason using the size of the unit fraction parts and number of parts, e.g. $\frac{3}{4}$ is bigger than $\frac{2}{6}$.
Fifths ($\frac{1}{5}$) should be fractions for students to reason about with equivalency.

Measurement and Data Standards Feedback

KY.3.MD.1 Tell and write time to the nearest minute and measure elapsed time intervals in minutes. Solve word problems involving addition and subtraction of time intervals within and across the hour in minutes.

Response
Too confusing
Make into parts (part a etc.)
This is a lot!
Note this is not a critical standard
Seperated into 1a Solve word problems involving addition and subtraction of time intervals within and across the hour in minutes.and 1b Solve word problems involving addition and subtraction of time intervals within and across the hour in minutes.

KY.3.MD.2.a Measure and estimate masses and liquid volumes of objects using standard units of grams (g), kilograms (kg) and liters (L).

Response
Maybe the emphasis should be on standard measures.

KY.3.MD.3 Investigate questions involving categorical data.

Response
Note this is not a critical standard

KY.3.MD.3.a Identify a statistical question focused on categorical data and gather data;

Response
This is confusing. Provide clarity for teachers perhaps by giving examples.
Remove
These standards so not ask the students to calculate a measure of spread or center (descriptive stats) nor to make and inference about a population from a sample (inferential statistics). Remove this point or replace with "data-based."

KY.3.MD.3.b Create a scaled pictograph and a scaled bar graph to represent a data set (using technology or by hand);

Response
Remove "a scaled pictograph and". All students in 3rd grade do not need to create scaled pictographs.

KY.3.MD.4.a Identify a statistical question focused on numerical data;

Response
This is confusing. Provide clarity for teachers perhaps by giving examples. 3.MD.3 and 3.md.4 can be confusing to interpret the difference if low content knowledge.
remove this
These standards so not ask the students to calculate a measure of spread or center (descriptive stats) nor to make and inference about a population from a sample (inferential statistics). Remove this point or replace with "data-based."

KY.3.MD.4.c Show the data by making a dot plot where the horizontal scale is marked off in appropriate units – whole numbers, halves, or quarters.

Response
use the word line plot instead
Get rid of dot plots!

KY.3.MD.4.d Make observations from the graph about the question posed, including questions about the shape of the data and compare responses.

Response
Clarification: to what depth of describing the shape is expected?

KY.3.MD.5 Recognize area as an attribute of plane figures and understand concepts of area measurement.

Response
Add the information from the clarification as part a, part b etc. This could be combined with 3.MD.6 to create the parts.
Recognize area as an attribute of plane figures and understand concepts of area measurement. Explain the concept of area and differentiate it from perimeter.

KY.3.MD.6 Measure areas by counting unit squares (square cm, square m, square in, square ft. and improvised units).

Response
Measure areas by counting unit squares (square in, square ft. and improvised units).

KY.3.MD.7.b Multiply side lengths to find areas of rectangles with whole-number side lengths in the context of solving real world and mathematical problems and represent whole-number products as rectangular areas in mathematical reasoning.

Response

Include a part about finding the missing side length when given the area (similar to 3.MD.8 with perimeter)

KY.3.MD.7.c Use tiling to show in a concrete case the area of a rectangle with whole-number side lengths a and $b + c$ is the sum of $a \times b$ and $a \times c$. Use area models to represent the distributive property in mathematical reasoning.

Response
Too young at this stage
This is confusing. Provide clarity and visuals for teachers...possibly a concrete example.

KY.3.MD.7.d Recognize area as additive. Find areas of figures that can be decomposed into non-overlapping rectangles by adding the areas of the non-overlapping parts, applying this technique to solve real world problems.

Response
Too young at this stage
Make it a standalone standard instead of part d of 3.MD.7
I think we need a clarification of what time they're supposed to find. And if they're supposed to find a missing side or not. Which I think is too much for them at this age.

KY.3.MD.8 Solve real world and mathematical problems involving perimeters of polygons.

Response
No

KY.3.MD.8.b Find an unknown side length, given the perimeter and some lengths.

Response

I think clarification is needed in what type of shapes. Just rectangles or additive rectangles?

KY.3.MD.8.c Draw rectangles with the same perimeter and different areas or with the same area and different perimeters.

Response
This standard would be better in the 4th grade to deepen knowledge after just learning area and perimeter in the 3rd grade.
Add an additional standard that highlights area and perimeter as parameters.

Geometry Standards Feedback

KY.3.G.1 Classify polygons by attributes.

Response
Not yet
Specify the attributes

KY.3.G.1.a Recognize and classify polygons based on the number of sides and vertices (triangles, quadrilaterals, pentagons and hexagons).

Response
include definitions of these polygons for alignment and 5.g.4. Provide this for all related standards in all grade levels to show coherence and progression of learning from one grade level to the next.

KY.3.G.1.b Recognize and classify quadrilaterals (rectangles, squares, parallelograms, rhombuses, trapezoids) by side lengths and understanding shapes in different categories may share attributes and the shared attributes can define a larger category.

Response

include definitions of these polygons for alignment and 5.g.4. Provide this for all related standards in all grade levels to show coherence and progression of learning from one grade level to the next.
More specific
We need the definition of a trapezoid. Exclusive or inclusive. Please define in the standards.
Add examples of different categories in the clarification

KY.3.G.2 Partition shapes into parts with equal areas. Express the area of each part as a unit fraction of the whole.

Response
Why is this in geometry and not fractions?

4th Grade Standards Feedback

Operations and Algebraic Thinking Standards

KY.4.OA.1 Interpret a multiplication equation as a comparison. Represent verbal statements of multiplicative comparisons as multiplication equations.

Response
unnecessary
Provide more clarity and examples in the clarification section.
Confusing wording.
Note that this is NOT a critical domain

KY.4.OA.2 Multiply or divide to solve word problems involving multiplicative comparisons by using drawings and equations with a symbol for the unknown number to represent the problem, distinguishing multiplicative comparison from additive comparison.

Response
Provide more clarity and examples in the clarification section.
Remove "drawings and". Not every student needs to draw the picture in order to successfully solve. It's GREAT if they do and can show how they are thinking, but shouldn't be REQUIRED every time in order to measure mastery of the standard.

KY.4.OA.3 Solve multistep problems.

Response
More specific. This is a big gap and the standard is so broad, it is not focused on enough.
Explicitly list the order of operations in the clarification

KY.4.OA.3.a Perform operations in the conventional order when there are no parentheses to specify a particular order.

Response
Algebra should not be introduced until later ages
Use parenthesis to perform operations.
Explicitly list the order of operations in the clarification

KY.4.OA.3.b Solve multistep word problems posed with whole numbers and having whole number answers using the four operations, including problems in which remainders must be interpreted. Represent these problems using equations with a letter standing for the unknown quantity. Assess the reasonableness of answers using mental computations and estimation strategies including rounding.

Response
Students solve multistep word problems with whole numbers using all four operations, interpreting remainders when needed. They represent problems with equations using a letter for the unknown and check their answers for reasonableness with estimation.
Same as above

This is a lot for one standard - Could be broken into two
Break this apart into separate parts for better teacher understanding. Interpreting remainders often get missed.
Interpreting remainders should be an additional separate standard.
Define estimation strategies

KY.4.OA.4 Find factors and multiples of numbers in the range 1-100.

Response
I think going up to 144 would be more standard. The multiples of natural numbers up to 12 are quite common.
Find factors and multiples of numbers in the range 1-1,000,000.

KY.4.OA.4.a Find all factor pairs for a given whole number.

Response
Within what range?

Number and Operations in Base Ten Standards

KY.4.NBT.1 Recognize in a multi-digit whole number, a digit in one place represents ten times what it represents in the place to its right.

Response
Also, recognize in a multi-digit whole number, a digit in one place represents ten times less what it represents in the place to its left.
This is a standard teachers STRUGGLE to address - provide graphic or explanation as to how this might be taught

KY.4.NBT.2 Represent and compare multi-digit whole numbers.

Response
Represent using what??

KY.4.NBT.2.a Read and write multi-digit whole numbers using base-ten numerals, number names and expanded form.

Response
Use language that is broadly seen as standard form instead of number name.
Clarifications should make clear that this is for numbers up to 1,000,000. We have expanded the range of numbers in the Overview, but this is not clear in the standards themselves.

KY.4.NBT.2.b Compare two multi-digit numbers based on meanings of the digit in each place, using $>$, $=$, and $<$ symbols to record the results of comparisons.

Response
Clarifications should make clear that this is for numbers up to 1,000,000. We have expanded the range of numbers in the Overview, but this is not clear in the standards themselves.

KY.4.NBT.3 Use place value understanding to round multi-digit whole numbers to any place.

Response
Clarifications should make clear that this is for numbers up to 1,000,000. We have expanded the range of numbers in the Overview, but this is not clear in the standards themselves.

KY.4.NBT.4 Fluently add and subtract multi-digit whole numbers using an algorithm.

Response
Why teach algorithm's at this stage?

Clarify the definition of an algorithm and differentiate between standard algorithm
add "or strategies based on place value."
Is this where standard algorithm is supposed to be introduced based upon Grade 2 clarifications? Maybe NOTE that standard algorithm maybe taught after all other strategies but does not have to be mastered.
Put the words "efficient strategy" in place of algorithm.

Numbers & Operations-Fractions Standards Feedback

KY.4.NF.1.a Use visual fraction models to recognize and generate equivalent fractions that have different numerators/denominators even though they are the same size.

Response
Remove set model from SMP section (or at least put third as the most abstract/confusing)
Collapse into one 4.NF.1 standard

KY.4.NF.1.b Explain why a fraction $\frac{a}{b}$ is equivalent to a fraction $\frac{n \times a}{n \times b}$.

Response
Not until 6th grade
Include learning for teachers about how the identify property comes into play for this standard.
Add a pat c - something about density of fractions, or at least an beginning concept of that. Perhaps "students understand that there are an infinite number of fractions between any two whole numbers.
Collapse into one 4.NF.1 standard

KY.4.NF.2 Compare two fractions with different numerators and different denominators using the symbols $<$, $=$, or $>$. Recognize comparisons are valid only when the fractions refer to the same whole. Justify the conclusions.

Response
5th grade

This could be split up into parts.

The cluster description says to limit denominators to 2,3,4,5, 6, 8, 10, 12, 100. However, students need to see more than this. Even the current clarification have denominators of 36 and 40.
--

KY.4.NF.3 Understand a fraction a/b with $a > 1$ as a sum of fractions $1/b$.

Response

Clarify and simplify for teachers.

KY.4.NF.3.a Understand addition and subtraction of fractions as joining and separating parts referring to the same whole.

Response

6th grade

Explicitly include converting between mixed number form and fraction form where the fraction is greater than one. Understand that sometimes fraction form is more useful and is a correct way to represent a quantity.
--

KY.4.NF.3.c Add and subtract mixed numbers with like denominators.

Response

Should this explicitly include converting between mixed number form and fraction form.
--

KY.4.NF.4 Apply and extend previous understandings of multiplication to multiply a fraction by a whole number.

Response

Understanding that a whole number as a fraction is that whole number over 1.
--

KY.4.NF.4.a Understand a fraction a/b as a multiple of $1/b$.

Response
Clarify and simplify for teacher understanding. Maybe
The clarification references visual fraction models it should SHOW.

KY.4.NF.4.c Solve word problems involving multiplication of a fraction by a whole number.

Response
Feedback for the KAS in general - follow the same format for all grade levels K-5 when it comes to word problem standards. Are they standalone like in some grades or are they attached as a part within a standard?

