

Kentucky Academic Standards (KAS) for Mathematics

Appendix: Draft KAS for Mathematics Public Feedback Comments Received

April 2026



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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.

Kindergarten Standards Feedback

Counting and Cardinality Standards Feedback

KY.K.CC.1 Count.

Response
Clarifications should include the types of counting so that teachers better understand the progression.
How high?
Count what?
add something about counting forward and backward

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

Response
add more specifics about "number paths" and "hundreds charts" both vertical and horizontal looks, as well as upside down hundreds charts. Throughout all elementary standards add more specifics about number lines in clarification statements.
100 is too large a number for 5 year olds. Let's solidify 1-20 first.
at a minimum to 100. Many teachers won't go beyond that number - they need to know that the 100 is what students will be assessed on - not all that they can be exposed to or learn. I state this for all standards that have a hard stop number on them.
Make 2 separate (count to 100 by ones; count to 100 by tens)

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

Response
From 20
Ensure that counting backwards from 100 is in the standards somewhere K-2
at least 30
omit and/or combine with K. CC.1 in general, as counting forward and backward should be taught simultaneously, and 30 seems like such a random number
Count backwards from 20 by ones.
Why 30? Seems random.

Counting backward from 20

Count backwards from 20 because that's the number students should be able to write to.

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

Again, 100 is too large a number

at a minimum of 100

KY.K.CC.3 Represent numbers.

Response

How?

Represent numbers how?

We have seen some student who can write number and represent the number with objects, but are unable to identify the numbers. When shown the numbers, they are unable to orally state the number name.

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

Response

0-100

at a minimum

Write Numerals from 0 to 20.

Use term "numerals" - more specific and mathematically correct

Write numerals from 0-20

numerals

Write numerals from 0 to 20.

Write numerals from 0 to 20.

Write numbers to 50.

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
minimum
Does this mean when given a numeral, represent with objects? Or does it mean the students need to represent both quantity and written numeral? Be more specific is my advice.

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

Response
In clarifications, add information for teachers regarding the types/stages of counting
Language is too complicated and needs to be simplified.

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
Make the language more friendly, use one to one county as the verbiage.
This standard is a bit too wordy and hard to understand. What is meant by object?
Revise the verbiage. Make more simple.

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
Make the wording less bulky, make it more simple and to the point.
state this as cardinality

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

Response
Again, the verbiage is strange. Please use something like “understand that each number name after the one before it is a quantity that is one more than the number before it.

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

Response
a minimum of 20

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
at a minimum of 20
Students need to know multiple strategies, however, we need to focus on one-two master, then add more
these arrangements are confusing; you mean to say how many? with objects arranged in linear way, such as in a row or in an array.
why these shapes? do you mean count 10 when counters are organized?

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

Response
"count by ones" to.....at least 10
combine with 5.a

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

up to a minimum of what #?

KY.K.CC.7 Compare two numbers between 1 and 10 presented as written numerals.

Response

Add in written as numbers or shown in pictures.

uo to a minimum of 10

Be more specific. Use the same verbiage as standard above.

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

redundant, they will be using models, objects, fingers, to solve the problems in subsequent standards.

up to a minimum of what # also say "math drawings" to focus on useful representations to solve the problem not just illustrations

the "or" at the end implies that only one option is needed. it should reflect CSA: "...represent addition and subtraction with concrete representations (e.g., counters, fingers, acting out), S-c representations (e.g. drawings), and abstract repres. (e.g.,

this is a long list. do you mean represent it concretely, visually, and abstractly?

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

Break into two parts, one with addition and one with subtraction.

I would say math drawings so they are not illustrating but drawing a representation that will help them solve the problem

Students must be able to read to do this- add with adult support. Or keep it numeracy based.

wording is awkward with 3 and one or

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

Response
This should be one standard. The ideas are all one.
Focus on the basic foundational skills first; this is too much
50
same as previous comments on minimums (will say "same" from now on)
In clarifications, drawings need to show differences in sizes of numbers (e.g. in number bond)
Consider a visual such a tape diagram to help students visualize quantity more specifically
Consider a change in the image on the clarification
Consider a change in the image on the clarification to not be a tape diagram or tens frame for the 5 (2 and 3) to give a clearer picture that so that it better reflects the "size" difference in a number. So that students can see the visual differences.
Keep the wording of the standard but add coherence to KY.1.OA.7 for part b
This needs a new "b": "decompose mentally, including knowing a missing part when one part is given (they need to be automatic with decomposing)
Keep the wording of the standard but add coherence to KY.1.OA.7 for part b

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
Focus on the basic foundational skills first; this is too much
math drawings
Consider a change in the image in the clarification to maybe ten frame use of the number bond. Numbers in the bond needs to show difference in size for 3 and 2. Three should be larger.
Consider a visual such a tape diagram to help students visualize quantity more specifically
Consider a change in the image on the clarification (a different way to show the bond)
One way should suffice for 5 year olds
Too wordy. Please simplify with student friendly verbiage.

we need more on decomposing. maybe an 'add' of decomposing mentally.

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

Response
Keep the wording of the standard but add coherence to KY.1.OA.7 for part b
Focus on the basic foundational skills first; this is too much
I would not use drawings here.
Think about maybe adding the balance with unifix cubes on it for this as clarification.
Clarification: maybe suggest an image of number balance and how to use it
Add a balance diagram for the clarification
Clarification: Maybe suggest an image of number balance and how to use it to show equality for a number.
This doesn't seem to fit inside this header as worded. It could say, "Use equations and illustrations to illustrate how to sums can equal the same number" (e.g., $4 + 2 = 3 + 3$)

KY.K.OA.4 For any number from 1 to 9, find the number that makes 10 when added to the given number by using objects or drawings and record the answer with a drawing or equation.

Response	
math drawings	don't say "makes 10" in this case, say equals 10
Identify complements of 10 for the integers ([1,9]). Represent the additive relationship using concrete manipulatives or pictorial models, and document the result in symbolic form or through a diagram. or choose a number 1 to 9	
Choose a number from 1-9. Using object or drawings to show what number should be added to make 10. Record the answer with a drawing or equation.	
Choose a number from 1-9. Use objects or drawings to show what number should be added to make 10. Record your answer with a drawing or an equation.	
Choose a number from 1 to 9. Use objects or drawings to show what number must be added to make 10. Record your answer with a drawing or an equation.	
Choose a number from 1-9. Use objects or drawings to show what number should be added to make 10. Record your answer with a drawing or an equation.	
Simplify: make more student friendly.	

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

Response
In clarifications, name the strategies students should be fluent in: +/- 0,1,2 and doubles. Clarify, does counting on represent fluency in this standard?
Fluently add and subtract within 5 without materials
20
same
I think this statement was intended to mean "develop automaticity with sums and differences within 5" Fluently is a poor choice of wording given the definition of fluency in the standards (and everywhere)
Demonstrate automaticity with (instead of fluency)

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
The word "quantities" in here is confusing. Return to "...11 to 19 into ten ones and some further ones". The clarification can stay describing units of triangles or beans.
This should be a first grade standard.
Please rewrite with simple verbiage, this sounds so wordy. Something simple would be easier to understand.
In the first sentence - would change "ten ones" to ten and "some further ones" to ones.
The word "quantities" in here is confusing. Return to "...11 to 19 into ten ones and some further ones". The clarification can stay describing units of triangles or beans.
The word "quantities" in here is confusing. Return to "...11 to 19 into ten ones and some further ones". The clarification can stay describing units of triangles or beans.

Measurement and Data Standards Feedback

KY.K.MD.1 Describe measurable attributes (length, height, weight, width, depth) of an object or a set of objects using appropriate vocabulary.

Response

students should know the basis of the vocabulary but need to work on, at this age, a solid foundation of numbers
using appropriate mathematical vocabulary
Change to "appropriate mathematical vocabulary"
take out depth for kindergarten
What is the appropriate vocabulary?
Provide examples/clarification statement for depth

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
how to describe the difference - in general language? not sure - are they measuring with a tool here? unclear
Make wording as simple as the example.

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
Add "count the number of objects in each category"
remove "and sort." The language is redundant as this is what "classify" means. And "sort the categories by count"
Remove people. That's not necessary. You could state objects within an environment (living or non-living) but why are we labeling people? It's too subjective.
"classify" means to sort, so this language is redundant.
20
This standard should have a boundary not including sorting attributes of people. Only keep this to objects that can easily be measurable with quantities.
Add "count the number of objects in each category"
Add graphing back-used to be in standards.
Add "count the number of objects in each category"

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

Response
Remove. If not all of this standard, at least remove "penny."
Remove penny as it's no longer within the coin system and not used in money anymore.
Remove totally. If not totally, then remove "penny."
And know value of each
no pennies anymore How are you dealing with all the different quarters?
no longer making the penny, how should this be addressed???
may need to take penny out of 4 coins
remove "penny"
The penny is no longer in circulation, it should be removed from standards.
Due to the updated information on the penny, perhaps it should be removed from the standard and add in the paper bills for \$1, \$5, \$10, and \$20
And value
Money identification is not needed in the math standards. Recognizing and identifying coins by name should be moved to the social studies standards because denominations of money are a cultural element not a mathematical one.
May want to remove penny if we are not going to be using them anymore.
remove. this is not necessary as a standard. And, the penny is going away.
not needed.

Geometry Standards Feedback

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

Response
"use shape names to describe objects in the environment."
two dimensional and three dimensional?
In clarifications discuss right and left.

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

Response
This seems to be more of a ELA standard - Prepositions

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

Response
which - 2D or 3D or both

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

Response
separate 2D and 3D
shapes are not three-dimensional; solids are. change to "identify objects as two or three dimensional."
Kindergarten may be the first time students are learning shapes, it seems like a lot to ask of 5 year old's to differentiate between two or three - dimensional shapes.
is this really necessary? there is already so much Identify and Name happening in K...Need more time on numeracy

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

Response
include the word "analyze" which means to identify the important parts/attributes
separate 2D and 3D shapes
within a category? like 2D compared to 2D? etc.
Provide necessary vocabulary as the variety of vocabulary used can make this a hard standard to obtain and assess.
Geometry is one of the lowest sets of "test data" across the state. Students are struggling to know the basics for math, multiplication facts, division, patterns, but yet in 4th grade we asking students to know all the attributes to 2d and 3d shapes.
keep as 2-D?

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

Response
Components need clarified.
term "components" isn't clear
This should only be limited to 2D shapes. 3D shapes could be difficult for kindergarteners to draw real-world. Modeling shapes, yes.
Take it out. It is not age appropriate.

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
In clarifications, name the strategies in which students should be
First of all, students in first grade can't read fluently. Secondly, they should be focused on the basics of story problems. Comparing problems and unknowns in all positions are too much.
When introducing this standard, maybe just introduce the concepts of adding to, taking away, etc, then bring in the unknown positions. Last part could be a separate standard.

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
This standard could be okay, but the word problems, again, are an issue.

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

Response
Add property examples to clarifications. As it is, the words "not responsible for knowing" and "need not use" open up the door for teachers to use phrases like "flip-flop property" or other phrases that will be confusing as students learn the formal vocab
In clarifications, name the strategies students should be using.
In clarifications, name specific strategies that come from these properties. Namely, compensation, pretend-a-ten, and make-a-ten.
Currently, the Clarification for KY.1.OA.3 reads "Students are not responsible for knowing the formal language of the different properties, but have the conceptual understanding of each property (commutative and associative property)." This should be ch
Currently, the Clarification for KY.1.OA.3 reads "Students are not responsible for knowing the formal language of the different properties, but have the conceptual understanding of each property (commutative and associative property)." This should be ch
students need to know the why befor
Teachers are encouraged to use the formal mathematical language. Students need conceptual understanding.

Clarification: Teachers need to use formal mathematical language for the properties. Students need to have conceptual understanding of the properties.
Clarification: teachers should model formal language for student
Teachers need to use the formal mathematical language. Students need to have the conceptual understanding of the property.
Students should have conceptual understanding of the properties. Teachers should be encouraged to use the formal language in order to model, but not require students to use the language.
can you insert strategies by name like with the within 20 standard?
Students should have conceptual understanding of the properties. Teachers should be encouraged to use the formal language in order to model, but not require students to use the language.

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

Response
Use a more measurable verb than understand - explain, describe, relate
This is an unnecessary standard. If students can apply properties of operations to add and subtract, then they understand subtraction.
This should all be hands on in the classroom
Students understand that subtraction can be thought of as having an unknown addend.
Understand that subtraction can be thought of as having an unknown addend.
understand that subtraction can be thought of as having an unknown addend
Understand that subtraction can be thought of as having an unknown-addend.
Understand that subtraction can be thought of as having an unknown-addend. Use a more measurable verb than understand - explain, describe, relate
Understand that subtraction can be thought of as having an unknown-addend.
this sounds like they just need to write it as an equation and not necessarily that they will understand it.
Understand that subtraction can be thought of as having an unknown-addend. Use a more measurable verb than understand - explain, describe, relate

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

Response
Relate counting strategies (counting on, counting back, counting all).
Relate counting strategies (counting on, counting back, etc)
Change to "relate counting strategies (counting on, counting all, counting back) to addition and subtraction.