KY.4.NF.7.a Compare two decimals to hundredths by reasoning about their size.

Response
Collapse to one 4.NF.7 standard

KY.4.NF.7.b Recognize that comparisons are valid only when the two decimals refer to the same whole.

Response
Recognized
Collapse to one 4.NF.7 standard

KY.4.NF.7.c Record the results of comparisons with the symbols $>$, $=$, or $<$ and justify the conclusions.

Response
Collapse to one 4.NF.7 standard

Measurement and Data Standards Feedback

KY.4.MD.1 Know relative size of measurement units (mass, weight, liquid volume, length, time) within one system of units (metric system, U.S. standard system and time).

Response
Noting this is not a critical domain for student mastery

KY.4.MD.1.a Understand the relationship of measurement units within any given measurement system.

Response
Collapse into one 4.MD.1 standard

KY.4.MD.1.b Within any given measurement system, express measurements in a larger unit in terms of a smaller unit.

Response
Collapse into one 4.MD.1 standard

KY.4.MD.1.c Record measurement equivalents in a two-column table.

Response
remove
Collapse into one 4.MD.1 standard

KY.4.MD.2.a Solve measurement problems involving whole number, simple fractions or decimals.

Response
Collapse into one 4.MD.2 standard

KY.4.MD.2.b Solve problems that require converting a given measurement from a larger unit to a smaller unit within a common measurement system, such as $2 \text{ km} = 2,000 \text{ m}$.

Response
Collapse into one 4.MD.2 standard

KY.4.MD.2.c Visually display measurement quantities using representations such as number lines that feature a measurement scale.

Response
Provide more clarity or an example in the clarification section.
Remove this standard to reduce the number of standards taught.
Collapse into one 4.MD.2 standard

KY.4.MD.4 Use dot plots to analyze data to a statistical question.

Response
Use the phrase line plot instead
No. No more dot plots. Bar graphs. Double bar graphs. NOT dot plots.
While these are data-based questions they are not "statistical" because the students do not calculate the spread/center nor do they make an inference about a population based on a sample.

KY.4.MD.4.a Identify a statistical question focused on numerical data.

Response

Provide more explanation and clarity - Perhaps an example.

While these are data-based questions they are not "statistical" because the students do not calculate the spread/center nor do they make an inference about a population based on a sample.

KY.4.MD.4.b Make a dot plot to display a data set of measurements in fractions of a unit (12,14,18).

Response
6th grade
line plot
No. If you want students to put numbers with fractions in order, then make that a standard in the fraction section and get rid of dot plots.

KY.4.MD.4.c Solve problems involving addition and subtraction of fractions by using information presented in dot plots.

Response
Later age
line plot
No more dot plots.

KY.4.MD.5 Recognize angles as geometric shapes that are formed wherever two rays share a common endpoint and understand concepts of angle measurement.

Response
Since we don't revisit this until 7th grade, let's remove this standard and let students wait until 7th grade.

KY.4.MD.6 Measure angles in whole-number degrees using a protractor. Sketch angles of specified measure.

Response
I don't believe it's necessary to use protractors when on our state test they don't have to it is given to them digitally. and they don't learn about any thing with angle measurements in the previous grade.
This has not been taught to my son and he's in 5th grade. I honestly don't believe all schools are sticking to the requirements of each grade anyway.
Since we don't revisit this until 7th grade, let's remove this standard and let students wait until 7th grade.
Clarifications to include graphic of a paper or student made protractor

KY.4.MD.7 Recognize angle measure as additive. When an angle is decomposed into non-overlapping parts, the angle measure of the whole is the sum of the angle measures of the parts. Solve addition and subtraction problems to find unknown angles on a diagram in real world and mathematical problems.

Response
Split into parts
Since we don't revisit this until 7th grade, let's remove this standard and let students wait until 7th grade.

Geometry Standards Feedback

KY.4.G.1 Draw points, lines, line segments, rays, angles (right, acute, obtuse) and perpendicular and parallel lines. Identify these in two-dimensional figures.

Response
6th grade
Needs clarifications

KY.4.G.2 Classify two-dimensional figures based on the presence or absence of parallel or perpendicular lines, or the presence of absence of angles of a specified size. Recognize right triangles as a category and identify right triangles.

Response
6th grade
split into parts
Needs clarifications

KY.4.G.3 Identify lines of symmetry.

Response
Should be taught in lower grades
Of which shapes
Needs clarifications

KY.4.G.3.a Recognize a line of symmetry for a two-dimensional figure.

Response
Needs clarifications

KY.4.G.3.b Identify line-symmetric figures and draw lines of symmetry.

Response
Needs clarifications

5th Grade Standards Feedback

Operations and Algebraic Thinking Standards Feedback

KY.5.OA.1 Use parentheses, brackets or braces in numerical expressions and evaluate expressions that include symbols.

Response
Not until middle school
Clarify how PEMDAS can build unintended misconceptions
Include the "nested" terminology?
Use parentheses, brackets or braces in numerical expressions and evaluate expressions that include symbols to solve multi-step word problems that use all four operations with whole numbers.
Clarification needs example of use
An example problem would be a good addition to the clarifications here.

KY.5.OA.2 Write simple expressions with numbers and interpret numerical expressions without evaluating them.

Response
Revise to include a quantifier instead of the word simple. How many operations/steps can be in the expression to qualify as simple? The clarifications have an example with 2 operations/steps. Is that the limit?
Should it include write simple expressions given a number story
Write simple expressions with numbers and interpret numerical expressions and use the order of operations to evaluate them.

KY.5.OA.3 Generate numerical patterns for situations.

Response
Broad.

KY.5.OA.3.a Generate a rule for growing patterns, identifying the relationship between corresponding terms (x, y).

Response
6th grade

KY.5.OA.3.b Generate patterns using one or two given rules (x, y).

Response
6th grade

Number and Operations in Base Ten Standards Feedback

KY.5.NBT.1 Recognize that in a multi-digit number, a digit in one place represents 10 times as much as it represents in the place to its right and $\frac{1}{10}$ of what it represents in the place to its left.

Response
Extend to include decimal place values?
Graphic updated to show how this might be taught in a concrete manner not just abstractly or with a procedure

KY.5.NBT.2 Multiply and divide by powers of 10. Explain patterns in the number of zeros of the product when multiplying a number by powers of 10. Explain patterns in the placement of the decimal point when a decimal is multiplied or divided by a power of 10. Use whole-number exponents to denote powers of 10.

Response
Tricky standard for students/teachers maybe update with another graphic

KY.5.NBT.3 Read, write and compare decimals to thousandths.

Response
Read, write and compare numbers from decimals (thousandths) to numbers past 1,000,000.
Should this include the use of money for comparisons?

KY.5.NBT.3.a Read and write decimals to thousandths using base-ten numerals, number names and expanded form.

Response
Standard form instead of number names?
Read and write numbers from decimals (thousandths) to numbers past 1,000,000 using base-ten numerals, number names, and expanded form.

KY.5.NBT.3.b Compare two decimals to thousandths based on meanings of the digits in each place, using $>$, $=$, and $<$ symbols to record the results of comparisons.

Response
Feedback for all KAS - Consider having a consistent structure at least K-5. Will place value and comparing always be within a standard as separate parts or separate standards?
Compare numbers from decimals (thousandths) to numbers past 1,000,000 using $>$, $=$, and $<$ symbols to record the results of comparisons.
Incorporate graphic for clarification of base10 blocks being used for decimals and comparisons. (or at least grid paper)

KY.5.NBT.4 Use place value understanding to round decimals to any place.

Response
Use place value understanding to round numbers to any place.

KY.5.NBT.5 Fluently multiply multi-digit whole numbers (not to exceed four-digit by two-digit multiplication) using an algorithm.

Response
Again teach and enforce competent basics
Clarify the definition of algorithm and distinguish from standard algorithm
Let's remove this standard to reduce the number of standards taught. Current technology does not require that everyone be able to do this on paper, and the process isn't particularly helpful unless we are deepening understanding of place value.

what might be fluent strategies? Should standard algorithm be considered fluently? Note on fluency taking time.
Give more examples of the expectation of algorithms.
Replace algorithm with "efficient strategy". Maybe include the language "computational fluency"

KY.5.NBT.6.b Illustrate and explain the calculation by using equations, rectangular arrays and/or area models.

Response
No models....more wtime to master algorithm to prepare for middle school.
This should be thrown out all together.
The and/or in there leaves this open to multiple ways students need to show. It is too many.
Confusing.
Let's remove this standard to reduce the number of standards taught. Current technology does not require that everyone be able to do this on paper, and the process isn't particularly helpful unless we are deepening understanding of place value.
Area models for division are very difficult for students

KY.5.NBT.7 Operations with decimals to hundredths.

Response
Multiplication & division should be limited to very simple equations, if any. They haven't mastered division yet & are being asked to divide decimals. They should have just mastered multiplication this year so basic work with multiplying decimals is ok.
I think division should be excluded from operations with decimals.
What is the verb in this standard?
Let's remove "multiply and divide". Reduce the number of standards that need to be taught.

KY.5.NBT.7.b. Relate the strategy to a written method and explain the reasoning used.

Response
They spend too much time writing out explanations and reasonings.
This standard should be eliminated.
Omit
????
Let's remove this standard.
Collapse into one 5.NBT.7 standard

Numbers & Operations-Fractions Standards

KY.5.NF.2 Solve word problems involving addition and subtraction of fractions.

Response
Same as above
Middle school
Multi-step or one step?
Collapse into one 5.NF.2 standard

KY.5.NF.2.a Solve word problems involving addition and subtraction of fractions referring to the same whole, including cases of unlike denominators.

Response
Same as above
Middle school
Multi-step or one step?
Collapse into one 5.NF.2 standard

KY.5.NF.2.b Use benchmark fractions and number sense of fractions to estimate mentally and assess the reasonableness of answers.

Response
Middle school
I believe in 5th grade this should only relate to benchmark fractions 0, $\frac{1}{2}$, or 1.
Collapse into one 5.NF.2 standard

KY.5.NF.3 Interpret a fraction as division of the numerator by the denominator ($\frac{a}{b} = a \div b$). Solve word problems involving division of whole numbers leading to answers in the form of fractions or mixed numbers by using visual fraction models or equations to represent the problem.

Response
Align with division standard
Eliminate "using visual fraction models".
improper or proper fractions? Specify if improper, do they need to be made proper?
Some research indicates this standard should come sooner - maybe 4th grade?)
Clarifications should include a visual fraction model.

KY.5.NF.4 Apply and extend previous understanding of multiplication to multiply a fraction or whole number by a fraction.

Response
Multiplying a fraction by a fraction is not developmentally appropriate
Clarifications for this standard can be improved. Give an actual example/visual for a. For b, modify example to more than just unit fraction x unit fraction.

KY.5.NF.4.a Interpret the product $\left(\frac{a}{b}\right) \times q$ as a parts of a partition of q into b equal parts; equivalently, as the result of a sequence of operations $a \times q \div b$.

Response
This is not developmentally appropriate
Middle school
Clarify and simplify for teachers
Provide an example of this in the clarifications.

KY.5.NF.4.b Find the area of a rectangle with fractional side lengths by tiling it with squares of the appropriate unit fraction side lengths and show that the area is the same as would be found by multiplying the side lengths. Multiply fractional side lengths to find areas of rectangles and represent fraction products as rectangular areas.

Response
This is not developmentally appropriate
Middle school
Eliminate " by tiling it with squares of the appropriate unit fraction side lengths and show that the area is the same as would be found by multiplying the side lengths."
This is a lot of complex words to communicate a fairly simple concept that students have pre-requisite knowledge for. How can it be simplified?
the standard says "tiling it with squares" - change "squares" to "units" or "rectangles"... as we see in the example, the unit is $\frac{1}{3}$ by $\frac{1}{4}$ which is not a square.

KY.5.NF.5 Interpret multiplication as scaling (resizing), by:

Response
There are some standards that really could go so that we could spend time on other things. Money and time are concepts that are real life and students in fifth grade do not know well/ We need to spend time with those things versus stuff that is not as sig
Make scaling whole by fraction only

KY.5.NF.5.a Comparing the size of a product to the size of one factor on the basis of the size of the other factor, without performing the indicated

multiplication.

Response
Same opinion as above
This is not developmentally appropriate

KY.5.NF.5.b Explaining why multiplying a given number by a fraction greater than 1 results in a product greater than the given number (recognizing multiplication by whole numbers greater than 1 as a familiar case); explaining why multiplying a given number by a fraction less than 1 results in a product smaller than the given number; and relating the principle of fraction equivalence $ab = (n \times a)(n \times b)$ to the effect of multiplying ab by 1.

Response
This is not developmentally appropriate
Middle school

KY.5.NF.6 Solve real world problems involving multiplication of fractions and mixed numbers.

Response
This is not developmentally appropriate
I believe multiplication of mixed numbers should move to 6th grade.
Multi-step or one step?
Give them a limit on their denominator.

KY.5.NF.7 Apply and extend previous understandings of division to divide unit fractions by whole numbers and whole numbers by unit fractions.

Response

This is not developmentally appropriate

KY.5.NF.7.a Interpret division of a unit fraction by a non-zero whole number and compute such quotients.

Response

I don't think that this point and following have to be restricted to unit fractions only. Those can simply provide a nice starting point
--

This is not developmentally appropriate

KY.5.NF.7.b Interpret division of a whole number by a unit fraction and compute such quotients.

Response

This is not developmentally appropriate

KY.5.NF.7.c Solve real world problems involving division of unit fractions by non-zero whole numbers and division of whole numbers by unit fractions.

Response

This is not developmentally appropriate

Make it a standalone standard since other "word problem" standards are stand alone and not "part c"

Measurement and Data Standards Feedback

KY.5.MD.1 Convert among different size measurement units (mass, weight, liquid volume, length, time) within one system of units (metric system, U.S. standard system and time).

Response

With metric system, revise to say certain units like meter, centimeter, kilometer, and millimeter

This is too many. Pick specific ones and focus on just those. If some are to be mastered in previous grades, eliminate them here.

This standard needs to be broken up.

Do we need a real understanding of metric measures for 5th graders?

KY.5.MD.2 Identify and gather data for statistical questions focused on both categorical and numerical data. Select an appropriate data display (bar graph, pictograph, dot plot). Make observations from the graph about the questions posed.

Response

Bar graphs and pictographs are good. Double or triple bar graphs too. But line plots have got to go!
--

KY.5.MD.4 Measure volumes by counting unit cubic cm, cubic in, cubic ft. and improvised units.

Response

This should not be a separate standard but part of 5.MD.3

Clarification needed - graphic of cubes stacked in clear container or filled shape?

KY.5.MD.5 Relate volume to the operations of multiplication and addition and solve real world and mathematical problems involving volume.

Response

No complex figures

What about an example of filling in the missing volume and then subtracting it out of the shape

KY.5.MD.5.c Recognize volume as additive. Find volumes of solid figures composed of two non-overlapping right rectangular prisms by adding the volumes of the non-overlapping parts, applying this technique to solve real

world problems.

Response
No complex figures
I believe this standard should move to 6th grade. We are just beginning to be introduced to volume and conceptually understanding it in 5th grade. The compound figures are very difficult for most students to grasp.
This needs to be a stand alone standard. Too many steps to keep under this umbrella.
Make it a standalone standard

Geometry Standards Feedback

KY.5.G.1 Use a pair perpendicular number lines, called axes, to define a coordinate system, with the intersection of the lines (the origin) arranged to coincide with the 0 on each line and a given point in the plane located by using an ordered pair of numbers, called its coordinates. Understand that the first number indicates how far to travel from the origin in the direction of one axis and the second number indicates how far to travel in the direction of the second.

Response
Break into parts
Utilize the x-axis and y-axis terminology when discussing "traveling"
This is noted as being a critical domain but NO reference is made in the overview.
'Use a pair of-- perpendicular...' -- the 'of' is currently missing in the standard. The order we are traveling from the origin matters for ordered pairs. We travel first on the x axis, and then the y.

KY.5.G.4 Classify two-dimensional figures in a hierarchy based on properties.

Response
Our kids cannot tell you the value of a quarter or read a clock but they need to know that a rectangle cannot be a square or a rhombus cannot be a square. We need to rethink what is necessary to teach. We need to think about real like math!!!!
We need the definition of a trapezoid. Exclusive or inclusive. Please define in the standards.

define a hierarchy

Remove this standard- move to 6th grade.
--

6th Grade Standards Feedback

Ratios & Proportional Relationships Standards Feedback

KY.6.RP.1 Understand the concept of a ratio and use ratio language to describe a ratio relationship between two quantities.

Response

Clarification could use an example.

KY.6.RP.2 Understand the concept of a unit rate a/b associated with a ratio $a:b$ with $B \neq 0$ and use rate language in the context of a ratio relationship.

Response

Too abstract for age

change a & b to y and x

KY.6.RP.3 Use ratio and rate reasoning to solve real-world and mathematical problems.

Response

The reality world problems are worded too difficult for an average 6th grader to understand

Use ratio and unit rate language to solve real0world and mathematical problems.

add a part of the standard that includes finding a percent of a quantity as a rate per 100; solve problems involving finding the whole, given a part and the percent.

KY.6.RP.3.a Make tables of equivalent ratios relating quantities with whole-number measurements, find missing values in the tables and plot the pairs of values on the coordinate plane. Use tables to compare ratios.

Response
Too abstract for age
Construct tables of equivalent ratios using whole-number quantities, determine missing values within the tables, and represent the ratio pairs as points on the coordinate plane. Utilize the tables to analyze and compare ratios.
Using tables, finding missing values in tables, and plotting values on coordinate plane are great. But they should not be required to "make" a table at this time.

KY.6.RP.3.c Use ratio reasoning to convert measurement units; manipulate and transform units appropriately when multiplying or dividing quantities.

Response
Too abstract for age. Students have no previous experience with measurement to check to see if answers are reasonable
Measurement units should be specified and the basic unit conversion should be given to students as they apply and transform units. (Give students $1000\text{m} = 1\text{km}$ when asking them to make conversions)
There is no need to specify converting units of measurement. The could be cut out as a standard. Converting measurements will happen when solving real world problems.
KY.6.RP.3.c Find a percent of a quantity as a rate per 100; solve problems involving find the whole, given a part and the percent. (this was deleted from the 6th grade standards and we need percents back in 6th grade - what's written should be KY.6.RP.3d.

The Number System Standards Feedback

KY.6.NS.1 Interpret and compute quotients of fractions and solve word problems involving division of fractions by fractions.

Response
This standard is developmentally premature; 6th graders should focus on unit fraction and whole number division to build a foundation for later fraction-by-fraction division.
Too abstract for age. Students don't understand the basic foundations of what fractions are. Therefore they cannot understand how to divide them.
Should be clarified that students do not need to show this using fraction models/arrays or even number lines.
Clarification for this standard needs a visual fraction model.

KY.6.NS.2 Fluently divide multi-digit numbers using an algorithm.

Response
Fluently divide multi-digit numbers.
The largest barrier for teaching long division is the memorization of multiplication tables. Reword to allow for something like a mult. chart to remove multiplication barrier so algor. can be taught for decimals.
This should not be a fluency standard
Emphasis on this as a fluency is misplaced. All other fluency standards to this point have been necessary for the next work as we expand the range of numbers. Understanding division is important-hand calculation of division isn't actually efficient.

KY.6.NS.2.a Convert a rational number to a decimal using long division.

Response
This is not a necessary skill for anyone, especially 6th graders
using the term "long division" is more limiting than a standard algorithm as the latter can be any algorithm based on place value.

KY.6.NS.2.b Know that the decimal form of a rational number terminates in 0s or eventually repeats.

Response
Too abstract for age
I wish there were a standard that addressed the main definition of rational number: a number that can be written as a ratio of integers. The decimal idea flows from that...

KY.6.NS.4 Use the distributive property to express a sum of two whole numbers 1–100 with a common factor as a multiple of a sum of two whole numbers with no common factor.

Response

move this to E.E. standards and tie it in to algebraic expressions
Too abstract for age
Apply the distributive property to rewrite the sum of two whole numbers (1–100) that share a common factor as the product of that factor and a sum of two whole numbers with no common factor.
Would like to see this changed to GCF/LCM. The distributive property portion is confusing to students and not helpful.
This standard needs reworked. When students see $5(3+4)$ their instinct is to add 3 and 4 based on the order of operations, not think of the distributive property. However, when they see $5(3x+4)$ it is clearer for them to see the property used fully.

KY.6.NS.5 Understand that positive and negative numbers are used together to describe quantities having opposite directions or values; use positive and negative numbers to represent quantities in real- world contexts, explaining the meaning of 0 in each situation.

Response
Too abstract for age
Recognize that positive and negative numbers are used to represent quantities with opposite directions or values, and apply them to describe real-world situations. Interpret and explain the meaning of 0 in each context.

KY.6.NS.6 Understand a rational number as a point on the number line. Extend number line diagrams and coordinate axes, using appropriate range and intervals, to represent points on the line and in the plane, that include negative numbers and coordinates.

Response
Too abstract for age
Interpret a rational number as a point on the number line. Extend number line diagrams and coordinate axes to include negative numbers and represent points within an appropriate range and interval on both the line and the coordinate plane.
Understand a rational number as a point on the number line. Place negative numbers on appropriate number line diagrams and coordinate planes/axes, and appropriate intervals.
Clarification should include a number line example.

KY.6.NS.6.a Recognize opposite signs of numbers as indicating locations on opposite sides of 0 on the number line; recognize 0 is its own opposite and

the opposite of a positive number is a negative, and the opposite of a negative number is a positive, such as $-(-3) = 3$.

Response
Too abstract for age
Recognize that opposite signs indicate positions on opposite sides of 0 on the number line. Understand that 0 is its own opposite, that the opposite of a positive number is negative, and that the opposite of a negative number is positive (e.g., $-(-3) = 3$)

KY.6.NS.6.b Find and position integers and other rational numbers on a horizontal or vertical number line diagram; find and position pairs of integers and other rational numbers on a coordinate plane.

Response
Too abstract for age

KY.6.NS.6.c Understand signs of numbers in ordered pairs as indicating locations in quadrants of the coordinate plane; recognize the similarity between whole numbers, their negative opposites and their positions on a number line, ordered pairs differ only by signs and their locations on one or both axes.

Response
Too abstract for age
Interpret the signs of numbers in ordered pairs as indicating their locations in the quadrants of the coordinate plane. Recognize that ordered pairs differ only by signs and positions on one or both axes, similar to how whole numbers and their opposites r

KY.6.NS.7.b Write, interpret and explain statements of order for rational numbers in real-world contexts.

Response

Feel like interpret and explain would be the same in this situation.

KY.6.NS.7.c Understand the absolute value of a rational number as its distance from 0 on the number line; interpret absolute value as magnitude for a positive or negative quantity in a real-world situation.