Change to "relate counting strategies (counting on, counting all, counting back) to addition and subtraction.

Change to "relate counting strategies (counting on, counting all, counting back) to addition and subtraction.

Relate counting strategies (counting on, counting back, counting all).

Relate counting strategies (counting on, counting back, counting all).

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

Response

Fluently add and subtract within 10 without materials.

Demonstrate automaticity...

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

The first sentence is redundant of KY.1.OA.6.a - Add and subtract within 20 using strategies such as...

collapse the 1.OA.6a, 1.OA.6b into one 1.OA.6 standard

Seems redundant - KY.1.OA.6 already states add and subtract within 20 with the clarification of KY.1.OA.6 a. to fluently add and subtract within 10 and KY.1.OA.3 that states to use properties of operations as a strategy to add and subtract.

some of the phrases here are confusing like the last one.

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

Response

A similar standard needs to be added to second grade. When students get to third, they really struggle with this skill.

Understand the meaning of the equal sign by creating a balance of addition and or subtraction equations, determining if both sides are equal or not equal.

Understand the meaning of the equal sign to mean balance, and determine if equations involving addition and subtraction are true or false

Number and Operations in Base Ten Standards Feedback

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

Response

This is an unnecessary standard. If students can apply properties of operations to add and subtract, then they understand the relationship between three whole numbers.

Before finding an unknown students need to know the basis of why they are adding/subtracting with 2 parts. If they don't understand the process, they will not understand an unknown

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

Response

add "within 120" for clarity?

Add a part c. Count by 5's from 0 - 60. Rational - students are supposed to count by 5's for reading a clock at grade 2 (KY.2.MD.7) and there is no where in our standards we teach counting by 5's.

The value of 120 is not consistent with the Grade 1 Overview page as it mentions only 100.

The value of 120 is not consistent with the Grade 1 Overview page as it mentions only 100.

The value of 120 is not consistent with the Grade 1 Overview page as it mentions only 100.

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

Response

This is inconsistent with the overview page, which only mentions 100 for 1st grade

I think 100 is more appropriate for first grade.

Count forward to and backward from 120 by ones and by tens, starting at any number less than 120

The overview page does not match OV page says 100 and this is 120.

The value of 120 is not consistent with the Grade 1 Overview page as it mentions only 100.

The value of 120 is not consistent with the Grade 1 Overview page as it mentions only 100.

KY.1.NBT.1.b In this range, read and write numerals and represent a number of objects with a written numeral.

Response
I think 100 is more appropriate for first grade.
In this range (0-120)
Change to "In this range (0-120)..."
Change to "in this range (0-120)"
Range should be noted as 0-120

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
add an image of "bundles"/sticks" to show a bundle of 10 ones. Rational - teachers are doing bundles and sticks in K and this needs to wait until Grade 1 according to this standard. An image would reinforce this concept.
Change two-digit number to two digit numeral.
Change to "two-digit numeral"
Change to "two-digit numeral"
Change to "two-digit numeral"
Understand the two-digits of a two-digit numeral
Understand the two-digits of a two-digit numeral
Understand the two-digits of a two-digit numeral

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

Response
bullets instead of parts

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
bullets instead of parts

KY.1.NBT.2.c The numbers 10, 20, 30, 40, 50, 60, 70, 80, 90 refer to one, two, three, four, five, six, seven, eight or nine tens (and 0 ones).

Response
bullets instead of parts

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
Is greater than, less than and equal symbols introduced in any previous standards for 1st grade in Numbers and Operations? Students need to connect and understand the symbols significance before comparing with these symbols.

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
There is no need to have this standard decomposed. It can be one standard. Also, clarify which strategies should be included.
This standard pushes teachers to use standard algorithm way to early. Adding to the clarifications or the standard how this should be done could improve student learning.

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
Collapse 1.NBT. 4a and 1.NBT.4b into one standard 1.NBT.4
could the middle two bullets be more specific. what are the strategies? These two phrases show up alot but most people don't know what would be on either list.

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
Add clarification
I don't think regrouping is appropriate for first grade.
Standard needs added clarification
Standard needs to add clarification.
Need to add more clarification
If students are able to demonstrate their ability, why do they also need to explain?
Standard needs added clarification
Wording sounds confusing (one adds tens and tens?) Remove the word "one"
take out and sometimes necessary to compose a ten. 2 digit work for first grade should focus on unitizing the ten for 2 digit #'s, adding multiples of 10, or adding ones. No regrouping of tens when were are just learning to unitize a ten.
Standard needs added clarification

KY.1.NBT.5 Given a two-digit number, mentally find 10 more or 10 less than the number, without having to count; explain the reasoning used.

Response
The clarification does not match the use of the word "mentally" in the standard. If using materials, then they are not doing it mentally.
Remove the word "mentally"
Remove the word "mentally"

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
remove first "in the range of 10-90" in this statement
Take out the first "in the range of 10-90 in this statement.

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
Remove properties of operations as this can not be used with subtraction (can't use commutativity with subtraction)
Collapse these standards into one 1.NBT.6 standard
Remove the properties of operations as commutative does not work.
Remove "properties of operations" (can't use commutativity with subtraction)
Remove "properties of operations"

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

Response
Unnecessary standard
If 1st grade students are able to show understanding, why are they also being asked to explain?
What written method? Needs to be more specific
Name strategies that need to be taught based on the standard.
Take away the explanation

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
Specify certain lengths and objects not subjective to a program.

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

Response
Developmentally 1st graders may not be ready to assign a value of more than one to a coin. Students must understand that a ten represents 1 ten or tens ones before this standard can be understood.
Please specify the money used within this.
remove part b of this standard. The 2nd grade standard is more than sufficient in preparing students to be proficient in this skill.
Emphasis on money should be reduced and/or moved to social studies. Reduced emphasis on the penny as it will be nearly phased out before the next revision cycle
See comments below
Move standard to 2nd grade

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

Response
remove analog clocks no conceptual understanding with it.
Would like to see analog clocks removed at this level
Would like to see analog clocks removed at this level
Add AM and PM

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

Response
remove penny since it has been removed from circulation?
remove
Identify the coins by values and count pennies, nickels, dimes, and quarters to 100.
Remove penny as they are no longer made.
Remove this standard.
remove penny
Remove "penny"

Remove
Because the penny is no longer in circulation, students shouldn't be asked to identify a penny or it's value.
remove penny - add bills
Coin identification is not inherently mathematical and should be moved to Social Studies. Penny should be de-emphasized because it will be phased out before the next standards revision.
Add identifying coin by name (not always mastered in K)
Move to 2nd

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

Response
Guidelines on what questions that they could be asking

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

Response
Specify strategies and data examples that need to be taught.
Determine a strategy

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

Response
organize, revise and represent data.
Change to "Organize, represent, and label data in a table/chart with up to three categories.

Geometry Standards Feedback

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

Response

Remove drawing as this can be a difficulty with fine motor skills and not knowing the standard itself and stick to just building the shapes to possess defining attributes.

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
Unnecessary standard
Too wordy

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
emphasize "equal"
Please bold "equal shares"
No quarters, only fourths. Save for 2nd grade.
Move to 2nd

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
Make it less wordy
Students are struggling with word problems all the way through school. Students need to know how to fully break apart word problems prior to moving into 2 step problems
Too wordy: and does this stand that has words that expire such as adding to, taking from, putting together, etc
Include the standard algorithm as a strategy.

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

Response
100
Why are we limiting students to only using mental strategies? Students should be able to use whatever strategy works for them.

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
I don't think it should stop at 20, maybe 100.
Needs to determine objects even or odd to 100 to help with 3rd grade standard 3.OA.9 OR add a standard to 3rd about odd and even to 100.
The wording could be simplified

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
Use term repeated addition, add a standard about other ways to show repeated addition
Introduce the idea that these equations could also be expressed as multiplication.

Number and Operations in Base Ten Standards Feedback

KY.2.NBT.1.b The numbers 100, 200, 300, 400, 500, 600, 700, 800, 900 refer to one, two, three, four, five, six, seven, eight, or nine hundreds (and 0 tens and 0 ones).

Response
This standards could be specific to a program

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

Response
"from any number within the count sequence"
Add skip counting sequences for numbers 1-10 with visual models (number line, etc) as skip counting skills are necessary for developing more efficient strategies for multiplication fluency. Not enough time in 3rd to develop skip counting w/ understanding

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

Response
Change the wording from base-ten numerals to standard form

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
I think this should be a third grade standard. 2nd should be mentally fluent to 20. 3rd should be mentally fluent to 100. If it's not mental, this standard is redundant due to 2.NBT.7
Limiting students to certain strategies versus allowing them to utilize standard algorithm as a "place value strategy" seems to be counterproductive.
Additional support in 1st grade for place value
Include the standard algorithm as a strategy.

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

Response
Allow students to utilize standard algorithm
Include standard algorithm as a strategy.

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

Response
Add and subtract within 1000 with and without regrouping.
Allow students to utilize standard algorithm
Include standard algorithm as a strategy.
Using models, strategies, properties or relationships

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
Collapse into one 2.NBT.7 standard

Standard algorithm should be used as a strategy after introducing concrete models or drawings such as base ten blocks.
Allow students to use standard algorithm
Expression is a hard concept at a second grade level
Include standard algorithm as a strategy.

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
The vocabulary "one" could be confusing to a new teacher
Include standard algorithm as a strategy.

KY.2.NBT.8 Mentally add 10 or 100 to a given number 100–900 and mentally subtract 10 or 100 from a given number 100–900.

Response
Add skip counting in clarifications

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

Response
A deeper understanding of fact families

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

Meter sticks should be taken away, this is not a typical way that we measure in the US.

KY.2.MD.2 Measure the length of an object twice, using length units of different lengths for the two measurements; describe how the two measurements relate to the size of the unit chosen.

Response

Too wordy and confusing

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

Response

Meters should be taken away, this is not a typical way that we measure in the US.

Doesn't seem to be a necessary standard

Move to 3rd

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

Metric should be taken away, this is not a typical way that we measure in the US.

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

I think this should be an OA standard.

Need more emphasis on number lines in second grade. This standard is very surface level and number lines are SO IMPORTANT for so much math in future grades (adding/subtraction, x and /, fractions, decimals, etc.)

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
The wording is not clear. I think it would be more clear to put both of the parenthetical clarifications together at the end, and then continue to reiterate that dollars and cents are not used together in the clarifications.
Add language to clarify time and money.
Count coins together - pennies, nickels, dimes, and quarters.
Add - Identify coins and their values.
No need for use of cents symbol as the symbol is not used in real world applications any longer. Students will so rarely encounter the cents symbol in real life. The focus should be only on using the dollar sign in real world application.
Solve word problems involving money with adding or subtracting within 100...

KY.2.MD.9 Investigate questions involving measurements

Response
Specify what "investigate" entails for this age group.

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

Response
Remove "statistical" from root of standard. Students at this age are neither computing summaries (descriptive statistics) or making inferences (analytical statistics).
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
I think students should just have to SOLVE questions by analyzing graphing data.
Specify what those types of questions should start with (sentence starters).
I'm not sure exactly what this should say, but this is really vague.

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

revise "dot plot" to "line plot" which is more correct.

No dot plots.

revise to say "line plot" instead of "dot plot"

Dot plots seem useless...

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

Maybe revise this to say "number of categories students are able to complete or build upon"

Geometry Standards Feedback

KY.2.G.1 Recognize and draw shapes having specified attributes, such as a given number of angles or sides. Identify triangles, quadrilaterals, pentagons, hexagons and cubes (identify number of faces).

Response

Use build or "compose" instead of drawing due to fine motor challenges to truly assess the standard and not fine motor ability.

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

Partition rectangles in various ways...helps with comparing/equivalent fractions later on.
--

3rd Grade Standards Feedback

Operations and Algebraic Thinking Standards Feedback

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

Response
what does "demonstrate" mean?
what does it mean to "demonstrate?"

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

Response
What does "demonstrate" mean?
What does "demonstrate" mean?

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

Response
Seems redundant to KY.3.OA.6

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

Response
The associative and distributive property are not developmentally appropriate for 3rd grade students. Every year most never understand or learn how to do either of these standards.
I think assessing specific properties and strategies is unnecessary. We should teach specific properties as strategies, but assessing students on strategies is unnecessary.
The Clarification for KY. 3.OA.5 reads "Students need not use formal terms for these properties." This should be changed to require the formal vocabulary to be taught. As it is, the words "not responsible for knowing" and "need not use" open up the door
The Clarification for KY. 3.OA.5 reads "Students need not use formal terms for these properties." This should be changed to require the formal vocabulary to be taught. As it is, the words "not responsible for knowing" and "need not use" open up the door

How do you use properties to divide? What are they? I know I can use partial quotients, but what are the properties?

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

Response

This should be a fourth grade standard. We don't teach factors/multiples in third.

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

Lacking clarity. Are we talking facts up to 10×10 or is 13×6 considered something that students need to fluently solve. Same for division. Basic Facts or also like $84/4$ for example??

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

2 step problems are not developmentally appropriate. I have taught 2nd and 3rd grade for over 12 year and only a small percentage of students ever master this

Does this standard mean for a "letter for the unknown quantity" as in a variable? Or should this be a symbol or question mark? Students should be able to estimate their answers and briefly know how to round at this stage.

If plan to use other mental Computation strategies, can you be more specific? What strategies besides rounding?

This is a lot covered under one standard. I think assessing the reasonableness of answers using estimation strategies should be a standard on its own.

Take away the equations. Students should just need to solve the problem

I would remove "and estimation strategies including rounding." Most 3rd grade students are not able to think so flexibly. This could be introduced as an idea, but students should not be expected to master.

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

Response

I think this should be treated as a strategy/tool.
Do not limit students to only explaining patterns using properties of operations. Noticing that the 4's column is increasing by 4 each time in a multiplication table is a pattern.
As mentioned in second grade, need something about odd- and even to 100, as many patterns are focusing on odd/even products and sums within 100.
Too vague, needs more specific

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
Rounding is not developmentally appropriate for 3rd grade students.
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.
We need a Place Value standards similar to second and fourth where we are recognizing and naming numbers. Maybe to 10,000 or 100,000?
This standard should include a focus on reasonable estimation rather than just a focus on rounding up or down to the nearest 10 or 100.
Use place value understanding, including position on a number lines, to round whole numbers to the nearest 10 or 100.

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
Fluently add and subtract within 10000 using strategies and algorithms based on place value, properties of operations and/or the relationship between addition and subtraction
Allow students to use standard algorithm
clarity--what do you mean by "algorithms?"
algorithms? The standard algorithm? Needs to be more specific as there is much confusion on this.
Should be forced to learn multiple strategies. Leave it up to the teachers which to use with students to help them learn best. Dont test on multiple strategies when they find one they like are are successful with. This is not fair to the student.
just strategies -take out algorithms

Place value understanding supports fluent operations, but expecting students to move from thousands to millions in 4th grade is unrealistic. It does not align with developmental readiness, available instructional time, or deep conceptual learning.

Place value understanding supports fluent operations, but expecting students to move from thousands to millions in 4th grade is unrealistic. It does not align with developmental readiness, available instructional time, or deep conceptual learning.

Or keep as is and make sure trainers are aware that the standard says ALGORITHMS based on place value...

Place value understanding supports fluent operations, but expecting students to move from thousands to millions in 4th grade is unrealistic. It does not align with developmental readiness, available instructional time, or deep conceptual learning.

KY.3.NBT.3 Multiply one-digit whole numbers by multiples of 10 in the range of 10–90 using strategies based on place value and properties of operations.

Response

Make a part of KY.3.OA.9 - Pattern in a multiplication table

Should not be forced to learn multiple strategies and then tested on them. Teach them the skill of multiplication, but leave the method up to the teacher. If you want a specific method taught, then specify that instead of leaving it as strategies.

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

Include numerator and denominator

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

Wording is confusing, keep clarifications

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
Wording is confusing, keep clarifications
clarity-- are we talking fractions less than or equal to one? or fractions greater than one included? mixed number or improper fraction?
Make the wording more user friendly

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

Response
They are just learning about fractions and usually cannot reason about the size.
This standard should also be where it is introduced to students that just because a fraction is the same size or is partitioned in the same way, that doesn't mean the denominator will
I am not sure what "in special cases" refers to.

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
This standard or the previous one should be where it is introduced to students that just because a fraction is the same size, doesn't mean all fractions will have the same denominator. Different denominators for equivalency should be introduced too.

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

Response
They are just learning about fractions and usually cannot generate equivalent fractions correctly.

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

Response

Either include with this standard or add a new standard specific to mixed numbers. Our current standards do not include mixed numbers, yet we expect students to understand mixed numbers when it is time to measure lengths to the nearest $\frac{1}{4}$ inch.

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

Again they are just learning about fractions and it's hard for them to compare fractions without pictures. If the standard is just about comparing with pictures they can do that.

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

Students just learn how to tell time to the nearest minute, and it's hard for them to understand how to find elapsed time.

Students are expected to learn at least 4 scenarios for elapsed time and only a small percentage master this. Maybe, change to elapsed time when the start and end time are both known. Move finding start time and finding end time to 4th

Students are just learning to tell time to the nearest minute, they should not be finding elapsed time across the hour until they have mastered finding the time and finding elapsed time in the hour.

Take out measuring elapsed time in third grade. move to fourth

Telling time to the minute and measuring elapsed time should be separate standards to ensure that proper focus to elapsed time is given.

KY.3.MD.2 Measure and solve problems involving mass and liquid volume.

Response

Why do we learn metric system when we use inches, feet, yards. Students don't understand the real world value of liters and kL. Let's teach the units we use in the real world.

should not be doing mass and liquid at this age.

Move to 4th or 5th

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

Same as above. We need to be teaching the units we use (cups, pounds, inches, etc) so students see the real world value.

should not be doing mass and liquid at this age.

This is a reasonable standard, but not a lot of third graders know how to estimate measurements in grams, kilograms or liters without first learning how to measure them outside of knowing pounds (lbs).

remove "and estimate"

KY.3.MD.2.b Add, subtract, multiply, or divide to solve one-step word problems involving masses or volumes that are given in the same units.

Response

Not real world...change metrics

Relates to KY.3.OA.8 - Redundant

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

Response

Define what investigate that this grade level means.

Revise and simplify the wording of the standard

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

Response

They have a hard time being able to create questions.
Remove "statistical" from the root.
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."
I think the wording is confusing.
Provide examples of questions/sentence starters that are grade-level appropriate.
Revise and simplify the wording of the standard

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
Creating a bar or pictograph from scratch is very difficult for students to complete.

KY.3.MD.4 Investigate questions involving numerical data.

Response
I think the wording is confusing.
Define what investigate that this grade level means.
Include more specific wording/vocabulary

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

Response
They have a hard time being able to create questions.
Remove "statistical" from the root.
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."
Provide examples of questions/sentence starters that are grade-level appropriate.
Include more specific wording/vocabulary

KY.3.MD.4.b Generate measurement data by measuring lengths using rulers marked with halves and fourths of an inch.

Response
There are no standards about fractions as mixed numbers, and then they're measuring with fractions as mixed numbers...very confusing. Moved to fourth grade or add a standard about fractions as mixed numbers

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
Why is this called a dot plot? It has always been called a line plot
Get rid of dot plots!
Revise "dot plot" to "line plot"
same as above
When did this change from "line plot?"
Dot plot or line plot

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
remove

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

Response
Reword this standard more like 5.MD.3. The information that is in parts a and b of 5.MD.3 (units and no gaps or overlaps) is included in the clarifications here in 3.MD.5 but the coherence would be more cohesive if written like 5.MD.3

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

Response
Confuses students when you move from counting each unit square to multiplying length by width

KY.3.MD.7.a Find the area of a rectangle with whole-number side lengths by tiling it and show the area is the same as would be found by multiplying the side lengths.

Response
Make multiplying length by width the only strategy to find area

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
They do not understand the distributive property to be able to do this.
This standard is more advanced than the fourth grade standard MD.3. This mixes algebraic equations with measurement/data and ability to reason, which is a struggle in itself as a third grade student.
Make more user friendly

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
They have a hard time decomposing the shapes into smaller ones.
move to 4th grade.
Be more specific
Make more user friendly

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

Response
Be more specific, what does this include? composite shapes? polygons? rectangles?

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

Response
They just learn how to find the area and perimeter, but not enough to understand how to relate the two.
Why?
Compose or build rather than draw to avoid fine motor concerns hindering showing mastery of skill.
make standard less complicated for 3rd graders or move to 4th

Geometry Standards Feedback

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

Response
Clarify the understanding of what attributes determine a category and which do not.

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

Response
remove

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
We need the definition of a trapezoid. Exclusive or inclusive. Please define in the standards.
Provide some clarity about parallelograms, trapezoids, etc.. Could be in the images of the standards.

KY.3.G.1.c Identify shapes that do not belong to a given category or subcategory.

Response
Identify them as what? What shapes are we talking about?

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

The intent of this standard is unclear and presents unnecessary conceptual complexity at the grade level.

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

The Red

Students should be assessed on whether they can solve the word problem or not. They should be asked to do this in a way they choose, not assessed on which strategy they used to get the answer. This forces them to have to learn all the methods.

Different wording, maybe: Students will solve word problems involving multiplicative comparisons using multiplication or division, drawings, and equations with an unknown. Distinguish multiplicative comparisons from additive comparisons.

*KY.4.OA.3 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

I like reverting this back to the original standard language from the CCSS. However, this standard previously had pulled the information about the conventional order from KY.3.OA.8 and that piece will be lost with the omission of it here.

If the numbers are whole, why are there remainders? This is all very wordy and bulky, it's not simply stated.

At this age, multi-step word problems are something that students are still struggling with. There needs to be more practice with each operation before moving ahead. Fractions and Long division should be something towards the end of 4th grade.

This standard is too much in one cluster. Again, is it a letter for unknown quantity or variable? Also, in previous grades, students have not been reviewed on remainders. This standard should be used later on, potentially after learning factors.

Make separate standards

take off estimation strategies.

This can be presented as a word problem OR an order of operations question. It is tricky for students.

Take away "including remainders"

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

Response

Should this be within a range of values?

Number and Operations in Base Ten Standards

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

Response

Should this be 3rd grade? They work on similar skills in 2nd, none in 3rd, then again in 4th

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

Response

Should this be 3rd grade? They work on similar skills in 2nd, none in 3rd, then again in 4th

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

Should this be 3rd grade? They work on similar skills in 2nd, none in 3rd, then again in 4th

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

Response
This is hard for students because it can be rounding from the tens place to millions. It would be nice to not have to teach so many different levels of rounding.
Use place value understanding including number lines to round multi- digit numbers to any place.

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

Response
Clarification includes a model when talking about strategies and algorithms. It seems like this is showing the progression from model > strategy > algorithm, but the way it is arranged could be misunderstood to see the model as a strategy.
KY.4.NBT.4 Clarification includes a model when talking about strategies and algorithms. It seems like this is showing the progression from model > strategy > algorithm, but the way it is arranged could be misunderstood to see the model as a strategy, whic
KY.4.NBT.4 Clarification includes a model when talking about strategies and algorithms. It seems like this is showing the progression from model > strategy > algorithm, but the way it is arranged could be misunderstood to see the model as a strategy, whic
This is a huge jump from third grade where they only go to 1,000. Maybe to 100,000 or 10,000?

*KY.4.NBT.5 Multiply whole numbers Up to four-digit number by a one-digit number Two-digit number by two-digit number Multiply using strategies based on place value and the properties of operations. Explain the reasoning using representations such as equations, rectangular arrays, or area models.

Response
Multiply whole numbers using strategies based on place value and the properties of operations. a. Up to... b. Two-digit... c. Explain the reasoning...
This is a 5th grade standard?
Students DO NOT know their multiplication facts. Learning multiplication facts prior to moving into multi digit multiplication.
Students should also be able to not only explain their reasoning, but be able to demonstrate their understanding in different ways not just by one or two methods.
separate standards
should not be forced to use and learn all these strategies. Just ask them to multiply. Do not dictate how. Leave that to the teachers as tools not forced and tested.

Too many strategies are expected to be known by the students. There isn't enough time in class to fully teach all of the strategies that may be seen and/or used.

Simply let students multiply with their chosen strategy. Teach standard algorithm first (4th grade), then other strategies as needed for those that struggle with standard algorithm.

***KY.4.NBT.6** Divide up to four-digit dividends by one-digit divisors. Find whole number quotients and remainders using strategies based on place value the properties of operations the relationship between multiplication and division Explain the reasoning using representations such as equations, rectangular arrays, or area models.

Response
Again, 5th grade standard
Students should not be doing long division at this stage. We need a clear basis on multiplication and why it works how it works. If students do not their multiplication facts this makes it 10 times harder than what it needs to be.
Students should also be able to not only explain their reasoning, but be able to demonstrate their understanding in different ways not just by one or two methods.
should not be forced to use and learn all the strategies, just test on the basic skill, can you divide four digit dividends by one digit divisors...with remainders
Too many strategies are expected to be known by the students. There isn't enough time in class to fully teach all of the strategies that may be seen and/or used.
Simply let students multiply with their chosen strategy. Teach standard algorithm first (4th grade), then other strategies as needed for those that struggle with standard 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
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
Explain why a fraction $\frac{a}{b}$ is also equivalent to $\frac{a}{b}$ divided by n / b divided by n
Collapse into one 4.NF.1 standard

add: using area models, drawings, and/or (mxa) / (nxb)

KY.4.NF.3.b Decomposing a fraction into a sum of fractions with the same denominator in more than one way, recording each decomposition by an equation. Justify decompositions.

Response

This feels repetitive of 4.NF.3 (the overall standard). Could this be moved to the clarification side?

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

Response

This should not be a 4th grade standard- need to understand like fractions first

Students also need to be able to demonstrate their understanding through differing and preferred methods here.

Use language such as "by using reasoning strategies, such as counting up on a number line or creating visual fraction models" as in the fifth grade standard.