Response
Feel like this could be together with finding them on a number line.
Too abstract for age
Clarification should include a number line example.

KY.6.NS.7.d Distinguish comparisons of absolute value from statements about order.

Response
Is this relevant to teach?
Too abstract for age
Tell the difference(s) about absolute value and statements about order.
Should be in 7th grade

KY.6.NS.8 Solve real-world and mathematical problems by graphing points in all four quadrants of the coordinate plane. Include use of coordinates and absolute value to find distances between points with the same first coordinate or the same second coordinate.

Response
Only should contain positive numbers

Expressions & Equations Standards Feedback

KY.6.EE.1 Write and evaluate numerical expressions involving whole-number exponents.

Response
Change to just exponents?
Too abstract for age
Include fractions

KY.6.EE.2 Write, read and evaluate expressions in which letters stand for numbers.

Response
I think this is good, but these students should be mature enough to at least to introduce the fact that we can use more than just letters as symbols for variables.
Too abstract for age
This is a fluency standard and should say "Fluently write..."
In clarification: Note that a variable does not represent one specific, unknown number, but instead represents all possible values.

KY.6.EE.2.a Write expressions that record operations with numbers and with letters standing for numbers.

Response
I think students should also be mature enough to be familiar with the fact that variables can represent elements from domains that don't just contain numbers.
Too abstract for age

KY.6.EE.2.c Evaluate expressions for specific values of their variables, including values that are non-negative rational numbers. Include expressions that arise from formulas used in real-world problems. Perform arithmetic operations, including whole-number exponents, in the conventional order

when there are no parentheses to specify a particular order (Order of Operations).

Response
Too abstract for age
Include decimals
Evaluate expressions by substituting specific values, including non negative rational numbers. Apply expressions from real world formulas and perform arithmetic, including whole number exponents, in the conventional order of operations.
in clarification: note that the order of operations does not prescribe the order in which you must rewrite the express but instead

KY.6.EE.4 Identify when two expressions are equivalent when the two expressions name the same number regardless of which value is substituted into them.

Response
Too abstract for age

KY.6.EE.5 Understand solving an equation or inequality as a process of answering a question: which values from a specified set, if any, make the equation or inequality true? Use substitution to determine whether a given number in a specified set makes an equation or inequality true.

Response
Too abstract for age
Understand solving an equation or inequality as determining which values from a given set make it true. Use substitution to check whether a specific value from the set satisfies the equation or inequality.

KY.6.EE.6 Use variables to represent numbers and write expressions when solving a real-world or mathematical problem; understand that a variable can represent an unknown number, or depending on the purpose at hand, any number in a specified set.

Response
Too abstract for age
One can go further than this to mention that it can represent an element in any set.

KY.6.EE.7 Solve real-world and mathematical problems by writing and solving equations of the form $x + p = q$ and $px = q$ for cases in which p , q and x are all nonnegative rational numbers.

Response
Too abstract for age

KY.6.EE.8 Write an inequality of the form $x > c$, $x < c$, $x \geq c$, or $x \leq c$ to represent a constraint or condition in a real-world or mathematical problem. Recognize that inequalities of these forms have infinitely many solutions; represent solutions of such inequalities on vertical and horizontal number lines.

Response
Too abstract for age

KY.6.EE.9 Use variables to represent two quantities in a real-world problem that changes in relationship to one another;

Response
Too abstract for age

KY.6.EE.9.a Appropriately recognize one quantity as the dependent variable and the other as the independent variable.

Response
Too abstract for age
I think further explanation or more in depth explanation
Collapse to one standard for 6.EE.9

KY.6.EE.9.b Write an equation to express one quantity, thought of as the dependent variable, in terms of the other quantity, thought of as the independent variable.

Response
Too abstract for age
Collapse to one standard for 6.EE.9

KY.6.EE.9.c Analyze the relationship between the dependent and independent variables using graphs and tables and relate these to the question.

Response
Too abstract for age
Collapse to one standard for 6.EE.9

Geometry Standards Feedback

KY.6.G.1 Find the area of right triangles, other triangles, special quadrilaterals and polygons by composing into rectangles or decomposing into triangles and quadrilaterals; apply these techniques in the context of solving real-world and mathematical problems.

Response

Too abstract for age. Should only include triangles, quadrilaterals

If this standard is to include surface area, it needs to be stated in the standard, not just the clarifications.
--

KY.6.G.2 Find the volume of a right rectangular prism with rational number edge lengths. Apply the formulas $V = lwh$ and $V = Bh$ to find volumes of right rectangular prisms with rational number edge lengths in the context of solving real-world and mathematical problems.

Response

Too abstract for age

KY.6.G.3 Draw polygons in the coordinate plane given coordinates for the vertices; use coordinates to find the length of a side joining points with the same first coordinate or the same second coordinate. Apply these techniques in the context of solving real-world and mathematical problems.

Response

Too abstract for age

KY.6.G.4 Classify three-dimensional figures including cubes, prisms, pyramids, cones and spheres.

Response

Include representing three-dimensional figures using nets made up of rectangles and triangles and use the nets to find surface area. This is critical for developing analytical geometric reasoning (Van Heile's levels).

Represent three-dimensional figures using nets made up of rectangles and triangles, and use the nets to find the surface area of these figures. Apply these techniques in the context of solving real-world and mathematical problems.
--

Statistics & Probability Standards Feedback

KY.6.SP.0 Apply the four-step investigative process for statistical reasoning.

Response
Too abstract for age
This sounds more like a generalization than a standard. Is this really needed? The other standards seem to have this embedded overall throughout.
Include process
Spell out the 4 steps

KY.6.SP.0.a Formulate Questions: Formulate a statistical question as one that anticipates variability and can be answered with data.

Response
Too abstract for age

KY.6.SP.0.b Collect Data: Design and use a plan to collect appropriate data to answer a statistical question.

Response
Too abstract for age

KY.6.SP.0.c Analyze Data: Select appropriate graphical methods and numerical measures to analyze data by displaying variability within a group, comparing individual to individual and comparing individual to group.

Response
Too abstract for age

KY.6.SP.1 Recognize a statistical question as one that anticipates variability in the data related to the question and accounts for it in the answers.

Response
Too abstract for age

KY.6.SP.2 Understand that a set of numerical data collected to answer a statistical question has a distribution which can be described by its center, spread and overall shape.

Response
Too abstract for age

KY.6.SP.3 Recognize that a measure of center for a numerical data set summarizes all of its values with a single number to describe a typical value, while a measure of variation describes how the values in the distribution vary.

Response
Too abstract for age
Why do students need to quantify the measure of variation? The point is that we want students to recognize variation and how it affects the data.

KY.6.SP.4 Display the distribution of numerical data in plots on a number line, including dot plots, histograms and box plots.

Response
Too abstract for age

KY.6.SP.5 Summarize numerical data sets in relation to their context, such as by:

Response
Too abstract for age

This does not seem to be the whole standard.
--

Very vague

KY.6.SP.5.a Reporting the number of observations.

Response

Too abstract for age

Clarify

KY.6.SP.5.b Describing the nature of the attribute under investigation, including how it was measured and its units of measurement.

Response

Too abstract for age

Clarify this is very confusing

KY.6.SP.5.c Determining quantitative measures of center (median and/or mean) to describe distribution of numerical data.

Response

Too abstract for age

KY.6.SP.5.d Describing distributions of numerical data qualitatively relating to shape (using terms such as cluster, mode(s), gap, symmetric, uniform, skewed-left, skewed-right and the presence of outliers) and quantitatively relating to spread/variability (using terms such as range and interquartile range).

Response

Too abstract for age

KY.6.SP.5.e Relating the choice of measures of center and variability to the shape of the data distribution.

Response

Too abstract for age

If this includes mean absolute deviation, it needs to be clearly stated in the standards.

MAD is too difficult for 6th Graders

7th Grade Standards Feedback

Ratios & Proportional Relationships Standards Feedback

KY.7.RP.1 Compute unit rates associated with ratios of fractions, including ratios of lengths, areas and other quantities measured in like or different units.

Response

Too abstract for age

KY.7.RP.3 Use percents to solve mathematical and real-world problems.

Response

Problems should not be written where the average 7th grader does not know what it is asking.
--

This should say use "proportional relationships" to solve mathematical and real world problems. Percents is one type of proportional relationship.
--

delete, should be in 6th grade

KY.7.RP.3.a Find a percent of a quantity as a rate per 100; solve problems involving finding the whole, a part and a percent, given two of these.

Response
This needs to be a 6th grade standard, as it is in common core. It's nuts to teach kids what a percent is in the same unit or grade that they calculate percent error. This was a terrible change from common core.
delete, should be in 6th grade

KY.7.RP.3.b Use proportional relationships to solve multistep ratio and percent problems.

Response
Shouldn't be multi step

Ratios & Proportional Relationships Standards Feedback

KY.7.NS.1 Apply and extend previous understandings of addition and subtraction to add and subtract rational numbers; represent addition and subtraction on a horizontal or vertical number line diagram.

Response
Should only include integers, not negative fractions or mixed numbers
Clarification should include a number line example.

KY.7.NS.1.c Understand subtraction of rational numbers as adding the additive inverse, $p - q = p + (-q)$. Show that the distance between two rational numbers on the number line is the absolute value of their difference and apply this principle in real-world contexts.

Response
This standard is too rigorous, as students are just beginning to learn absolute value and need more time with the concept before applying it to subtraction and real-world contexts.

Real world context is too abstract for age
--

KY.7.NS.1.d Apply properties of operations as strategies to add and subtract rational numbers.

Response
Only include integers
Covered in 6th grade
Change to "Fluently apply properties..."

KY.7.NS.2 Apply and extend previous understandings of multiplication and division and of fractions to multiply and divide rational numbers.

Response
Students do not have a foundation of fractions at this age

KY.7.NS.2.a Understand that multiplication is extended from fractions to rational numbers by requiring that operations continue to satisfy the properties of operations, particularly the distributive property, leading to products such as $(-1)(-1) = 1$ and the rules for multiplying signed numbers. Interpret products of rational numbers by describing real-world contexts.

Response
Too abstract for age

KY.7.NS2.c Apply properties of operations as strategies to multiply and divide rational numbers.

Response

Integers only
Change to "Fluently apply..."

KY.7.NS.3 Solve real-world and mathematical problems involving the four operations with rational numbers.

Response
Integers only
Covered in 6th grade

Expressions & Equations Standards Feedback

KY.7.EE.1 Apply properties of operations as strategies to add, subtract, factor and expand linear expressions with rational coefficients.

Response
Too abstract for age

KY.7.EE.3 Solve real-life and mathematical problems posed with positive and negative rational numbers in any form, using tools strategically. Apply properties of operations to calculate with numbers in any form; convert between forms as appropriate; and assess the reasonableness of answers using mental computation and estimation strategies.

Response
Too abstract for age
Solve real-world and mathematical problems with positive and negative rational numbers in any form, using appropriate tools. Apply operations, convert between forms as needed, and check answers for reasonableness using estimation and mental computation.

KY.7.EE.4.a Solve word problems leading to equations of the form $px + q = r$ and $p(x + q) = r$, where p , q and r are specific rational numbers. Solve equations of these forms. Graph the solution set of the equality and interpret it in context of the problem.

Response
Too abstract for age
Add "compare algebraic and arithmetic solution, identifying the sequence of the operations used in each approach."

KY.7.EE.4.b Solve word problems leading to inequalities of the form $px + r > r$, $px + q < r$, $px + q \geq r$, $px + q \leq r$ where p , q and r are specific rational numbers. Graph the solution set of the inequality and interpret it in context of the problem.