Is it possible to add clarification on regrouping? Regardless of having like denominators, can they learn the basics of regrouping fractions as they learn the basics of finding common denominators?

Specify whether it needs regrouping or not

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

Response

This should not be a 4th grade standard- need to understand like fractions first

KY.4.NF.5 Convert and add fractions with denominators of 10 and 100.

Response

I prefer express as opposed to convert.

"convert" is unclear. Replace with "express a fraction with a denominator of 10 as an equivalent fraction with denominator 100."

KY.4.NF.5.a Convert a fraction with a denominator of 10 to an equivalent fraction with a denominator of 100.

Response
I prefer express as opposed to convert.
This should not be a 4th grade standard- need to understand like fractions first

KY.4.NF.6 Use decimal notation for fractions with denominators 10 or 100.

Response
This should not be a 4th grade standard- need to understand like fractions first

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
Change "metric system, U.S. standard system and time" to "(km, m, cm; g, lb, oz; l, ml; hr, min sec)" or add to clarifications to specify that both systems need to be emphasized
By saying "within one system of units" it may be interpreted that you only need to focus on either the Metric System or US System. It needs to be clearly stated that both are required.
By saying "within one system of units" it may be interpreted that you only need to focus on either the Metric System or US System. It needs to be clearly stated that both are required.
This sh
This should be a third graders standard introduced when they start learning about different types of measurements.
Can 4th grade learn US standard (customary) and 5th grade learn metric, since it pairs with powers of 10? I know the 5th grade standard extends some, but separating them completely feel clearer and less complex.
Too many measurements to know

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

Response
Too many measurements to know

KY.4.MD.2 Use the four operations to solve word problems involving distances, intervals of time, liquid volumes, masses of objects and money.

Response
Too many measurements to know

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

Response
The inclusion of whole number and "or" in here might lead people to inadvertently never introduce problems with fractions or decimals.
Should 4th grade be given problems with fractions and decimals? That feels like an added layer of teaching that is taught later to them in 5th grade.

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

Response
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.
Use dot plots or line plots...

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

Response
With this standard being repeated through the elementary grades, it might be helpful to add a continuum as an appendix about the expectations of each grade level so that the learning builds.
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.
Examples or grade-level appropriate sentence starters.

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
no
revise "dot plot" to "line plot"
Make a dot plots or line plot....

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

Response
No more dot plots.
revise "dot plot" to "line plot"
....ingot plots or line plots.

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
"Larger world" instead of real-world. The applications are just as real in the classroom as they are outside of it. Students can use this math at any point in their lives, especially angles.

Geometry Standards Feedback

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

Response
It is fixed here, but in the current document there is a typo. "...or the presence of absence of angles of a specified size"
Provide some clarity about parallelograms, trapezoids, etc.. Could be in the images of the standards.

5th Grade Standards Feedback

Operations and Algebraic Thinking Standards Feedback

*KY.5.OA.1 Evaluate expressions using the conventional order (Order of Operations) with and without parentheses, brackets, or braces in numerical expressions.

Response
As it stands, this will be the first grade where Order of Operations is a requirement in instruction. The 2019 clarifications specify the order of grouping symbols, but the use of the word or in the standard might lead to only one set of grouping symbols
remove "using the conventional order"
Needs a quantifier for how many steps can be in each expression.
Expressions cannot be evaluated because they don't have an equal sign. You can state to simplify but not evaluate or solve.
In clarification, describe the amount of terms. As written with use of "or", the expression could be as simple as 2 terms. Students would need to see multiple terms in order for students recognize the value of the grouping symbols beyond parenthesis.
Add language that describes the structure of expressions (eg. Break expressions into terms, making sense of praenthesis, brackets, or braces. Then evaluate...."
4th grade just touches on order of operations-
Students can use this method of Order of Operations, but there is no fixed set of steps that students need to follow under examples of solving like PEMDAS. Students should be introduced to all possible expressions they might see and new ways to solve.
How many operations/steps needs to be stated
2 separate - one to include parentheses, brackets, and braces

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?
What is simple? How many steps?

Number and Operations in Base Ten Standards Feedback

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

How are the powers of ten to be expressed? (using exponents or in standard form or both)

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

Response

Include a focus on estimation and not just rounding up or down based on a rule.

Can this be more specific like "round decimals to the nearest whole, tenth, hundredth, or thousandth"?

Use place value understanding and number lines...

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

Response

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

Add in the Clarifications some language to clarify when to introduce the use of symbols such as $()$ or $\cdot$ for multiplication. For example, when do you introduce the understanding of $(5)(3)$ or $5\cdot3$, in addition to 5×3 ?

Add in the Clarifications some language to clarify when to introduce the use of symbols such as $()$ or $\cdot$ for multiplication. For example, when do you introduce the understanding of $(5)(3)$ or $5\cdot3$, in addition to 5×3 ?

This is okay to teach with an algorithm, but the standard too can be used to have students explain how they solved their problems and justify why as well, not just follow a set of steps to get an answer.

It needs to be specific about what algorithms are used. I have noticed on past KSA released items that a question requires students to use a specific strategy (like the standard algorithm) and takes away their choice of how they solve the problem.

KY.5.NBT.6 Divide up to four-digit dividends by two-digit divisors.

Response

Include using an algorithm as the way to solve. It is used for multiplication so it should be for division as well.

Divide up to four-digit dividends by one-digit divisors and up to three-digit dividends by two-digit divisors.

It needs to be specific about what algorithms are used. I have noticed on past KSA released items that a question requires students to use a specific strategy (like the standard algorithm) and takes away their choice of how they solve the problem.

KY.5.NBT.6.a Find whole-number quotients of whole numbers with up to four-digit dividends and two-digit divisors using...strategies based on place value the properties of operations the relationship between multiplication and division

Response

This should be using the standard algorithm. They use multiple strategies up to now and like multiplication, it should be an algorithm.

This should be using the standard algorithm. They use multiple strategies up to now, it should be an algorithm.

It needs to be specific about what algorithms are used. I have noticed on past KSA released items that a question requires students to use a specific strategy (like the standard algorithm) and takes away their choice of how they solve the problem.

Simply let students divide with their chosen strategy. Teach standard algorithm first (4th grade), then other strategies as needed for those that struggle with standard algorithm.

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

Response

The and/or in there leaves this open to multiple ways students need to show. It is too many.

Should the language here be changed to match the changes in 4.NBT.4 and 4.NBT.5?

The and/or in there leaves this open to multiple ways students need to show.

It needs to be specific about what algorithms are used. I have noticed on past KSA released items that a question requires students to use a specific strategy (like the standard algorithm) and takes away their choice of how they solve the problem.

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

Response

Operations with decimals where the sum, difference, product, or quotient does not exceed the hundredths place. Please specify expectations for multiplication and division (products and quotients) with decimals.

Can we separate this? 5.NBT.7 (add and subtract...) 5.NBT.8 (multiply and divide...)

*KY.5.NBT.7.a Add, subtract, multiply and divide decimals to hundredths using: concrete models or drawings strategies based on estimation and place value properties of operations relationships between operations

Response
Remove divide decimals from this standard. Students do not have adequate experiences with decimals prior to 5th grade. Teaching students to add, subtract, and multiply decimals is challenging. Division with dec.great standard to be moved to middle school.
Rewrite to state “using one of the following strategies:”. If we’re teaching different ways then we should be allowing the proficiency to be shown in accordance to what is easiest for that student.
Collapse into one 5.NBT.7 standard
make separate standards
Yes, but same remark as above.
Let students calculate with standard algorithm and choose other strategies if needed
And correctly demonstrate appropriate calculator use with division

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

Response
Omit
Omit
Clarification on the written method

Numbers & Operations-Fractions Standards

*KY.5.NF.1 Add and subtract fractions with unlike denominators (including mixed numbers) by...using reasoning strategies, such as counting up on a number line or creating visual fraction models finding common denominators

Response
counting up is not an addition/subtraction strategy.

Rewrite to state “using one of the following strategies:”. If we’re teaching different ways then we should be allowing the proficiency to be shown in accordance to what is easiest for that student.

When does simplifying fractions come in? Is it a necessary 5th grade skill to teach?

Consider revising or adding a standard to 3rd grade in which students add and subtract fractions with like denominators.

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

Response

Does this also include mixed numbers?

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

Response

Be more specific. They multiply a fraction by a whole number in 4th grade, why is it again mentioned in 5th grade standards? Can the whole number portion be removed?

When does simplifying fractions come in? Is it a necessary 5th grade skill to teach?

KY.5.NF.4.a Interpret the product $(ab) \times q$ 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

Add to the clarifications an example of the first part of the standard in addition to what is already there. Ex. Explain the 2 parts of 4 partitioned into 3 pieces visually or otherwise.

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

Just so you know: nothing stops them from multiplying. They don't understand this standard very well because of it's heavy reasoning and opt to do what they already know, multiply across and compare.

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

Response
"Larger world"
I feel this could be a part of 5.NF.4

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
In the clarifications it says to use conversions in solving multi-step, real world problems. If this is the priority, it should be part of the standard language.
Convert within U.S. standard system ONLY. It's TOO MUCH and not realistic for most students' futures.
This is too many. Pick specific ones and focus on just those. If some are to be mastered in previous grades, eliminate them here.
Is the requirement that students be able to convert within metric AND US System, or just one of them. This is not clear. Also, when is the requirement to be able to convert between systems?
Is the requirement that students be able to convert within metric AND US System, or just one of them. This is not clear. Also, when is the requirement to be able to convert between systems?
This is too many. Pick specific ones and focus on just those.
As mentioned in 4th grade standards, can 5th grade only focus on the metric system?
Are we looking at straight conversion problems here or is this two-step problems as well? This is not specific.

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

change "dot plot" from "line plot"

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

revise "dot plot" to "line plot"

And line plot

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

Response

It seems like something is left out here. The CCSS says counting unit cubes, using cubic cm...

I think 5.MD.4 should include the formula stage of 5.MD.5. All volume standards are taught in tandem anyway, but for clarity purposes, I think formulas fit better here.

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

Response

I don't think this is necessary, maybe under the clarification?

KY.5.MD.5.a Find the volume of a right rectangular prism with whole-number side lengths by packing it with unit cubes and show that the volume is the same as would be found by multiplying the edge lengths, equivalently by multiplying the height by the area of the base. Represent threefold whole-number products as volumes.

Response

Should be a part of 5.MD.4

KY.5.MD.5.b Apply the formulas $V = l \times w \times h$ and $V = B \times h$ for rectangular prisms with whole-number edge lengths in the context of solving real world and mathematical problems.

Response

Should be a part of 5.MD.4

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
This needs to be a stand alone standard. Too many steps to keep under this umbrella.
This needs to be a stand alone standard. Too many steps to keep under this umbrella.
This should be the MEAT of the standard 5.MD.5.
Only focus on additive volume with ALL dimensions provided. Requiring students to also find missing side lengths creates excessive cognitive load. Learning progressions support starting with fully specified problems before increasing complexity.
Only focus on additive volume with ALL dimensions provided. Requiring students to also find missing side lengths creates excessive cognitive load. Learning progressions support starting with fully specified problems before increasing complexity.
Only focus on additive volume with ALL dimensions provided. Requiring students to also find missing side lengths creates excessive cognitive load. Learning progressions support starting with fully specified problems before increasing complexity.
Additive volume of compound figures should be moved to 6th grade because it is just 1st introduced in 5th and conceptual understanding should be the focus before extending to complex figures.

Geometry Standards Feedback

KY.5.G.1 Use a pair of 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
Is this first quadrant only? This is not specific.

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

Response
Provide some clarity about parallelograms, trapezoids, etc.. Could be in the images of the standards.

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
Two or more quantities
Add the language to say two or more quantities
Add language for two or more or stop requiring comparing more than 2 quantities.

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

Response
The wording of the standard isn't so much the issue. I would just like some clear directions in the
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.
Every ratio is a real-world example, so I would like specific clarification.

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
I don't feel like plotting the points from the table goes with the rest of this standard

KY.6.RP.3.b Solve rate problems including those involving unit pricing and constant speed.

Response
Use ratio/rate reasoning to solve...

Use ratio/rate reasoning to solve....

*KY.6.RP.3.c Find a percent of a quantity as a rate per 100 (e.g., 30% of a quantity means 30/100 times the quantity) and solve real-world problems given the percent and the whole.

Response
this would better align with 7th grade
Use ratio/rate reasoning and other strategies to find a percent of a quantity as a rate per 100. (eg. Add something either here or in the clarifications about different representations such as double number lines, tape diagrams, ten frames, five frames)
Find a percent of a quantity as a rate per 100 (e.g., (Add note to use multiple strategies to find percents such as double number lines or 10% frames))
Use ratio/rate reasoning and other strategies to find percent of a quantity as a rate per 100 (e.g., add something either here or in the clarifications about different representations such as double number lines, tape diagrams, etc.)
7th grade standards include all percent standards and this is not needed in 6th grade
Move to 7th grade standards.
This is more of a proportion question, and true proportions aren't truly introduced until 7th grade.
6th graders do not seem to have any concept of %. So asking them to find a percent of a quantity as a rate per 100 is asking too much. Then to ask them to apply that to real world problems is even more over their head.

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

Response
There is no need to specify converting units of measurement. The could be cut out as a standard because it is covered by the standard "KY.6.RP.3 Use ratio and rate reasoning to solve real-world and mathematical problems."
This standard is asking students to convert units but doesn't specific not all unit conversions are covered at this level. this is beyond a dok 3 for a new concept and is unrealistic at this level.
This make more sense under KY.7.RP.3c or KY.7.RP.1 than here. 6th grade students struggle enough with unit and equivalent unit rates, and 6th grade standards are predominately equivalent ratios, however in the 7th grade standards more applicable.
Make sure to add examples using different representations in the clarifications
make sure to add examples or in the clarification cell give examples of ratio reasoning
make sure to add examples using different representations in the clarifications
They learn this in 6th grade and then never use it again. This is an outdated standard and student should know the general measurements (1 foot=12 inches), but I feel this is more science related.
Move to 7th grade standards.

No revision, take out.

We don't usually use these measurements.

This is not applicable for our country when everything that our students will use in their daily life is in the customary units. We will be setting them up for many areas of confusion. This is also very complex and vague on the wording.

This is too complex for students that are just starting to think proportionally. If this is to be included, we should not expect middle school student to have any conversion formulas memorized.

Clarify expectations by explicitly stating that conversions are limited to within a measurement system (e.g., metric-to-metric or customary-to-customary).

The students do not know any of the conversions coming into 6th grade. So trying to teach them all the different units and how they are related takes way more time than we have.

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

Include an example of a visual fraction model in the clarifications

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

Response

Let's not make students divide multi-digit numbers by hand. Let's focus on having them understand the meaning of decimals, estimate values, etc.

Make clear when a calculator is appropriate

Let's not make students divide multi-digit numbers by hand. Let's focus on having them understand the meaning of decimals, estimate values, etc.

the word fluently is used incorrectly here because fluent would imply flexibility and there is one method here. Take off 'using an algorithm'. could say, 'using a strategy or an algorithm' or if algorithm is the goal, then remove the word 'fluently'

*KY.6.NS.2.a Convert a rational number to a decimal.

Response

Convert a rational number to a decimal using multiple strategies (e.g., equivalent fractions, benchmark fractions, division)

why is this added?

This should tie into proposed KY.6.RP.3.c above so that students move fluidly and understand relationship from decimal to fraction to percentage

Is this needed?
Convert a rational number to a decimal using multiple strategies (e.g. equivalent fractions of 10 and 100, benchmark fractions, division)
convert rational numbers to equivalent rational numbers using multiple strategies with demoninators of 10,100,1000 as well as using benchmark fractions
Convert a rational number to a decimal using multiple strategies (e.g., equivalent fractions of 10 and 100, benchmark fractions, division)
I believe this is very closely related to an 8th grade standard. Teaching equivalence $\frac{1}{2}=0.5$ is okay, but converting seems to be advanced for a 6th grader.
Should be a 7th grade standard as it originally was.
Convert a rational number to a decimal using multiple strategies (e.g., equivalent fractions of 10 and 100, benchmark fractions, division)
Change to "Convert a fraction to a decimal." In 6th grade, we refer to fractions as rational numbers. In 7th grade, we refer to rational numbers as +/- integers. While rational numbers are ALL of these things, let's get specific by grade level.
some rational numbers are decimals, so this reads odd. It is better than it was, but could read, "covert fractions and mixed numbers to decimal equivalencies'

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

Response
Remove. rational and irrational numbers are discussed more deeply in 8th grade more effectively. This isn't needed in 6th grade.
Is this needed?
students don't even learn the vocabulary for rational vs. irrational until 7th grade - "repeating decimals" should be eliminated
should be 7th grade.
Revise language into a child-friendly language and shows the importance
Is there a way to make the standard more precise or make it more of a child friendly language?
change "rational number" to "fraction"

KY.6.NS.3 Fluently add, subtract, multiply and divide multi-digit decimals using an algorithm for each operation.

Response
add "and and explain how place value determines the placement of the decimal point."
Fluently add, subtract, multiply and divide multi-digit decimals using an algorithm for each operation, and explain how place value determines the placement of the decimal point

add "and explain how place value determines the placement of the decimal point." to the end of the standard
Make clear when using a calculator is appropriate
add "and explain how place value determines the placement of the decimal point." to the end of the standard; Refer back to P.8 for meaning of "fluency" added to clarifications - not just speed
Until what place value, or digits.
if the goal is to master an algorithm here, remove the word fluently. Or, better, keep fluently and change wording to "Flexibly and efficiently add....." this is what Wisconsin, Washington, and many other states have been doing.

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
I have found that students understand distributive property better with variables. I would prefer to move this standard to the Algebra standards.
This should be eliminated. The language is confusing, and students do not need to do this until 8th grade or high school.
This should be eliminated. The language is confusing, and students do not need to do this until 8th grade or high school.
The should be focusing on distributing the variable instead of factors of 1-100. They should have already learned this in 4th and 5th grade.
Revise, the factoring that this is wanting us to do in 6th grade is what students are expected to know in 4th and 5th grade, we should be focusing on distributing the variable instead of factors of 1 - 100.
This should be moved to the grade level where they work on strategies to multiply whole numbers. In 6th grade, the focus is moving to an Algorithm, so this feels late.
Clarify the instructional intent by explicitly connecting this standard to factoring using the distributive property, and consider removing or revising the restriction to "whole numbers 1–100."
I am not sure how this relates to anything else we do in this unit.

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
change 'or' to 'and' on first line...horizontal AND vertical number lines. remove word 'diagram'. Find and position could be "name and locate" to be more precise.

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

Consider simplifying the wording or breaking the standard into two clearer statements: one focused on quadrant location and one focused on the relationship between numbers and their opposites.
--

KY.6.NS.7 Understand ordering and absolute value of rational numbers.

Response

absolute value isn't

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

Response

The wording is confusing. Please revise the language.

THIS NEEDS TO BE REWORDED, IT DOES NOT MAKE SENSE! PLEASE :)
--

This is worded in a confusing way. I think I know what it is asking for, but shouldn't I be sure?

what does distinguish mean?

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

Remove the second portion of this standard - Include use of coordinates and absolute value to find distances between points with the same first coordinate or the same second coordinate.

Finding distance on the coordinate plane is a step too far for most 6th graders. They are still learning to plot points in all four quadrants.
--

are there any problems that are not the 'include' type? If no, then this could read, "Solve ...problems involving distances between points....[what is written last] by graphing points on the coordinate plane.
--

Expressions & Equations Standards Feedback

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

Response

Could you remove 'Write' and still have the same standard? Is it write expressions to represent situations? this wording is confusing.

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

Response

Write and Evaluate expressionsassessing "read"???

In clarification: Note that a variable does not represent one specific, unknown number, but instead represents all possible values.

Add language to specify one, two, or multi-step expression

SIMPLIFY to write an single step expression.

Refer back to P.8 for meaning of "fluency" added to the standard and/or clarifications - fluency is not just speed

Why add the word "fluently" in there? Are we going to give students feedback on whether or not they are "fluent" in evaluating expressions? How will we measure that?

what is the word 'fluently' adding to this standard? is it about solving the expressions flexibly? Otherwise, fluently is not the correct word.

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

Response

Kids are capable of this standard, however I think 6th graders would benefit from focusing on rational number operations instead of an intro to algebra

KY.6.EE.2.b Identify parts of an expression using mathematical terms (sums, term, product, factor, quotient, coefficient); view one or more parts of an expression in a single entity.

Response

Again students are capable of learning this standard. I just believe time would be better spend mastering the other standards

*KY.6.EE.2.c Fluently 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
There is no benefit for the word "Fluently"
more concise.
Consider simplifying the wording by separating the evaluation of expressions from the explanation of order of operations, or moving the Order of Operations clarification to a clarification statement rather than the core standard.U
Refer back to P.8 for meaning of "fluency" added to the standard and/or clarifications - fluency is not just speed
Why add the word "fluently" in there? Are we going to give students feedback on whether or not they are "fluent" in evaluating expressions? How will we measure that?
This isn't appropriate for 6th graders
same comment as above. there are other ways this statement could be improved. remove the double use of 'include.' And order of operations should be its own letter (d)

KY.6.EE.3 Apply the properties of operations to generate equivalent expressions.

Response
Which properties are we supposed to be teaching?
Which property are you wanting students to focus on?
Do we need to add what specific properties we are referring to?

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

Add example to clarifications: the expressions $y + y + y$ and $3y$ are equivalent because they name the same number regardless of which number y stands for

I don't think these standards are needed in 6th grade.

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

I would cut the algebra unit completely

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

I am not a fan of including the term "solving" when applied to expressions.

I would cut the algebra unit completely

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

include subtraction and division

I would cut the algebra unit completely

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
Sometimes the assessment of this standard requires students to write a one-step inequality. Is it clear that this is NOT the way to assess this standard?)
will the evaluation of this standard be through reasoning vs first solving for this form and then reasoning?
Ensure that the assessment of this standard matches the simplicity of this standard, this standard does not represent a one step inequality, but instead just two rational numbers with an understanding of the terms of the symbols and how to graph
Ensure that the assessment of this standard matches the simplicity of this standard, this standard does not represent a one step inequality, but instead just two rational numbers with an understanding of the terms of the symbols and how to graph
I would cut the algebra unit completely

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

Response
This concept should start in 7th grade
This concept should start in 7th grade
I would cut the algebra unit completely

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

Response
This concept should start in 7th grade
This concept should start in 7th grade
What is the purpose of the modifier "appropriately"? Does this change the intent from what it would be if it just started with recognize? Would there be a more appropriate verb here, like identify?
I would cut the algebra unit completely

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

This concept should start in 7th grade
This concept should start in 7th grade
I would cut the algebra unit completely

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
Move to 7th grade
Move to 7th grade
I would cut the algebra unit completely

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
Students just need to know the formula.

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
use of in class board work for each student to determine where the student is in progress
In the clarifications, specify that edge lengths should include multiple types of rational numbers, not only whole number edge lengths.
Let's remove this standard from 6th grade. It is already repeated in 7th grade and again in 10th. Let's let it go to clear up some space in 6th grade.

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

Response
Add: represent three-dimensional figures using nets made up of rectangles and triangles, and use the nets to find the surface area of these figures"
Using nets is an important pre-requisite to 7.G.6 and surface area in general. Consider adding this back in either to this standard or 6.G.3. It feels like this standard should go beyond just classifying solids.
Let's remove this standard.

Statistics & Probability Standards Feedback

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

Response
Explain the purpose of this standard further.
What is the purpose of a standard to be #0?
Let's remove this standard.

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

Response
with use of computerized tools using ; tools like CAD, and Auto CAD, and SPSS, and preparing students for roles in modern industry with hands-on, technical training in areas like automation, instrumentation, and safety
Let's remove this standard.

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

Response
Let's remove this standard.

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

Data Analysis shall be a part of all middle school curriculum using newest tools for SASS

Let's remove this standard.

KY.6.SP.0.d Interpret Results: Draw logical conclusions and make generalizations from the data based on the original question.

Response

Let's remove this standard.

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

Recognize and make use of the analytical tools to resolve problems from questions presented that impact Science, Technology, Engineering and Math

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

Should we clarify what is meant by center and spread here?

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

Should we clarify what is meant by measure of center and measure of variation here?

... how the values in the distribution vary with a single number.

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

Response

Or line plots

Let's remove this standard until students are ready to use technology to create displays.

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

Response

Not needed, I would cut this one.

Some of these seem like they can be combined.

"such as" is odd wording to lead into more standards

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

Response

Can you combine this with another standard? This seems to vague of a standard to be its own sub category.

this seems like an odd standard

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

Response

Not needed

see above

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

Response
see above

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
This should be moved to 8th grade
This should be moved to 8th grade
Revise it by saying "informally".
Skewed-left, and skewed-right seems like a trick questions, revise it by saying have students informally describe how the data is presenting itself.
Adding skewed left or right feels too complex for their first introduction into statistics. We should just initially focus on informal observations.
see above

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

Response
Explain the choice of measure of center and variability to shape of the data distribution
Move to 8th grade
Move to 8th grade
this standard row is fine, but there is no place to insert what might be missing - and where is the data science/data literacy - most states are including something about that in their revisions.

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

Compute unit rates associated with ratios of fractions, including ratios of lengths, areas, and other quantities measured in like units.

KY.7.RP.2.b Identify the constant of proportionality (unit rate) in tables, graphs, equations, diagrams and verbal descriptions of proportional relationships.

Response

In the Overview, under critical area 1, it says "graph proportional relationships and understand the unit rate informally as a measure of the steepness of the related line, called the slope"; The word "slope" needs to appear in the actual standards.

In the Overview, under critical area 1, it says "graph proportional relationships and understand the unit rate informally as a measure of the steepness of the related line, called the slope"; The word "slope" needs to appear in the actual standards.

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Overview critical area 1, it says "graph proportional relationships and understand the unit rate informally as a measure of the steepness of the related line, called the slope"; Standard or overview needs to be revised to match the grade level intentions

KY.7.RP.2.d Explain what a point (x, y) on the graph of a proportional relationship means in terms of the situation, with special attention to the points (0, 0) and (1, r) where r is the unit rate.