Response
less wordy
Too abstract for age

Geometry Standards Feedback

KY.7.G.1 Solve problems involving scale drawings of geometric figures, including computing actual lengths and areas from a scale drawing and reproducing a scale drawing at a different scale.

Response
Too abstract for age

KY.7.G.2 Draw (freehand, with ruler and protractor and with technology) geometric shapes with given conditions. Focus on constructing triangles from three measures of angles or sides, noticing when the conditions determine a

unique triangle, more than one triangle, or no triangle.

Response
Too abstract for age
This standard seems random when compared to other Geometry standards. Plus there is not a lot of emphasis put on this standard.
This is not necessary until Geometry.

KY.7.G.3 Describe the two-dimensional figures that result from slicing three-dimensional figures, as in plane sections of right rectangular prisms and right rectangular pyramids.

Response
Many students struggle to identify 3D figures themselves and are not yet ready to determine the 2D cross sections that result from slicing them.
This standard seems random when compared to other Geometry standards. Plus there is not a lot of emphasis put on this standard.

KY.7.G.4.a Apply the formulas for the area and circumference of a circle to solve real-world and mathematical problems.

Response
Should not be asked to find radius or diameter
Collapse into one 7.G.4 standard

KY.7.G.4.b Explore and understand the relationship between the radius, diameter, circumference and area of a circle.

Response
Collapse into one 7.G.4 standard

KY.7.G.5 Apply properties of supplementary, complementary, vertical and adjacent angles in a multi-step problem to write and solve simple equations for an unknown angle in a figure.

Response
Too abstract for age

KY.7.G.6.a Solve real-world and mathematical problems involving area of two-dimensional objects composed of triangles, quadrilaterals and other polygons.

Response
Too abstract for age
Collapse into one 7.G.6 standard

KY.7.G.6.b Solve real-world and mathematical problems involving volume and surface area, using nets as needed, of three-dimensional objects including cubes, pyramids and right prisms.

Response
Too abstract for age
Collapse into one 7.G.6 standard
delete should be in 6th grade

Statistics & Probability Standards Feedback

KY.7.SP.0 Create displays, including circle graphs (pie charts), scaled pictographs and bar graphs, to compare and analyze distributions of categorical data from both matching and different-sized samples.

Response

Too abstract for age

Add "relate data analysis to the concept of variability"
--

KY.7.SP.1 Understand that statistics can be used to gain information about a population by examining a sample of the population; generalizations about a population from a sample are valid only if the sample is representative of that population. Understand that random sampling tends to produce representative samples and support valid inferences.

Response

Too abstract for age

Understand that statistics can provide information about a population by examining a sample. Generalizations are valid only if the sample is representative, and random sampling tends to produce representative samples that support valid inferences.

KY.7.SP.2 Use data from a random sample to draw inferences about a population with an unknown characteristic of interest.

Response

Too abstract for age

KY.7.SP.2.a Generate multiple samples of categorical data of the same size to gauge the variation in estimates or predictions.

Response

Too abstract for age

Confusing

KY.7.SP.2.b Generate multiple samples (or simulated samples) of numerical data to gauge the variation in estimates or predictions.

Response
Too abstract for age

KY.7.SP.2.c Gauge how far off an estimate or prediction might be related to a population character of interest.

Response
Too abstract for age

KY.7.SP.3 Describe the degree of visual overlap (and separation) from the graphical representations of two numerical data distributions (box plots, dot plots) with similar variabilities with similar contexts (same variable), measuring the difference between the centers (medians or means) by expressing this difference as a multiple of a measure of variability (interquartile range when comparing medians or the mean absolute deviation when comparing means).

Response
Too abstract for age
Teaching the mean absolute deviation to students takes way too much time. This part of the standard should be removed because it is essentially standard deviation which is a high school concept.
Describe the overlap or separation between two data distributions with similar variability. Compare their centers (medians or means) using a multiple of a variability measure (interquartile range or mean absolute deviation).

KY.7.SP.4 Calculate and use measures of center (mean and median) and measures of variability (interquartile range when comparing medians and mean absolute deviation when comparing means) for numerical data from random samples to draw informal comparative inferences about two populations.

Response
Too abstract for age
Teaching the mean absolute deviation to students takes way too much time. This part of the standard should be removed because it is essentially standard deviation which is a high school concept.

Calculate and use measures of center (mean and median) and variability (interquartile range for medians, mean absolute deviation for means) from random samples to make informal comparative inferences about two populations.

It is confusing in the standards which grade(s) mean absolute deviation is supposed to be taught. When do kids learn to interpret (6th)? When do they learn to calculate? 7th? This seems backwards.

KY.7.SP.5 Describe the probability of a chance event is a number between 0 and 1, which tells how likely the event is, from impossible (0) to certain (1). A probability near 0 indicates an unlikely event, a probability around $\frac{1}{2}$ indicates an event that is neither unlikely nor likely and a probability near 1 indicates a likely event.

Response

Too abstract for age

KY.7.SP.6 Approximate the probability of a chance event by collecting data on the chance process that produces it and observing its long-run relative frequency and predict the approximate relative frequency given the probability.

Response

Too abstract for age

KY.7.SP.7 Develop a probability model and use it to find probabilities of events. Compare probabilities from a model to observed frequencies; if the agreement is not good, explain possible sources of the discrepancy.

Response

Too abstract for age

KY.7.SP.7.a Develop a uniform probability model by assigning equal probability to all outcomes and use the model to determine probabilities of

events.

Response
Too abstract for age

KY.7.SP.8 Find probabilities of compound events using organized lists, tables, tree diagrams and simulation.

Response
Too abstract for age

KY.7.SP.8.a Explain just as with simple events, the probability of a compound event is the fraction of outcomes in the sample space for which the compound event occurs.

Response
Too abstract for age

KY.7.SP.8.b Represent sample spaces for compound events described in everyday language using methods such as organized lists, tables and tree diagrams.

Response
Too abstract for age

KY.7.SP.8.c Design and use a simulation to generate frequencies for compound events.

Response

Too abstract for age

8th Grade Standards Feedback

The Number System Standards Feedback

KY.8.NS.1 Understand informally that every number has a decimal expansion; the rational numbers are those with decimal expansions that terminate in 0s or eventually repeat. Know that other numbers are called irrational.

Response
Using previous knowledge of rational numbers, understand informally that every number has a decimal expansion. Rational numbers have decimal expansions that terminate or eventually repeat, while other numbers are called irrational.
If students need to know whole, natural, integer classifications, this needs to be specified.
just why??

KY.8.NS.2 Use rational approximations of irrational numbers to compare the size of irrational numbers, locate them approximately on a number line diagram and estimate the value of expressions.

Response
Too abstract for age
again...why??

Expressions & Equations Standards Feedback

KY.8.EE.1 Know and apply the properties of integer exponents to generate equivalent numerical expressions.

Response
The table in the clarification is blurry- it is important for those properties to be clear.

KY.8.EE.5 Graph proportional relationships, interpreting the unit rate as the slope of the graph. Compare two different proportional relationships represented in different ways.

Response
Using previous knowledge of proportional relationships, graph proportional relationships and interpret the unit rate as the slope of the graph. Compare two different proportional relationships represented in different ways.
why do we have such an insane push on this??

KY.8.EE.6 Use similar triangles to explain why the slope, m , is the same between any two distinct points on a non-vertical line in the coordinate plane; know the equation $y = mx$ for a line through the origin and the equation $y = mx + b$ for a line intercepting the vertical axis at b .

Response
Too abstract for age

KY.8.EE.7 Solve linear equations in one variable.

Response
Change to "Fluently solve..."

KY.8.EE.7.a Give examples of linear equations in one variable with one solution, infinitely many solutions, or no solutions. Show which of these possibilities is the case by successively transforming the given equation into simpler forms, until an equivalent equation of the form $x = a$, $a = a$, or $a = b$ results (where a and b are different numbers).

Response
Too abstract for age

Give examples of linear equations in one variable with one solution, infinitely many solutions, or no solution. Show which case applies by simplifying the equation to an equivalent form: $x = a$, $a = a$, or $a = b$.

KY.8.EE.7.b Solve linear equations with rational number coefficients, including equations whose solutions require expanding expressions using the distributive property and combining like terms.

Response
Too abstract for age

KY.8.EE.8 Analyze and solve a system of two linear equations.

Response
Too abstract for age

KY.8.EE.8.a Understand that solutions to a system of two linear equations in two variables correspond to points of intersection of their graphs, because points of intersection satisfy both equations simultaneously; understand that a system of two linear equations may have one solution, no solution, or infinitely many solutions.

Response
Too abstract for age
Understand that solutions to a system of two linear equations are the points where their graphs intersect, and that the system may have one solution, no solution, or infinitely many solutions.

KY.8.EE.8.b Solve systems of two linear equations in two variables algebraically by using substitution where at least one equation contains at least one variable whose coefficient is 1 and by inspection for simple cases.

Response
Too abstract for age

Elimination is an easier concept to teach students. Leave substitution for Algebra 1.

KY.8.EE.8.c Solve real-world and mathematical problems leading to two linear equations in two variables.

Response

Too abstract for age

Functions Standards Feedback

KY.8.F.1 Understand that a function is a rule that assigns to each input exactly one output. The graph of a function is the set of ordered pairs consisting of an input and the corresponding output.

Response

I think keeping in mind sets beyond merely the subsets of $\mathbb{R}$ would be beneficial.

what is the push on this insanity??

KY.8.F.5.b Sketch a graph that exhibits the qualitative features of a function that has been described verbally.

Response

Too abstract for age

Geometry Standards Feedback

KY.8.G.2 Understand that a two-dimensional figure is congruent to another if the second can be obtained from the first by a sequence of rotations, reflections and translations. Given two congruent figures, describe a

sequence that exhibits the congruence between them.

Response
Too abstract for age

KY.8.G.3 Describe the effect of dilations, translations, rotations and reflections on two-dimensional figures using coordinates.

Response
Should not include dilation or rotation
Specify how many degrees of rotation students should be able to rotate with. Just 90? Or any number of degrees? Around the origin, or around any point?

KY.8.G.4 Understand that a two-dimensional figure is similar to another if the second can be obtained from the first by a sequence of rotations, reflections, translations and dilations. Given two similar two-dimensional figures, describe a sequence that exhibits the similarity between them.

Response
Too abstract for age

KY.8.G.6 Explain a proof of the Pythagorean Theorem and its converse.

Response
Should not be able to prove. Just use to find missing lengths
Not necessary
Having a model proof in the clarifications will make it clear that this is not just about "a squared times b squared equals c squared"

KY.8.G.7 Apply the Pythagorean Theorem to determine unknown side lengths in right triangles in real-world and mathematical problems in two and three

dimensions.

Response
No 3d

KY.8.G.9 Apply the formulas for the volumes and surface areas of cones, cylinders and spheres and use them to solve real-world and mathematical problems.

Response
Can we remove the need to find surface area of cones, cylinders, and spheres? The formulas for these 3-D shapes are complicated and long. Being able to find the volume seems sufficient enough.
This seems out of place. However, could you use a different version of the surface area of a cone on the KSA? Using slant height provides a more useful formula for students.
surface area is a joke.
Diagrams that tie the formulas to the attributes of the figures they are for would be helpful in the clarifications..

Statistics & Probability Standards Feedback

KY.8.SP.2 Know that lines are widely used to model relationships between two quantitative variables. For scatter plots that suggest a linear association, informally fit a line and informally assess the model fit by judging the closeness of the data points to the line.