Response

Overview critical area 1, it says "graph proportional relationships and understand the unit rate informally as a measure of the steepness of the related line, called the slope"; Standard or overview needs to be revised to match the grade level intentions

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

Response
This should say use "proportional relationships" to solve mathematical and real world problems. Percents is one type of proportional relationship.
Use proportions, including percents, to solve...

***KY.7.RP.3.a** Solve percent problems involving finding the whole, a part and a percent, given two of these.

Response
Why is this a necessary addition? It should be in the clarifications of 3.b if at all. This is redundant.
Change and to or. Clarifications should show one of each of the 3 problem types using multiple representations (e.g double number lines, ten frames, ratio table)
"a part OR a percent" (change and to OR) using multiple visual representation (eg. 10% frames, ratio tables, and/or double number lines))
change "and a percent" to "or a percent" - clarifications should show one example of each of the three problem types using multiple representations (e.g., double number lines, tens frame, ratio table, etc.).
change "and a percent" to "or a percent" - clarifications should show one example of each of the three problem types using multiple representations (e.g., double number lines, tens frame, ratio table, etc.)

The Number System 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
Apply and extend previous understandings of addition and subtraction to add and subtract integers; represent addition and subtraction on a horizontal or vertical number line diagram.

KY.7.NS.1.a Describe situations in which opposite quantities combine to make 0.

Response
add develop an understanding with the use of zero pairs using manipulative such as 2 sided counters or algebra tiles to help identify patterns to develop the rules
add - develop an understanding with the use of zero pairs using manipulative such as 2 sided counters or algebra tiles to help identify patterns to develop the rules
Not essential for students to know in relation to other standards

KY.7.NS.1.b Understand $p + q$ as the number located a distance $|q|$ from p , in the positive or negative direction depending on whether q is positive or negative. Show that a number and its opposite have a sum of 0 (are additive inverses). Interpret sums of rational numbers by describing real-world contexts.

Response
add develop an understanding with the use of zero pairs using manipulative such as 2 sided counters or algebra tiles to help identify patterns to develop the rules
add - develop an understanding with the use of zero pairs using manipulative such as 2 sided counters or algebra tiles to help identify patterns to develop the rules
Not essential for students to know in relation to other standards
Need to add something about developing this understanding using zero pairs and include examples in clarifications. Using manipulatives such as two color counters or algebra tiles.

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
add - develop an understanding of subtraction of integers with the use of zero pairs using manipulative such as 2 sided counters or algebra tiles to help identify patterns to develop the rules
add - develop an understanding with the use of zero pairs using manipulative such as 2 sided counters or algebra tiles to help identify patterns to develop the rules
In all of these standards, change "rational numbers" to "positive and negative numbers". In 6th grade, rational numbers means fractions. In 7th grade, it means positive and negative. Let's make it more clear for everyone.

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

Response
Apply and extend previous understandings of multiplication and division and of fractions to multiply and divide integers.
Apply and extend previous understandings of multiplication and division and of fractions to multiply and divide integers.
not needed, covered in 6th grade.
In all of these standards, change "rational numbers" to "positive and negative numbers". In 6th grade, rational numbers means fractions. In 7th grade, it means positive and negative. Let's make it more clear for everyone.

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

Extend multiplication to rational numbers by using the properties of operations to derive & justify the rules for multiplying & explain why results such as $(-1)(-1) = 1$ are valid & interpret products of rational numbers in meaningful real-world contexts.

Need to add something about developing this understanding using zero pairs and include examples in clarifications. Using manipulatives such as two color counters or algebra tiles.

Extend multiplication to all rational numbers by using the properties of operations to derive and justify the rules for multiplying and explain why results such as $(-1)(-1) = 1$ are valid and interpret products of rational numbers in meaningful real-wor...

In all of these standards, change "rational numbers" to "positive and negative numbers". In 6th grade, rational numbers means fractions. In 7th grade, it means positive and negative. Let's make it more clear for everyone.

KY.7.NS.2.b Understand that integers can be divided, provided that the divisor is not zero and every quotient of integers (with non-zero divisor) is a rational number. If p and q are integers, then $-(p/q) = (-p)/q = p/(-q)$. Interpret quotients of rational numbers by describing real-world contexts.

Response

Understand that students must develop and apply the rules for dividing integers and rational numbers, integers can be divided... (keep the rest):

Need to add something about developing this understanding using zero pairs and include examples in clarifications. Using manipulatives such as two color counters or algebra tiles.

In all of these standards, change "rational numbers" to "positive and negative numbers". In 6th grade, rational numbers means fractions. In 7th grade, it means positive and negative. Let's make it more clear for everyone.

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

Response

When is calculator use appropriate

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

Apply properties of operations as strategies to add, subtract, and expand linear expressions with rational coefficients.

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

If multi-step real-world problems are important, it should be included in the standard text, not just the clarifications.

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

Inequalities should be moved to 8th grade since they are more inline with high school content. After 7th grade, they are not addressed again until high school curriculum so why introduce in 7th grade and not use again until high school? Considering that 8th grade content does not include inequalities and most students will not see this content again until 9th grade Algebra, is there any thought of moving this concept to 8th grade?

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

Be able too use problem solving for industrial, and Commercial use (Kentucky is a Manufacturing State)

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

Students must become familiar with : architectural tools for drawing AI Mode All Images Shopping Videos Short videos Forums More Tools AI Overview Top 15 Must Have Tools for Architecture Students – The Best ... Finding The Right Architecture Drawing Too

Remove this standard

Identify to replace Draw

Remove this standard.

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

Remove this standard.

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

Response

the word "derive" better describes the mathematical thinking

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

Move this concept to 8th grade

Move this concept to 8th grade

Remove this standard. Let it be addressed in HS Geometry.

KY.7.G.6 Solve problems involving area of two-dimensional objects and surface area and volume of three-dimensional objects.

Response

Need clarification on what 3D shapes should be taught at this point.
--

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

What "other polygons" are necessary?

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

Be able to apply principals to Industrial and Engineering Math questions
--

Define when calculator use is appropriate

Remove this standard. Let surface area be addressed in HS Geometry.

Need to clarify "right" prisms - is this only rectangular Prisms or does it include triangular, trapezoidal, etc. . .

Can we be more specific on the right prisms - Is it only rectangular and triangular bases or any type of base? With surface area possibly being eliminated from 6th grade content, this will be the first introduction of surface area for students.
--

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

Remove this standard. Students do NOT need to create scaled pictographs. It's more important in 7th grade for students to analyze displays than create them.

*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 (range when comparing extremes or interquartile range when comparing medians).

Response

Describe how much the visual representations (like box plots or dot plots) of two numerical data distributions overlap or are separated, especially when they have similar variability and are in the same context (same variable). Measure the difference between

Students struggle with this standard every year. There is so much content to cover for this one standard. Students do not retain the prior knowledge from previous grades to master this standard.

MAD - this is a very time consuming and tedious calculation that students struggle with. For 7th graders, knowing how to calculate mean, median, mode and range gives them the information they need to summarize data

This is just re-worded to take out the term "mean absolute deviation". It now sounds very wordy and honestly confusing.

too long more concise.

Add line plots

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

Response

Possibly combine with SP3...ultimately the comparison goes back to SP3

Students struggle to understand what the range and interquartile range conclude about the data.

6th grade standard

take out

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
Remove this standard.

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
Remove this standard.

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
Remove this standard.

KY.7.SP.7.b Develop a probability model (which may not be uniform) by observing frequencies in data generated from a chance process.

Response
Remove this standard.

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

Response

Considering this is the first time students are introduced to probability, should we focus on compound events, especially when students will not see this content again until high school Algebra, as it is not part of 8th grade content??

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

Considering this is the first time students are introduced to probability, should we focus on compound events, especially when students will not see this content again until high school Algebra, as it is not part of 8th grade content??

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

Considering this is the first time students are introduced to probability, should we focus on compound events, especially when students will not see this content again until high school Algebra, as it is not part of 8th grade content??

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

Response

Remove this standard.

Considering this is the first time students are introduced to probability, should we focus on compound events, especially when students will not see this content again until high school Algebra, as it is not part of 8th grade content??

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

Remove this standard.

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

Remove "estimate the value of expressions." WHY are we approximating square roots using decimal expansion? Knowing the two whole numbers it lies between is enough in 8th grade. NO ONE approximates square roots using long division after 8th grade.
--

Expressions & Equations Standards Feedback

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

Response

This small standard is huge. There is a lot of concepts students need to understand here. Be more specific on the type of exponent rules. Some of the curriculum we have used on this seem to be for high school students.
--

KY.8.EE.2 Use square root and cube root symbols to represent solutions to equations of the form $x^2 = p$ and $x^3 = p$, where p is a positive rational number. Evaluate square roots of small perfect squares and cube roots of small perfect cubes. Know that perfect squares and perfect cubes are rational.

Response

add a subsection to include order of operations which includes but is not limited to absolute value (from 6th and 7th grade), inequalities (6th and 7th grade) and operations with brackets, parenthesis, etc (from 5th grade).

*KY.8.EE.3 Use scientific notation to represent very large or very small quantities.

Response

I think this should be removed from the standards. leave it for science class.
--

This should be added to high school

*KY.8.EE.4 Compare and order numbers in both scientific and standard notation. Interpret scientific notation that has been generated by technology.

Response

I think this should be removed and given to science class.

This should be taught in high school

take out the last sentence.

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

Proportional relationships are more a 7th grade skill

Clarifications should help teachers see that this is a critical step towards linear equations; noting that the graph of every linear is a translation of a proportional.

This is written in the 7th grade Overview in Critical Area 1, but the standard is in 8th grade. It needs to be clear where this happens (7th or 8th grade), especially the use of "slope".

This is written in the 7th grade Overview in Critical Area 1, but the standard is in 8th grade. It needs to be clear where this happens (7th or 8th grade), especially the use of "slope".

This is written in the 7th grade Overview in Critical Area 1, but the standard is in 8th grade. It needs to be clear where this happens (7th or 8th grade), especially the use of "slope".

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

Take out similar triangles, can we split this in a and b where slope is a and slope intercept form is b

Why similar triangles?

*KY.8.EE.7 Fluently solve linear equations in one variable.

Response
Solve linear equations in one variable fluently or with technology.
Refer back to P.8 for meaning of "fluency" added to the standard and/or clarifications - fluency is not just speed
take out 7th grade standard.
Remove the word "fluently". Do we plan to measure the efficiency, accuracy, flexibility, AND appropriateness of their strategy? If not, don't include the word "fluent".

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
Solve for linear inequalities here and graph them.

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

Response
Very vague- is this for graphing or solving algebraically?
I don't think this standard should be in 8th grade. Leave it for high school. My students have had very little success in this standard.
This standard should be moved to high school. Most Middle school students are physically incapable of doing this as many are still in the concrete stage.
This standard should be moved to high school. Most Middle school students are physically incapable of doing this as many are still in the concrete stage.

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
What form are the equations "allowed" to be in?
I don't think this standard should be in 8th grade. Leave it for high school. My students have had very little success in this standard.

Move to high school. The common core is often developmentally inappropriate for students as it asks them to do things they are physically incapable of doing.

Move to high school. The common core is often developmentally inappropriate for students as it asks them to do things they are physically incapable of doing.

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
What form are the equations "allowed " to be in?
I don't think this standard should be in 8th grade. Leave it for high school. My students have had very little success in this standard.
Give the option of using elimination and/or graphing in order to solve a system of equation
Move to high school. This concept is too abstract for most middle school students.
Move to high school. This concept is too abstract for most middle school students.

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

Response
I don't think this standard should be in 8th grade. Leave it for high school. My students have had very little success in this standard.
Move to high school(9th grade)
Move to high school(9th grade)

Functions Standards Feedback

KY.8.F.3.b Identify and give examples of functions that are not linear.

Response
Nonlinear

Geometry Standards Feedback

KY.8.G.1 Verify experimentally the properties of rotations, reflections and translations: Lines are congruent to lines. Line segments are congruent to line segments of the same length. Angles are congruent to angles of the same measure. Parallel lines are congruent to parallel lines.

Response
Why is it important to include parallel lines are congruent to parallel lines and lines are congruent to lines as part of the standard?

KY.8.G.5 Use informal arguments to establish facts about the angle sum and exterior angle of triangles, about the angles created when parallel lines are cut by a transversal and the angle-angle criterion for similarity of triangles.

Response
There is too much content in this one standard.
Remove. Let's leave this to HS Geometry.

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

Response
Remove. Let's leave this to HS Geometry.

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
Is Surface Area still going to be 8th grade?
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.
Remove Surface area. It is not in our IM curriculum.

Statistics & Probability Standards Feedback

KY.8.SP.1 Construct and interpret scatter plots for bivariate numerical data to investigate patterns of association between two quantities. Describe patterns such as clustering, outliers, positive or negative association, linear association and nonlinear association.

Response
Add interpreting two-way tables back

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
Rational exponents are not taught prior to Algebra 2 or higher. This is not needed at the 10th grade level, which typically students have had Algebra 1 and are currently taking Geometry.
Redundant with KY.HS.N.2

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

Response
The standard doesn't cover simplifying radicals as radicals or simplifying radical operations as radicals, and I don't know that another standard does either.
Rational exponents are not taught prior to Algebra 2 or higher. This is not needed at the 10th grade level, which typically students have had Algebra 1 and are currently taking Geometry.

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
The kids are over thinking a problem that has no value in their future.
Leave as a +, or remove.
Remove.

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

Response
Again! Over thinking for no reason.
Bloom's Taxonomy
The clarification sounds more like a statistics standard. The actual standard is more of a mathematical practice and something to be embedded in all word problems.

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

Response
Bloom's Taxonomy

KY.HS.N.4.b Choose and interpret the scale and the origin in graphs and data displays. ★

Response
It needs to include the units/descriptions of the graphs for each axis
Bloom's Taxonomy

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

Response
This is unclear.

What's the difference between this and N.4.A?

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

Response

This is worded more like a science standard. Test writers have used problems involving graduated cylinders and measuring cups and asked students to determine the best way to report a measurement. That's outside our normal scope.

This is unclear.

Bloom's Taxonomy

Place significance in science standards. Chemistry would be appropriate.

*KY.HS.N.7 (+) Understand properties of complex numbers.

Response

I believe we should eliminate the complex number system until advanced courses such as pre-calculus. The average algebra 2 student does not need complex numbers and will never use it. It's very difficult to teach topics where students know they'll never.

What is the difference in this being a plus or delta standard?

It is confusing to label this as a plus standard when parts are plus and parts are not. Better to renumber the standards below as 7, 8, and 9.

Bloom's Taxonomy

Complex numbers are not taught prior to Algebra 2 or higher. This is not needed at the 10th grade level, which typically students have had Algebra 1 and are currently taking Geometry.

Too vague

Understand the following properties of complex numbers:

Wording is fine, but it's now a plus. If this is a plus, are all of the subtopics a plus? Only c is labeled that way.

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

I believe we should eliminate the complex number system until advanced courses such as pre-calculus. The average algebra 2 student does not need complex numbers and will never use it. It's very difficult to teach topics where students know they'll never.

I would remove the wording about the commutative and associative properties. This is primarily used with combining like terms which incorporates these properties.

Again! This is no useless and of no value to the kids future.

Is this part of a plus or delta standard? Shouldn't it have a label?

Typical 10th grades will not see this content as this is an Algebra 2 (Honors) concept which is an 11th grade subject.

Should be a plus if the heading is a plus

This standard should have a +

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

Response

I believe we should eliminate the complex number system until advanced courses such as pre-calculus. The average algebra 2 student does not need complex numbers and will never use it. It's very difficult to teach topics where students know they'll never.

Again (but put a different way). These mathematical "ideas" serve no purpose and will never be used to solve any thing in their future.

Typical 10th grades will not see this content as this is an Algebra 2 (Honors) concept which is an 11th grade subject.

Replace "conjugate" with "complex conjugate" to more precisely distinguish this mathematical concept from other uses of the word "conjugate."

Change language to rationalize.

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

Response

I believe we should eliminate the complex number system until advanced courses such as pre-calculus. The average algebra 2 student does not need complex numbers and will never use it. It's very difficult to teach topics where students know they'll never.

Complex plane isn't very important to calculus. It's a simple concept that can easily be picked up later for higher math.

why + instead of delta?

Bloom's Taxonomy

Typical 10th grades will not see this content as this is an Algebra 2 (Honors) concept which is an 11th grade subject.

see below

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

I believe we should eliminate the complex number system until advanced courses such as pre-calculus. The average algebra 2 student does not need complex numbers and will never use it. It's very difficult to teach topics where students know they'll never.

Polar graphing is good, remove complex graphing.

why + instead of delta?

Typical 10th grades will not see this content as this is an Algebra 2 (Honors) concept which is an 11th grade subject.

Replace "explain why . . . the same number" with "convert between the two representations."

Unnecessary for HS

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

I believe we should eliminate the complex number system until advanced courses such as pre-calculus. The average algebra 2 student does not need complex numbers and will never use it. It's very difficult to teach topics where students know they'll never.

why + instead of delta?

This part feels unnecessary given 8a and an earlier standard that says we can do operations.

Unnecessary for HS

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

I believe we should eliminate the complex number system until advanced courses such as pre-calculus. The average algebra 2 student does not need complex numbers and will never use it. It's very difficult to teach topics where students know they'll never.

why + instead of delta?

Unnecessary for HS

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

Response
I believe we should eliminate the complex number system until advanced courses such as pre-calculus. The average algebra 2 student does not need complex numbers and will never use it. It's very difficult to teach topics where students know they'll never.
why + instead of delta?
May need to specify what polynomial identities

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

Response
This standard is not needed
why + instead of delta?
Bloom's taxonomy
Replace second half with "Demonstrate that it is true by explaining the possible real and no real solutions for quadratic polynomials.

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

Response
Bloom's Taxonomy

KY.HS.N.12.c (+) Solve problems involving velocity and other quantities that can be represented by vectors.

Response
How?

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
Bloom's Taxonomy
Remove the parallelogram rule.

KY.HS.N.13.c (+) Understand vector subtraction $v - w$ as $v + (-w)$, where $-w$ is the additive inverse of w , with the same magnitude as w and pointing in the opposite direction. Represent vector subtraction graphically by connecting the tips in the appropriate order and perform vector subtraction component-wise.

Response
Bloom's Taxonomy

*KY.HS.N.15 (Δ) Perform operations with matrices.

Response
Should be a plus standard
I am genuinely confused on why this is a triangle instead of a +
Too vague
Remove all matrices

*KY.HS.N.15.a (Δ) Add, subtract and multiply matrices of appropriate dimensions.

Response
Should be a plus standard
I am genuinely confused on why this is a triangle instead of a +
Remove all matrices

*KY.HS.N.15.b (Δ) Multiply matrices by scalars to produce new matrices.

Response
I am genuinely confused on why this is a triangle instead of a +
Remove all matrices

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

Response
Should read "identity" matrices, not "identify" matrices.
Again, why + instead of triangle? What is the difference??
How? For what reason?
Remove all matrices

KY.HS.N.16.a (+) Understand that, unlike multiplication of numbers, matrix multiplication for square matrices is not a commutative operation, but still satisfies the associative and distributive properties.

Response
Break into multiple targets
Remove all matrices

KY.HS.N.16.b (+) Understand that the zero and identity matrices play a role in matrix addition and multiplication similar to the role of 0 and 1 in the real numbers. The determinant of a square matrix is nonzero if and only if the matrix has a multiplicative inverse.

Response
Break into 2
Remove all 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
Work with how?
Remove all matrices

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
Remove all matrices

Conceptual Category Algebra Standards Feedback

KY.HS.A.1 Interpret expressions that represent a quantity in terms of its context. ★

Response
I'm not sure what this is even saying. Too vague.
How? For what reason?

*KY.HS.A.1.a Interpret parts of an expression, such as terms, factors, and coefficients, for linear, quadratic, and exponential expressions.

Response
What changed?
How?

KY.HS.A.2 Use the structure of an expression to identify ways to rewrite it and consistently look for opportunities to rewrite expressions in equivalent forms.

Response

Remove "consistently" -- this is not measurable.
--

Is the clarification on this where the focus should be? Math, algebra especially, is based on rewriting parts to get the problem to go where you need it to go.

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

Bloom's Taxonomy

KY.HS.A.3.c Use the properties of exponents to rewrite exponential expressions. ★

Response

How?

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

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
--

Determine the maximum or minimum value of a quadratic expression by completing the square, averaging the zeros, or other methods.

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

Replace "derive" with "know"

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

Response
For why?

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

Response
Should not be a (+) standard
For why?

*KY.HS.A.7.b (Δ) Identify roots of polynomials with a degree greater than 2.

Response
Why not +?

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

Response
Should not be a plus standard
by what method?

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
Break into 2

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

Response
Should not be a plus standard
Should be a general standard.

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

Response
Should be a general standard.

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

Response
vague
Are there any more clarifications? If you graph a quadratic to solve, isn't that a two-variable equation?

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 feels like two different standards to me. Creating equations and being able to graph them accurately are very different.
Are there any more clarifications?

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

break into 2

Change this to a delta. I consider this linear programming which is in Algebra 2.

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

Since parts .a and .b use "literal equation/formula", should this also say "equation/formula"?

Since parts .a and .b use "literal equation/formula", should this also say "equation/formula"?

as opposed to a figurative equation? language change

*KY.HS.A.15.b (Δ) Rearrange formulas to solve a literal equation/formula that is a degree of 2 or higher.

Response

Why not +?

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

Break into 2

This standard has two verbs--understand and construct. Standard should focus on construct.

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

Response

It would be more clear to just add "rational and radical equations" to this standard then to split them apart. Are Ky.HS.A.17.A and KY.HS.A.17.b also delta standards?

Why not +?

break into 2

Replace "give examples" with "identify examples"

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

Response

In keeping with previous notation, if the main stem of the standard has a Delta, then all parts of the standard, should have a Delta.

Make this a delta if the heading is a delta. Also, please clarify that these are basic proportions where you cross multiply.

KY.HS.A.17.b Solve radical equations in one variable.

Response

In keeping with previous notation, if the main stem of the standard has a Delta, then all parts of the standard, should have a Delta.

Make this a delta if the heading is a delta

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

Response

This feels redundant to me with the one above as well as the earlier one that discussed literal equations.

There is already a standard about literal equations. What is the difference? How is this different from the previous one?

*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.

Response

It should read "or factoring"

Why is Quadratic Formula capitalized here but not in the following 2 substandards?

*KY.HS.A.19.b (Δ) Recognize when the quadratic formula gives complex solutions and write them as $a \pm bi$ for real numbers a and b .

Response
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.
If the other standards about Complex Numbers have a +, how can this expectation be a Delta?
Why not +?

*KY.HS.A.19.d (Δ) Solve quadratic equations by completing the square.

Response
Advanced standard
SHOULD NOT BE PLUS OR DELTA. If students are meant to use the quadratic formula, they should know where it comes from, which is completing the square.
Why not +?

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
It seems like if we specify methods of solving systems that should be learned, this would be a given with elimination.
Too much wording

KY.HS.A.20.b Solve systems of linear equations with graphs, substitution and elimination, focusing on pairs of linear equations in two variables.

Response
break into multiple targets

*KY.HS.A.21 (Δ) Solve a simple system consisting of a linear equation and a quadratic equation in two variables algebraically and graphically.

Response
Why not +?
break into 2

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

Response
Not a plus standard.
Remove all matrices

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

Response
Not a plus standard.
Remove all matrices

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

Response
Not a plus standard.
rearrange order of sentence structure
Remove all matrices

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

Response

Not a plus standard.
don't need to specify technology use
Remove all matrices

KY.HS.A.23 Understand that the graph of an equation in two variables is the set of all its solutions plotted in the coordinate plane.

Response
Understand how? Bloom's Taxonomy
add "and use this understanding to identify solutions and nonsolutions from a graph
Is there a better verb? What is a sample test question for this? Please add to clarifications.

KY.HS.A.24 Justify that the solutions of the equations $f(x) = g(x)$ are the x-coordinates of the points where the graphs of $y = f(x)$ and $y = g(x)$ intersect. Find the approximate solutions graphically, using technology or tables. ★

Response
break into 2 targets
This standard has two verbs--justify and find. How do students justify? Because they find the point on the graph? Is there supposed to be more?

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
Is there a better verb than understand? Determine if a relation is a function? Also, get rid of the function notation part; it should be part of the standard below.

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
Please clarify--are these random functions or specific to linear, quadratic, etc.?

*KY.HS.F.2 Recognize that arithmetic and geometric sequences are functions, sometimes defined recursively, whose domains are subsets of the integers.

Response
"Domains are subsets of the integers" - what is this saying?
Should include recursive sequences.
too much wording, split into 2
Just recognize? How is this tested? Should students write the function explicitly and/or recursively?

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

Response
This should all be one standard. Collapse into Ky.HS.F.3
How? What method? Bloom's taxonomy

*KY.HS.F.4.b (Δ) Graph square root, cube root and absolute value functions.

★

Response
Why not +?

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

Response
Why not +?

*KY.HS.F.4.d (Δ) Graph exponential and logarithmic functions, showing intercepts and end behavior. ★

Response
Why not +?
Should exponential functions be part of Algebra 1 and required?

*KY.HS.F.4.f (Δ) Graph piecewise functions, including step functions.

Response
Why not +?
Leave as plus. Would also like rationalization for why changes were made.

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
Unclear
What is the difference with this and other standards that are re-writing in equivalent forms?

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

Response
break into multiple
Is this specifically for sequences or is this also linear, quadratic, etc. functions? Also, change determine to write an explicit or recursive function.

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

more detail needed

KY.HS.F.7 Use arithmetic and geometric sequences to model situations and scenarios.

Response

what type of situations? Detail needed

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

Response

break into 2

KY.HS.F.7.b Write formulas to model arithmetic and geometric sequences and apply those formulas in realistic situations. ★

Response

2 targets here

*KY.HS.F.8 (Δ) Understand the effects of transformations on the graph of a function.