Response
Too abstract for age

High School Standards Feedback

Conceptual Category Number and Quantity Standards Feedback

KY.HS.N.1 Extend the properties of integer exponents to rational exponents, allowing for the expression of radicals in terms of rational exponents.

Response
Combine with KY.HS.N.2 and make it a (+) standard.
allowing students to understand that a radical can be written in terms of rational exponents.
Combine N.1 and N.2 unless one standard is intended for Algebra 1 and one for Algebra 2

KY.HS.N.2 Rewrite expressions involving radicals and rational exponents using the properties of exponents.

Response
Combine with KY.HS.N.1 and make it a (+) standard.

KY.HS.N.3. (+) Justify why the sum or product of two rational numbers is rational; that the sum of a rational number and an irrational number is irrational; and that the product of a nonzero rational number and an irrational number is irrational.

Response
No one needs irrational numbers
Noting that this standard is across all courses

KY.HS.N.4 Use units in context as a way to understand problems and to guide the solution of multi-step problems; ★

Response
Clarify in course matrix where this should be emphasized

KY.HS.N.4.a Choose and interpret units consistently in formulas; ★

Response
I think this could be a part of specific standards that use formulas, and not a standard on its own.
What does it mean by interpreting units? I think of interpreting numbers in slope-intercept real-world explanations but this isn't necessarily connected here.

KY.HS.N.5 Define appropriate units in context for the purpose of descriptive modeling. □

Response
It needs to be revised because my daughter is now in college and was taught in high school in Logan county with your standards and she was not taught any of this and had to learn calculus that she already took in high school because she had no idea what t
Noting that this standard is across all courses
I agree that this is important but it is embedded within many other standards, not necessarily something to be taught independently. This seems like more of a mathematical practice.

KY.HS.N.6 Choose a level of accuracy appropriate to the limitations on measurement when reporting quantities. □

Response
It needs to be revised because my daughter is now in college and was taught in high school in Logan county with your standards and she was not taught any of this and had to learn calculus that she already took in high school because she had no idea what t
Choose a level of accuracy appropriate to the use of significant digits in the scientific sense on measurements when reporting quantities.
Noting that this standard is across all courses
I agree that this is important but it is embedded within many other standards, not necessarily something to be taught independently. This seems more like a mathematical practice.

KY.HS.N.7 Understanding properties of complex numbers.

Response
This is not a sentence. Use the word "understand" to make consistent with the other standards. It would also be better if it was elaborated. What properties are they referring to? All of them? The ones below? It is unclear.
It needs to be revised because my daughter is now in college and was taught in high school in Logan county with your standards and she was not taught any of this and had to learn calculus that she already took in high school because she had no idea what t

KY.HS.N.7.a Know there is a complex number i such that $i^2 = -1$ and every complex number has the form $a + bi$ with a and b real.

Response
It needs to be revised because my daughter is now in college and was taught in high school in Logan county with your standards and she was not taught any of this and had to learn calculus that she already took in high school because she had no idea what t
there exists a complex number i such that...

KY.HS.N.7.b Use the relation $i^2 = -1$ and the commutative, associative, and distributive properties to add, subtract, and multiply complex numbers.

Response
It needs to be revised because my daughter is now in college and was taught in high school in Logan county with your standards and she was not taught any of this and had to learn calculus that she already took in high school because she had no idea what t

KY.HS.N.7.c (+) Find the conjugate of a complex number and use it to find the quotient of complex numbers.

Response
It needs to be revised because my daughter is now in college and was taught in high school in Logan county with your standards and she was not taught any of this and had to learn calculus that she already took in high school because she had no idea what t
This is skill should not be reserved for solely for advanced students

KY.HS.N.8 (+) Understanding representations of complex numbers using the complex plane.

Response
Again, this is not a sentence. Use the word "Understand" to maintain consistency with the other standards.
My reason for all of the revisions is that it is not actually taught you might think it's being taught but it is not and my daughter almost fell out of college because of it y'all failed her as a student
Remove - I realize this is a plus standard, but our advanced level courses have never seen a need for this in high school or intro college level mathematics
This is something that should not be reserved for advanced students. It could at least be introduced in regular classes.

KY.HS.N.8.a (+) Represent complex numbers on the complex plane in rectangular and polar form (including real and imaginary numbers) and explain why the rectangular and polar forms of a given complex number represent the same number.

Response
Polar coordinates should not be a plus standard as it is way above what even advanced students should be learning in required courses. Trigonometry is needed to fully understand
My reason for all of the revisions is that it is not actually taught you might think it's being taught but it is not and my daughter almost fell out of college because of it y'all failed her as a student
Remove
Use absolute value instead of modulus

KY.HS.N.8.b (+) Represent addition, subtraction, multiplication, modulus and conjugation of complex numbers geometrically on the complex plane; use properties of this representation for computation.

Response
My reason for all of the revisions is that it is not actually taught you might think it's being taught but it is not and my daughter almost fell out of college because of it y'all failed her as a student
Remove
Use absolute value instead of modulus

KY.HS.N.8.c (+) Calculate the distance between numbers in the complex plane as the modulus of the difference and the midpoint of a segment as the average of the numbers at its endpoints.

Response
My reason for all of the revisions is that it is not actually taught you might think it's being taught but it is not and my daughter almost fell out of college because of it y'all failed her as a student
Remove
Use absolute value instead of modulus

KY.HS.N.10 (+) Extend polynomial identities to the complex numbers.

Response
Remove
This is too vague. Using the clarification, it seems that "factor quadratics with complex factors" would make more sense.

KY.HS.N.11 (+) Know the Fundamental Theorem of Algebra; show that it is true for quadratic polynomials.

Response
This should be a standard not a plus standard. This is so helpful for solving
My reason for all of the revisions is that it is not actually taught you might think it's being taught but it is not and my daughter almost fell out of college because of it y'all failed her as a student

KY.HS.N.12 (+) Understand and apply properties of vectors.

Response
Is it necessary for vectors to even be a plus standard? I think it could be removed all together.
My reason for all of the revisions is that it is not actually taught you might think it's being taught but it is not and my daughter almost fell out of college because of it y'all failed her as a student
This need not be reserved for advanced students, either.

KY.HS.N.12.a (+) Recognize vector quantities as having both magnitude and direction. Represent vector quantities by directed line segments and use appropriate symbols for vectors and their magnitudes.

Response
Is it necessary for vectors to even be a plus standard? I think it could be removed all together.
My reason for all of the revisions is that it is not actually taught you might think it's being taught but it is not and my daughter almost fell out of college because of it y'all failed her as a student

KY.HS.N.12.b (+) Find the components of a vector by subtracting the coordinates of an initial point from the coordinates of a terminal point.

Response
Is it necessary for vectors to even be a plus standard? I think it could be removed all together.
My answer to all of these revisions is that my daughter was not taught any of it not a single one of those does she know and had to learn it herself my reason

KY.HS.N.13 (+) Perform operations with vectors (addition, subtraction and multiplication by a scalar).

Response
Again, this is something within reach of average high school freshman and is valuable to accruing mathematical maturity.

KY.HS.N.13.a (+) Add vectors end-to-end, component-wise and by the parallelogram rule. Understand that the magnitude of a sum of two vectors is typically not the sum of the magnitudes.

Response
Remove
Remove

KY.HS.N.13.b (+) Given two vectors in magnitude and direction form, determine the magnitude and direction of their sum.

Response
remove

KY.HS.N.13.d (+) Represent scalar multiplication graphically by scaling vectors and possibly reversing their direction; perform scalar multiplication component-wise.

Response
Is this a necessary plus standard? I think there are so many standards that have vectors in them, but I do not think it that widely applies to what we should teach in high school.

KY.HS.N.13.e (+) Compute the magnitude of a scalar multiple cv using $||cv|| = |c|v$. Compute the direction of cv knowing that when $|c|v \neq 0$, the direction of cv is either along v (for $c > 0$) or against v (for $c < 0$).

Response
Is this a necessary plus standard? I think there are so many standards that have vectors in them, but I do not think it that widely applies to what we should teach in high school.

KY.HS.N.15 Perform operations with matrices.

Response
Combine with KY.HS.N.14.
Make it a +
+ standard

KY.HS.N.15.a Add, subtract and multiply matrices of appropriate dimensions.

Response
Make it a +
Matrix multiplication should be a + standard, in my opinion. I think that scalar multiplication is more reasonable for a core standard
+ Standard

KY.HS.N.15.b Multiply matrices by scalars to produce new matrices.

Response
Make it a +
+Standard
matrices are not assessed on the SAT and do not represent prerequisite knowledge for more advanced HS math. This should be a (+) Standard.

KY.HS.N.16 (+) Understand properties of square and identify matrices.

Response
I think this should read "Understand properties of square and IDENTITY matrices."

KY.HS.N.16.c (+) Work with 2 x 2 matrices as transformations of the plane and interpret the absolute value of the determinant in terms of area.

Response
Remove

KY.HS.N.17 (+) Multiply a vector (regarded as a matrix with one column) by a matrix of suitable dimensions to produce another vector. Work with matrices

as transformations of vectors.

Response
Not necessary.
Remove

Conceptual Category Algebra Standards Feedback

KY.HS.A.1.b Interpret complicated expressions, given a context, by viewing one or more of their parts as a single entity. ★

Response
Can this be combined with part a?

KY.HS.A.3 Choose and produce an equivalent form of an expression to reveal and explain properties of the quantity represented by the expression. □

Response
1st part of the sentence is ok, 2nd part is wordy and unclear.

KY.HS.A.3.d (+) Complete the square in a quadratic expression to reveal the maximum or minimum value of the function it defines. □

Response
Remove the + - Completing the Square should be something students are learning in Algebra I & 2. It is the basis for understanding the why behind the quadratic formula.
Should not be (+). CTS is a critical concept that builds understanding by linking a concrete area model to the very abstract quadratic formula. Not only is it a strategy that always works, it is a strategy that is reliant on sense-making not memorizing

KY.HS.A.4 (+) Derive the formula for the sum of a finite geometric series (when the common ratio is not 1) and use the formula to solve problems. ★

Response
not n

KY.HS.A.5 Add, subtract and multiply polynomials.

Response
Add that students should understand that polynomials form a system that is analogous to real numbers so that students leverage their understanding of properties of operations with numbers to make sense of polynomial operations.

KY.HS.A.6 (+) Know and apply the Remainder Theorem.

Response
Should not be a (+) standard

KY.HS.A.8 (+) Prove polynomial identities and use them to describe numerical relationships.

Response
Remove

KY.HS.A.9 (+) Know and apply the Binomial Theorem for the expansion of $(x + y)^n$ in powers of x and y for a positive integer n , where x and y are any numbers, with coefficients determined for example by Pascal's Triangle.

Response
This is a useful skill to know for anyone needing to go through the Calculus sequence or deal with moderate algebraic use.

KY.HS.A.10 (+) Rewrite simple rational expressions in different forms.

Response
This should be a standard as it is helpful in later mathematics and does not take much time to teach
Remove the + standard, this should be part of the Algebra II curriculum

KY.HS.A.11 (+) Add, subtract, multiply and divide rational algebraic expressions.

Response
Remove the + from the standard, this should be part of the Algebra II curriculum.

KY.HS.A.12 Create equations and inequalities in one variable and use them to solve problems.

Response
This domain is all modeling however, on the matrix there is nothing noted about this being a modeling standard.

KY.HS.A.13 Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales.

Response
This domain is all modeling however, on the matrix there is nothing noted about this being a modeling standard.

KY.HS.A.14 Create a system of equations or inequalities to represent constraints within a modeling context. Interpret the solution(s) to the

corresponding system as viable or nonviable options within the context.

Response
This domain is all modeling however, on the matrix there is nothing noted about this being a modeling standard.
Is this just linear programming or also more simple 2-variable, 2 equation systems with one solution?

KY.HS.A.15 Rearrange formulas to solve a literal equation, highlighting a quantity of interest, using the same reasoning as in solving equations.

Response
This domain is all modeling however, on the matrix there is nothing noted about this being a modeling standard.

KY.HS.A.16 Understand each step in solving a simple equation as following from the equality of numbers asserted at the previous step, starting from the assumption that the original equation has a solution. Construct a viable argument to justify a solution method.

Response
Revise wording
Needs to be re-worded completely. Something along the lines of: solve an equation and justify each step using the properties of operations and properties of equality.

KY.HS.A.17 Solve and justify equations in one variable. Justify the solutions and give examples showing how extraneous solutions may arise.

Response
Is this only for the types of equations listed below?

KY.HS.A.17.a Solve rational equations written as proportions in one variable.

Response
"simple" rational equations

KY.HS.A.18 Solve linear equations and inequalities in one variable, including literal equations with coefficients represented by letters.

Response
Aren't literal equations already addressed in another standard?

KY.HS.A.19.a Solve quadratic equations by taking square roots, the quadratic formula and factoring, as appropriate to the initial form of the equation. Recognize when the quadratic formula gives complex solutions and write them as $a \pm bi$ for real numbers a and b .

Response
Add Completing the square as a method

KY.HS.A.19.b (+) Use the method of completing the square to transform any quadratic equation in x into an equation of the form $(x - p)^2 = q$ that has the same solutions. Derive the quadratic formula from this form.

Response
Remove the (+) from the standard. Students should be able to use Completing the square as a method.
Should not be a (+) standard as CTS is a critical strategy for many types of problems. It links a concrete area model with other very abstract strategies and is one of the few strategies for solving that students can use to develop deep understanding.

KY.HS.A.19.c (+) Solve quadratic equations by completing the square.

Response

Remove the (+)

Should not be a (+) standard as CTS is a critical strategy for many types of problems. It links a concrete area model with other very abstract strategies and is one of the few strategies for solving that students can use to develop deep understanding.

KY.HS.A.20.a Understand a system of two equations in two variables has the same solution as a new system formed by replacing one of the original equations with an equivalent equation.

Response

How is this tested? It is inherent within elimination.
--

KY.HS.A.22 (+) Use matrices to solve a system of equations.

Response

Make a standard but include “using technology”
--

Remove

This is very important to know how to do for many math and science classes. This should be a skill that the average student can utilize.
--

KY.HS.A.22.a (+) Represent a system of linear equations as a single matrix equation in a vector variable.

Response

instead of "in a vector variable" use "with vector variables"

Remove

KY.HS.A.22.b (+) Find the inverse of a matrix if it exists.

Response

Remove

KY.HS.A.22.c (+) Use matrices to solve systems of linear equations (using technology for matrices of dimension 3×3 or greater).

Response

Make standard but “using technology” for all types
--

Remove

KY.HS.A.25 Graph linear inequalities in two variables.

Response

In clarifications, what are the different forms of interval notation that students should know and use?

Conceptual Category Functions Standards Feedback

KY.HS.F.1.a Understand that a function from one set (called the domain) to another set (called the range) assigns to each element of the domain exactly one element of the range. If f is a function and x is an element of its domain, then $f(x)$ denotes the output of f corresponding to the input x .

Response

Needs to give a specific, testable skill. Is it the same as part b?

KY.HS.F.1.c For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities and sketch graphs showing key features given a verbal description of the relationship.

Response
Is this included already in F.4?

KY.HS.F.1.d Relate the domain of a function to its graph and, where applicable, to the quantitative relationship it describes.

Response
In clarifications, what are the different forms of set or interval notation that students should know and use?

KY.HS.F.3 Understand average rate of change of a function over an interval.

Response
Specify “for all functions, not just linear where the rate of change is constant”

KY.HS.F.3.a Calculate and interpret the average rate of change of a function (presented symbolically or as a table) over a specified interval.

Response
Algebra 2 concept? not tested KAS after Alg 1 & Geom?

KY.HS.F.3.b Estimate the rate of change from a graph. ★

Response
Should this change to compare instead of estimate?

KY.HS.F.4.b Graph square root, cube root and absolute value functions. □

Response
Make this a (+) standard.

KY.HS.F.4.c Graph polynomial functions, identifying zeros when suitable factorizations are available and showing end behavior. ★

Response
Make a plus standard

KY.HS.F.5 Write a function defined by an expression in different but equivalent forms to reveal and explain different properties of the function.

Response
Too vague

KY.HS.F.5.a Identify zeros, extreme values and symmetry of the graph within the context of a quadratic function.

Response
Get rid of "within the context" and it will read cleaner.

KY.HS.F.6.a Determine an explicit expression, a recursive process, or steps for calculation from a context. □

Response
I think that recursives should be a +standard.
Make a (+) standard or remove the recursive
Is this specifically for sequences or is this also linear, quadratic, etc. functions?

KY.HS.F.6.b Combine standard function types using arithmetic operations. ★

Response
Be more specific--does this include adding, subtracting, multiplying, AND dividing functions?

KY.HS.F.6.c (+) Compose functions. □

Response
I think this should be a required standard.
Remove the (+)

KY.HS.F.7.a Use formulas (explicit and recursive) to generate terms for arithmetic and geometric sequences.

Response
remove recursive or make recursive (+)

KY.HS.F.7.c (+) Translate between recursive and explicit formulas.

Response
Again, I think that recursive formulas should be a +standard.

KY.HS.F.8.a Identify the effect on the graph of replacing $f(x)$ by $f(x) + k$, $k f(x)$, $f(kx)$ and $f(x + k)$ for specific values for k (both positive and negative); find the value of k given the graphs.

Response

This is very basic. Should there be another standard about writing equations using transformations?

KY.HS.F.8.b Experiment with cases and illustrate an explanation of the effects on the graph using technology.

Response

Isn't experimenting a way to achieve part a? This seems unnecessary.

KY.HS.F.9.a Given the equation of an invertible function, find the inverse.

Response

Make this a (+) Standard.

Given the equation of an invertible function, determine the restricted domain then find the inverse.

KY.HS.F.11.b Recognize situations in which one quantity changes at a constant rate per unit interval relative to another.

Response

This is the same as part a, just indicating real-world situations even though it only says situations.

KY.HS.F.11.c Recognize situations in which a quantity grows or decays by a constant percent rate per unit interval relative to another.

Response

This is the same as part a, just indicating real-world situations even though it only says situations.

KY.HS.F.13 Observe using graphs and tables that a quantity increasing exponentially eventually exceeds a quantity increasing linearly, quadratically,

or (more generally) as a polynomial function.

Response
Use "as a linear, quadratic, or polynomial function" instead of "linearly, quadratically, or (more generally) as a polynomial function."
Can this go with F.11?

KY.HS.F.14 Interpret the parameters in a linear or exponential function in terms of a context.

Response
Too vague, can this be incorporated into other standards?

KY.HS.F.15 (+) Understand the relationship of radian measure of an angle to its arc length.

Response
Should not be a (+) standard as radian measure is used in many advanced HS courses and this is a prerequisite

KY.HS.F.16 (+) Understand and use the unit circle.

Response
This is critical in understanding that the Trig functions represent cyclical situations. These are the only periodic functions we study in depth in HS.

KY.HS.F.16.a (+) Explain how the unit circle in the coordinate plane enables the extension of trigonometric functions to all real numbers, interpreted as radian measures of angles traversed counterclockwise around the unit circle.

Response

This is critical in understanding that the Trig functions represent cyclical situations. These are the only periodic functions we study in depth in HS.

KY.HS.F.17 (+) Choose trigonometric functions to model periodic phenomena with specified period, midline and amplitude. ★

Response
Include phase shift
Should not be a (+) standard

KY.HS.F.20 (+) Proving identifies and formulas within the context of trigonometry.

Response
This should say "identities" instead of "identifies."

Conceptual Category Geometry Standards Feedback

KY.HS.G.1.b Understand properties of and differences between perpendicular and parallel lines.

Response
Add "definition" and properties

KY.HS.G.2 Representing transformations in the plane.

Response
Use "Represent" instead of "Representing" to form a sentence and stay consistent.
Collapse G.2.a and G.2.b into one standard

KY.HS.G.2.a Describe transformations as functions that take points in the plane as inputs and give other points as outputs.

Response
Describe transformations that take points in the plane as inputs and give other points as outputs.
Collapse G.2.a and G.2.b into one standard

KY.HS.G.2.b Compare transformations that preserve distance and angle measures to those that do not.

Response
How is this tested? Either distance and angle measures are the same or they're not; there's nothing major here.
Collapse G.2.a and G.2.b into one standard

KY.HS.G.2.c Given a rectangle, parallelogram, trapezoid, or regular polygon, formally describe the rotations and reflections that carry it onto itself, using properties of these figures.

Response
Why is this a standard; why is this important for the real-world?

KY.HS.G.3 (+) Develop formal definitions of rotations, reflections and translations in terms of angles, circles, perpendicular lines, parallel lines and line segments.

Response
Why is this a plus standard? These are the FOUNDATION of all the geometry to come and the formal definitions usher students into a higher order of Geometric Reasoning (Van Hiele's)

KY.HS.G.4 Understand the effects of transformations of geometric figures.

Response
Collapse G.4.a and G.4.b into one standard

KY.HS.G.4.a Given a geometric figure and a rotation, reflection, or translation, draw the transformed figure.

Response
Collapse G.4.a and G.4.b into one standard

KY.HS.G.4.b Specify a sequence of transformations that will carry a given figure onto another.

Response
Collapse G.4.a and G.4.b into one standard

KY.HS.G.4.c Use geometric descriptions of rigid motions to transform figures and to predict the effect of a given rigid motion on a given figure. Given two figures, use the definition of congruence in terms of rigid motions to decide if they are congruent.

Response
Add some examples/clarification of what this means.
Collapse G.4.a and G.4.b into one standard

KY.HS.G.5 Know and apply the concepts of triangle congruence:

Response

Use a period instead of a colon.

KY.HS.G.5.a Use the definition of congruence in terms of rigid motions to show that two triangles are congruent if and only if corresponding pairs of sides and corresponding pairs of angles are congruent.

Response

How is this tested? It's the definition of congruent. Maybe take off "Use the definition of congruence in terms of rigid motions to."

KY.HS.G.5.b Explain how the criteria for triangle congruence (ASA, SAS and SSS) follow from the definition of congruence in terms of rigid motions.

Response

Students should be able to use ASA, SAS, and SSS to solve problems. What about AAS?

KY.HS.G.6 Apply theorems for lines, angles, triangles, parallelograms.

Response

This is too vague. It needs to be more specific. Which theorems should be addressed and taught?

Can this be combined with G.1?

KY.HS.G.7 Prove theorems about geometric figures.

Response

This needs to be a plus standard. It is no longer relevant for non-accelerated students to be proving theorems. It is also too vague. There are so many theorems this could apply to.

In clarifications, explain that the skill is to prove a given theorem, not to know a list of theorems

KY.HS.G.7.a Construct formal proofs to justify theorems for lines, angles and triangles.