Response

Why would this be a Delta standard when students have been studying it since 8th grade?

Why not +?

Understand how? Bloom's Taxonomy

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

In keeping with previous notation, if the main stem of the standard has a Delta, then all parts of the standard, should have a Delta.

add "and with absolute value both greater and less than one" to the parenthetical.

Change to delta to match heading

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

Response

In keeping with previous notation, if the main stem of the standard has a Delta, then all parts of the standard, should have a Delta.

too vague

Change to delta to match heading

*KY.HS.F.9 (Δ) Find inverse functions.

Response

Why not +?

How?

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

Response

In keeping with previous notation, if the main stem of the standard has a Delta, then all parts of the standard, should have a Delta.

How?

KY.HS.F.9.b (+) Verify by composition that one function is the inverse of another.

Response

Not a plus standard.

KY.HS.F.9.c (+) Read values of an inverse function from a graph or a table, given that the function has an inverse.

Response

Read? Interpret or make inferences are better wording

*KY.HS.F.10 (Δ) Understand the inverse relationship between exponents and logarithms and use this relationship to solve problems involving logarithms and exponents with the use of technology.

Response

Why not +?

How? Bloom's Taxonomy

KY.HS.F.11.a Recognize and justify that linear functions grow by equal differences over equal intervals and that exponential functions grow by equal factors over equal intervals.

Response

Break into multiple

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

Response
"Distinguish"
What's the difference between this and part a?

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
"Distinguish"

KY.HS.F.12 Construct linear and exponential functions, including arithmetic and geometric sequences, given a graph, a description of a relationship, or two input-output pairs (include reading these from a table).

Response
This could be combined with F.11
break into 2
How is this different from the standards much earlier that have students write equations?

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
Make inferences is better
How is this tested? It's just a fact.

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

How? Bloom's Taxonomy

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.

Too vague :(Break into multiple more detailed objectives

KY.HS.F.16.b (+) Use special triangles to determine geometrically the values of sine, cosine, tangent for $\pi/3$, $\pi/4$ and $\pi/6$ and use the unit circle to express the values of sine, cosine and tangent for $\pi - x$, $\pi + x$ and $2\pi - x$ in terms of their values for x , where x is any real number.

Response

Break into multiple

KY.HS.F.16.c Use the unit circle to explain symmetry (odd and even) and periodicity of trigonometric functions.

Response

Should have a + next to it.

2 targets

Make this a plus to match the heading

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

Response

Should not be a (+) standard

"Determine" functions that best model.....

KY.HS.F.18 (+) Understand that restricting a trigonometric function to a domain on which it is always increasing or always decreasing allows its inverse to be constructed.

Response
How? Bloom's Taxonomy

KY.HS.F.20.a (+) Prove the Pythagorean identity and use it to find $\sin(\theta)$, $\cos(\theta)$, or $\tan(\theta)$ given $\sin(\theta)$, $\cos(\theta)$, or $\tan(\theta)$ and the quadrant of the angle.

Response
Should not be a plus standard.

Conceptual Category Geometry Standards Feedback

KY.HS.G.1 Know and apply precise definitions of the language of Geometry:

Response
should include understanding that some terms are undefined (point, line, distance, plane).
Too vague:(

*KY.HS.G.1.a Understand properties of line segments, angles and circles.

Response
How? Bloom's Taxonomy

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

Response

Bloom's Taxonomy

Remove "and differences between"

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

How? Bloom's Taxonomy

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

Response

What about a dilation?

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

Break into multiple targets

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

Response

Too vague; split up :)

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

Prove would be better wording

Students should be able to use ASA, SAS, and SSS to solve problems. That's not really covered in a standard. Also, what about AAS?

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

Response

to what processes?

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

Response

What Theorems? what figures? For what purpose? >:(

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

Response

remove "formal"

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

Response

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

remove "formal"

KY.HS.G.8 Create and apply geometric constructions.

Response
vague
Remove all constructions

KY.HS.G.8.a Make formal geometric constructions with a variety of tools and methods.

Response
Remove all constructions

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

Response
how and why?
Remove all constructions

KY.HS.G.9 Understand properties of dilations.

Response
How? Bloom's Taxonomy

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

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

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

Response
Which ones? How? Why?

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

Response
Which ones? Why?

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

Response
Should not be a (+) standard
Which ones? Why?

KY.HS.G.12 Understand properties of right triangles.

Response
List Scalene, Isosceles, and Equilateral as types of right triangles

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

Response
"Explain how a different angle of interest in the same right triangle will affect the outcome of sine, cosine, and tangent."

KY.HS.G.13 (+) Derive the formula $A = \frac{1}{2} ab \sin(C)$ for the area of a triangle by drawing auxiliary line from a vertex perpendicular to the opposite side.

Response
Please don't use a / to represent the fraction bar in any standard. Always use the horizontal bar, as was done in the elementary fractions standards for review.

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

Response
Remove

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

Response
How is this tested? The clarification is not a clarification; it needs an explanation with the picture.

KY.HS.G.17 (+) Apply basic construction procedures within the context of a circle.

Response
Should not be a plus standard. Van Heile's theory of geometric thought suggests the act of constructing these figures improves students' understanding.
Remove all constructions

KY.HS.G.17.a (+) Construct the inscribed and circumscribed circles of a triangle.

Response
Remove all constructions

KY.HS.G.17.b (+) Construct a tangent line from a point outside of a given circle to a circle.

Response
Remove all constructions

KY.HS.G.18 (+) Understand the relationship between an intercepted arc length within a circle and 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.

list the relationship and how to distinguish it

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 Understand the relationship between the algebraic form and the geometric representation of a circle.

Response

What? too vague. list the relationship that is desired to be looked over by students. list its importance

KY.HS.G.19.a Write the equation of a circle of given center and radius using the Pythagorean Theorem.

Response

19b covers both targets, delete 19a

KY.HS.G.19.b (+) Derive and write the equation of a circle of given center and radius using the Pythagorean Theorem.

Response
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
remove

KY.HS.G.20 (+) Derive the equations of conic sections.

Response
remove

KY.HS.G.20.a (+) Derive the equation of a parabola given a focus and directrix.

Response
remove

KY.HS.G.20.b (+) Drive the equations of ellipses and hyperbola given the foci, using the fact that the sum or difference of distances from the foci is constant.

Response
remove

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
remove
Is this a necessary standard or can it be left off?

KY.HS.G.25 Analyze and determine the validity of arguments for the formulas for the various figures and shapes.

Response
This makes no sense. Make it make sense.
Does this mean to explain why the formulas work? Cavalieri's principle is mentioned in the clarification but a plus standard just below it.

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
what is the target here? what is the student's action in verbiage?
Replace "Given" with "give." Replace "sphere" with "cylinder, cone,"

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
Break into 2
Remove second half.

KY.HS.G.29 Use geometric shapes, their measures and their properties to describe objects in real world settings.

Response
Which objects, How, and why?

KY.HS.G.30 Apply concepts of density based on area and volume in modeling situations, using appropriate units of measurement.

Response
To do what? Find density? Compare densities?

KY.HS.G.31 Apply geometric methods to solve design problems. ★

Response
too vague

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
Remove stem plots.
Shouldn't all of the SP standards except linear regression be deltas? They are all in Algebra 2 in another standards document.

KY.HS.SP.4 (+) When appropriate, fit a normal distribution to a numerical data set for given mean and standard deviation and then estimate population percentages using the Empirical Rule and recognize that there are data sets for which such a procedure is not appropriate.

Response
Should not be a plus standard.

*KY.HS.SP.5 (Δ) 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
Should not be a delta standard.
Why not +?

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
What does this mean--explanatory and response variables?

KY.HS.SP.6.a Calculate an appropriate mathematical model, or use a given mathematical model, for data to solve problems in context.

Response
Use the word regression somewhere.

*KY.HS.SP.9 (Δ) Understand statistics as a process for making inferences and justifying conclusions about population parameters based on a random sample from that population.

Response
should not be a delta standard.
Why not +?

*KY.HS.SP.10 (Δ) Decide if a specified model is consistent with the results from a simulation.

Response
Why not +?

*KY.HS.SP.11 (Δ) Recognize the purposes of and differences among sample surveys, experiments and observational studies; explain how randomization relates to each.

Response
Should not be a delta standard.

*KY.HS.SP.14 (Δ) Describe events as subsets of a sample space. Use characteristics (or categories) of the outcomes, such as, as unions, “A or B,” that are mutually exclusive events and as unions, “A or B,” that are non-mutually exclusive events and as intersections, “A and B,” and as complements of other events, “not A.” to calculate basic probabilities.

Response
Should be required
Calculate probabilities needs to be more of a focus; it seems like an afterthought at the end of the standard.

*KY.HS.SP.15 (Δ) Understand the concept of independence.

Response
Should be required

*KY.HS.SP.15.a (Δ) Understand that two events A and B are independent if the probability of A and B occurring together is the product of their individual probabilities, $P(A) \times P(B)$.

Response
Should be required
Should students calculate the probability or just understand that you should?

*KY.HS.SP.15.c (Δ) Recognize and explain the concept of independence in everyday language and everyday situations.

Response
Should be required
Isn't this inherent in part a?

*KY.HS.SP.16 (Δ) Understand the concept of conditional probability.

Response
should be required
TOO vague. How do you wish students to understand?

*KY.HS.SP.16.a (Δ) Understand the conditional probability of A given B as $P(A \text{ and } B)/P(B)$.

Response
Bloom's taxonomy
This is a definition. Where is the standard that has students find conditional probability? Part d is too wordy.

*KY.HS.SP.16.c (Δ) Recognize and explain the concept of conditional probability in everyday language and everyday situations.

Response
should be required
List examples desired for students to know - everyday language and situations
Isn't this inherent in the teaching?

*KY.HS.SP.16.d (Δ) 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

Too wordy

*KY.HS.SP.19.b (Δ) Perform calculations using the appropriate counting technique, including simple probabilities.

Response

This is a fairly basic skill. Why would they not know simple probability in the required courses?

Calculus (+) Standards Feedback

KY.HS.C.1 (+) Understand limits.

Response

I do not believe the underlying 2 targets fully encompass "understanding" limits. Change wording. Too broad. Bloom's Taxonomy

KY.HS.C.2 (+) Demonstrate an understanding of limits by estimating and finding the limit of a function at a point graphically, numerically and algebraically.

Response

break into 3 targets

KY.HS.C.7 (+) Understand and use the limit definition of continuity to determine whether a given function is continuous at a specific point.

Response

Delete Understand and portion of writing.

KY.HS.C.11 (+) Define derivatives.

Response

Too broad, narrow down.

KY.HS.C.11.a (+) Define the derivative of a function as the limit of the difference quotient.

Response

How is this assessed?

KY.HS.C.11.b (+) Understand this limit of the difference quotient can be interpreted as an instantaneous rate of change or the slope of a tangent line.

Response

How? Bloom's taxonomy

KY.HS.C.13 (+) Understand the derivative as a function.

Response

too vague. Bloom's taxonomy

KY.HS.C.16 (+) Understand and apply the Mean Value Theorem, including numerical, graphical and algebraic representations.

Response

Too vague, break up into multiple standards

KY.HS.C.32 (+) Understand and apply differential equations.

Response

too vague, break into multiple targets that cover more than a and b below.

KY.HS.C.33 (+) Understand the definite integral of a function over an interval. Interpret a definite integral as a limit of Riemann Sums and as net accumulation of change.

Response
Understand How? Bloom's taxonomy

KY.HS.C.34 (+) Write a Riemann sum that represents the definition of a definite integral.

Response
"Create"

KY.HS.C.35 (+) Calculate the values of Riemann Sums over equal subdivisions to approximate definite integrals of functions represented graphically and numerically (using tables). Use left-hand sums, right-hand sums, midpoint sums and trapezoidal sums.

Response
delete midpoint sums and trapezoidal sums

Standards for Mathematical Practice Feedback

MP.2. Reason abstractly and quantitatively.

Response
Abstract thinking is super challenging for lower primary students. Many of the strategies need to be concrete. Abstract thinking should come at later ages.
Abstractly is not appropriate for a 5-6 year old brain!!!!

MP.3. Construct viable arguments and critique the reasoning of others.

Response
This is more for the higher grade levels. They are not developmentally ready to critique others in 3rd grade.
Limit this to verbally in younger grades and then have a clarifying statement where students are writing arguments when they are at a more appropriate age for argumentative / informative writing.

MP.4. Model with mathematics.

Response
Add in how you would like students to be modeling, provide examples

MP.5. Use appropriate tools strategically.

Response
I feel there needs to be more of an emphasis on modeling (so maybe this applies to MP.4 depending on your beliefs), rather than just just being a part of an appropriate tool.

MP.6. Attend to precision.

Response
What exactly does this mean or look like?
Not appropriate for Kindergarten

MP.7. Look for and make use of structure.

Response
Wording
Unclear for K

MP.8. Look for and express regularity in repeated reasoning.

Response
Wording
Clarify this to show examples of such repeated reasoning - patterns, rules, etc.
Unclear for K