Response
I think being able to
This needs to be a plus standard. It is no longer relevant for non-accelerated students to be proving theorems. It is also too vague. There are so many theorems this could apply to.
In clarifications, define the typical forms of proof (paragraph, two-column etc) that students should know and use

KY.HS.G.7.b (+) Construct formal proofs to justify theorems for parallelograms.

Response
Why is this a plus standard while 7a is not?

KY.HS.G.8.b Apply basic construction procedures to construct more complex figures.

Response
I do not think this is a necessary Geometry standard.
Can this change to a plus? Also, needs to be more specific. What is complex to me may not be complex to someone else.

KY.HS.G.9.a Verify the properties that result from dilations given by a center and a scale factor.

Response
Remove "that" from in front of "dilations" for it to read more clearly.
Change to "Create dilations," not verify properties.

KY.HS.G.9.b Verify that a dilation produces an image that is similar to the pre-image.

Response

This is just a check of the work of creating a dilation. Can this be combined with part a or omitted?

KY.HS.G.10 Apply the properties of similarity transformations to establish the AA criterion for two triangles to be similar.

Response

This doesn't need to be its own standard. It should be added in as KY.HS.G.9.c.

Why does this have to be connected to transformations? The clarification doesn't use transformations.

KY.HS.G.11 Understand theorems about triangles.

Response

This is too vague. There are numerous theorems. The ones that are expected to be taught should be listed.

This is very broad. Need specific clarifications.

KY.HS.G.11.a Apply theorems about triangles.

Response

This is too vague. There are numerous theorems. The ones that are expected to be taught should be listed.

This is very broad. Need specific clarifications.

KY.HS.G.11.b (+) Prove theorems about triangles.

Response

Should not be a (+) standard

KY.HS.G.11.c Use similarity criteria for triangles to solve problems and to prove relationships in geometric figures.

Response

Specifically state AA~, SSS~, and SAS~. (Be consistent with congruent triangles standard.)

KY.HS.G.12.a Understand that by similarity, side ratios in right triangles are properties of the angles in the triangle, leading to definitions of trigonometric ratios for acute angles (sine, cosine and tangent).

Response

This is very wordy. "Understand that side ratios in right triangles lead to the definitions of trig ratios."

KY.HS.G.12.b Explain and use the relationship between the sine and cosine of complementary angles.

Response

This is a minor property that doesn't particularly help with solving right triangles. Can this be changed to + or omitted?

KY.HS.G.14 (+) Understand the apply the Law of Sines and the Law of Cosines.

Response

This should read "Understand AND apply" instead of "Understand the apply."

change the word the to and: Understand AND apply the Law of Sines & Law of Cosines

KY.HS.G.14.b (+) Prove the Laws of Sines and Cosines and use them to solve problems.

Response
Use the Laws of Sines and Cosines to solve triangles in applied problems. ★
The laws must be used to do part a. This is redundant.

KY.HS.G.15 Verify using dilations that all circles are similar.

Response
How is this tested? The clarification is not a clarification.

KY.HS.G.16 Identify and describe relationships among angles and segments within the context of circles involving:

Response
Stop at the word "circles" and put a period.
In clarifications, define with angles and segments

KY.HS.G.16.a Recognize differences between and properties inscribed, central and circumscribed angles.

Response
This should say "differences between and properties of."

KY.HS.G.16.b Understand relationships between inscribed angles and the diameter of a circle.

Response
This doesn't need to be on it's own. It

KY.HS.G.16.c Understand the relationship between the radius of a circle and the line drawn through the point of tangency on that radius.

Response
This and part c should also add "and use to solve problems." Understanding doesn't really mean anything.

KY.HS.G.17.a (+) Construct the inscribed and circumscribed circles of a triangle.

Response
Should not be a (+) standard

KY.HS.G.17.b (+) Construct a tangent line from a point outside of a given circle to a circle.

Response
One may derive the derivative of the function of a semicircle by generalizing this.

KY.HS.G.18 (+) Understand the relationship between an intercepted arc length within a circle and the radius of the circle.

Response
Make standard not plus standard
Should not be a (+) standard. These are natural extensions of concepts already developed and provide a foundation of applying proportional relationships to sense making.

KY.HS.G.18.a (+) Derive using similarity the fact that the length of the arc intercepted by an angle is proportional to the radius. Derive the formula for the area of a sector.

Response

Should not be a (+) standard. These are natural extensions of concepts already developed and provide a foundation of applying proportional relationships to sense making.

KY.HS.G.18.b (+) Define the radian measure of the angle as the measure of a central angle that intercepts an arc equal in length to the radius of the circle.

Response

Should not be a (+) standard. These are natural extensions of concepts already developed and provide a foundation of applying proportional relationships to sense making.

KY.HS.G.19.a Write the equation of a circle of given center and radius using the Pythagorean Theorem.

Response

Use "with given center" instead of "of given center."

KY.HS.G.19.b (+) Derive and write the equation of a circle of given center and radius using the Pythagorean Theorem.

Response

Use "with given center" instead of "of given center."

Should not be a (+) standard

KY.HS.G.19.c (+) Complete the square to find the center and radius of a circle given by an equation.

Response
should not be a (+) standard

KY.HS.G.20.a (+) Derive the equation of a parabola given a focus and directrix.

Response
Should not be a (+) standard

KY.HS.G.21 Use coordinates to justify and prove simple geometric theorems algebraically.

Response
This is too vague. What specific geometric theorems are expected to be taught here?
Isn't this already part of other standards?

KY.HS.G.22 Justify and apply the slope criteria for parallel and perpendicular lines and use them to solve geometric problems.

Response
Isn't this in other standards? What about writing equations of parallel and perpendicular lines?

KY.HS.G.23.b Find the point on a directed line segment between two given points that partitions the segment in a given ratio.

Response
Partitioning a directed line segment is not beneficial for student to learn. This should be an optional plus standard
This needs to be a plus standard.

KY.HS.G.24.b Compute the areas of triangles, rectangles and other quadrilaterals. ★

Response

This is only on the coordinate plane. Should students compute these off the coordinate plane but incorporating Pythagorean Theorem, trig, etc.?

KY.HS.G.25.a Finding the circumference and area of a circle.

Response

Use "Find" instead of "Finding" to form a sentence and make it consistent.

KY.HS.G.25.b Finding the volume of a sphere, prism, cylinder, pyramid and cone.

Response

Use "Find" instead of "Finding" to form a sentence and make it consistent.

KY.HS.G.26 (+) Given an informal argument using Cavalieri's principle for the formulas for the volume of a sphere and other solid figures.

Response

This one is a mess. I don't even know what it is trying to say. I think it should have a comma after argument and say "use" instead of "using," but I'm not sure.

KY.HS.G.28 Identify the shapes of two-dimensional cross-sections of three-dimensional objects and identify three-dimensional objects generated by rotations of two-dimensional objects.

Response
This doesn't need to be its own standard. It can be added in as KY.HS.G.25.c.
Separate this into two standards.

KY.HS.G.29 Use geometric shapes, their measures and their properties to describe objects in real world settings.

Response
This is too vague. This should be sprinkled in with each different area. For example, add this into a standard with circles, add it into a standard with volume, etc.

KY.HS.G.30 Apply concepts of density based on area and volume in modeling situations, using appropriate units of measurement.

Response
Density should not be a geometry standard but a science standard

KY.HS.G.31 Apply geometric methods to solve design problems. ★

Response
This is too vague. It needs to be clarified.

Conceptual Category Statistics and Probability Standards Feedback

KY.HS.SP.1 Represent the distribution of data with plots on the real number line (stem plots, dot plots, histograms and box plots).

Response
I'm wondering how this is distinguishable or could be distinguished from what students are doing in middle school.

KY.HS.SP.2 Use statistics appropriate to the shape of the numerical data distribution to compare center (median, mean) and spread (interquartile range when comparing medians and standard deviation when comparing means) of different data distributions.

Response
I'm wondering how this is distinguishable or could be distinguished from what students are doing in middle school.

KY.HS.SP.3 Interpret differences in shape, center and spread in the context of the distributions of the numerical data, accounting for the presence and possible effects of extreme data points (outliers).

Response
I'm wondering how this is distinguishable or could be distinguished from what students are doing in middle school.

KY.HS.SP.5 Summarize categorical data for two or more categories in frequency tables. Calculate and interpret joint, marginal and conditional relative frequencies (probabilities) in the context of the data, recognizing possible associations and trends in the data.

Response
There is a lot within this standard. Break it down.

KY.HS.SP.6 Represent data on two quantitative variables on a scatter plot and describe how the explanatory and response variables are related.

Response
Make this match the parts below it.

KY.HS.SP.6.a Calculate an appropriate mathematical model, or use a given mathematical model, for data to solve problems in context.

Response
Needs to be more specific

KY.HS.SP.9 Understand statistics as a process for making inferences and justifying conclusions about population parameters based on a random sample from that population.

Response
This sounds like a definition of statistics, not an actual skill students should complete.

KY.HS.SP.10 Decide if a specified model is consistent with the results from a simulation.

Response
Add the word "theoretical"

KY.HS.SP.15.c Recognize and explain the concept of independence in everyday language and everyday situations.

Response
This is very similar to part b.

KY.HS.SP.16.a Understand the conditional probability of A given B as $P(A \text{ and } B)/P(B)$.

Response
This is a definition. Where is the standard that has students find conditional probability? Part d is too wordy.

KY.HS.SP.16.b (+) Interpret independence of A and B as saying that the conditional probability of A given B is the same as the probability of A and the conditional probability of B given A is the same as the probability of B.

Response
Should not be a (+) standard in order to make sense of up-coming standards

KY.HS.SP.16.c Recognize and explain the concept of conditional probability in everyday language and everyday situations.

Response
Inherent in finding probabilities in real-world situations

KY.HS.SP.16.d Find the conditional probability of A given B as the fraction of B's outcomes that also belong to A and interpret the answer in terms of the model.

Response
Very wordy, needs clarification. Does it just mean to find the conditional probability?

Calculus (+) Standards Feedback

KY.HS.C.1.b (++) Prove that the limit of a function exists, based upon the definition of a limit.

Response

Make + not ++

KY.HS.C.5 (+) Describe asymptotic behavior (analytically and graphically) in terms of infinite limits and limits at infinity.

Response

In clarifications, describe what notation for intervals and sets students should know and be able to use
--

KY.HS.C.6 (+) Discuss the end behavior of functions; identify representative functions for each type of end behavior using precise mathematical symbols and language.

Response

In clarifications, describe what notation for intervals and sets students should know and be able to use
--

Standards for Mathematical Practice Feedback

MP.1. Make sense of problems and persevere in solving them.

Response

SMP not MP - confusing; as a whole feel like the paragraphs work, but need the FRAMEWORK of Grace and Amy for them to make sense and teachers begin to see the connection

MP.2. Reason abstractly and quantitatively.

Response

Not abstractly

this is making sense of problems

Clarify

MP.3. Construct viable arguments and critique the reasoning of others.

Response
I feel that children should be taught that there are more than one way to arrive at the same answers.

MP.4. Model with mathematics.

Response
modeling is using tools. this one could just go away.
The models need to be specified or explained more thoroughly.

MP.6. Attend to precision.

Response
this could be linked with MP1

MP.7. Look for and make use of structure.

Response
Using strategies instead of structure would fit better.
Also unnecessary
I'm not sure what this is referencing.
Clarify the difference between MP.7 and MP.8

MP.8. Look for and express regularity in repeated reasoning.

Response
I don't know how to fix this one, but I don't think it's used the way it's meant to be used in an elementary setting
too similar to MP2
Is this essentially "recognizing patterns"?
Don't understand
Clarify the difference between MP.7 and MP.8