Kentucky Alternate Assessment

Kentucky Academic Standards

Alternate Assessment Targets

Grade 4 Mathematics

Kentucky Academic Standards Purpose: KY Standards.Org

The *Kentucky Academic Standards (KAS)* Grades Primary-12 help ensure that all students across the commonwealth are focusing on a common set of standards and have opportunities to learn at a high level. This site provides administrators, teachers, parents, and other stakeholders in local districts with a basis for establishing and/or revising their curricula (for additional guidance, see **Kentucky Model Curriculum Framework**).

The instructional program should emphasize the development of students' abilities to acquire and apply the standards and assure appropriate accommodations are made for the diverse populations of students found within Kentucky schools. The resources found in this site specifies only the content for the required credits for high school graduation (program completion) and primary, intermediate, and middle-level programs leading up to these requirements. Schools and school districts are charged with identifying the content for elective courses and designing instructional programs for all areas.

The purpose of the Kentucky Academic Standards is to outline the minimum content knowledge required for all students before graduating or exiting Kentucky public high schools. Kentucky schools and districts are responsible for coordinating curricula across grade levels and among schools within districts. A coordinated curricular approach ensures that all students have opportunities to achieve Kentucky's Learning Goals and Academic Expectations.

Alternate Assessment Targets: (not a standard)

An Alternate Assessment Target represents limits to a selected Kentucky Academic Standard. An Alternate Assessment Target may reduce parts of the standard with specific guidance to what an assessment item could represent. Not all Kentucky Academic Standards selected for assessments will have an Alternate Assessment Target and may display the language: "*No limitations. All parts of the Kentucky Academic Standard are eligible to be included as an assessment item."* This would mean that the entire standard in its original form is reduced in depth and breadth and is eligible in its entirety to be used in the development of assessment items.

Standards for Mathematical Practice: (MP.1-MP.8)

The Standards for Mathematical Practice describe varieties of expertise that mathematics educators at all levels should seek to develop in their students. These practices rest on important “processes and proficiencies” with longstanding importance in mathematics education. The first of these are the National Council of Teachers of Mathematics (NCTM) process standards of problem solving, reasoning and proof, communication, representation and connections. The second are the strands of mathematical proficiency specified in the National Research Council’s 2001 report Adding It Up: adaptive reasoning, strategic competence, conceptual understanding (comprehension of mathematical concepts, operations and relations), procedural fluency (skill in carrying out procedures flexibly, accurately, efficiently and appropriately) and productive disposition (habitual inclination to see mathematics as sensible, useful and worthwhile, coupled with a belief in diligence and one’s own efficacy).

MP.1. Make sense of problems and persevere in solving them.

Mathematically proficient students start by explaining the meaning of a problem and looking for entry points to its solution. They analyze givens, constraints, relationships and goals. They make conjectures about the form and meaning of the solution and plan a solution pathway, rather than simply jumping into a solution attempt. They consider analogous problems and try special cases and simpler forms of the original problem in order to gain insight into its solution. They monitor and evaluate their progress and change course, if necessary. Older students might, depending on the context of the problem, transform algebraic expressions or change the viewing window on their graphing calculator to get the information they need. Mathematically proficient students can explain correspondences between equations, verbal descriptions, tables and graphs, or draw diagrams of important features and relationships, graph data and search for regularity or trends. Younger students might rely on using concrete objects or pictures to help conceptualize and solve a problem. Mathematically proficient students check their answers to problems using a different method and they continually ask themselves, "Does this make sense?" They can understand other approaches to solving complex problems and identify correspondences between different approaches.

MP.2. Reason abstractly and quantitatively.

Mathematically proficient students make sense of quantities and their relationships in problem situations. They bring two complementary abilities to bear on problems involving quantitative relationships: the ability to decontextualize—to abstract a given situation and represent it symbolically and manipulate the representing symbols as if they have a life of their own, without necessarily attending to their referents—and the ability to contextualize, to pause as needed during the manipulation process in order to probe into the referents for the symbols involved. Quantitative reasoning entails habits of creating a coherent representation of the problem at hand; considering the units involved; attending to the meaning of quantities, not just how to compute them; and knowing and flexibly using different properties of operations and objects.

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

Mathematically proficient students understand and use stated assumptions, definitions and previously established results in constructing arguments. They make conjectures and build a logical progression of statements to explore the truth of their conjectures. They are able to analyze situations by breaking them into cases, and can recognize and use counterexamples. They justify their conclusions, communicate them to others and respond to the arguments of others. They reason inductively about data, making plausible arguments that take into account the context from which the data arose. Mathematically proficient students also are able to compare the effectiveness of two plausible arguments, distinguish correct logic or reasoning from that which is flawed and—if there is a flaw in an argument—explain what it is. Elementary students can construct arguments using concrete referents such as objects, drawings, diagrams and actions. Such arguments can make sense and be correct, even though they are not generalized or made formal until later grades. Later, students learn to determine domains to which an argument applies. Students at all grades can listen or read the arguments of others, decide whether they make sense and ask useful questions to clarify or improve the arguments.

MP.4. Model with mathematics.

Mathematically proficient students can apply the mathematics they know to solve problems that arise in everyday life. In early grades, this might be as simple as writing an addition equation to describe a situation. In middle grades, a student might apply proportional reasoning to plan a school event or analyze a problem in the community. By high school, a student might use geometry to solve a design problem or use a function to describe how one quantity of interest depends on another. Mathematically proficient students who can apply what they know are comfortable making assumptions and approximations to simplify a complicated situation, realizing that these may need revision later. They are able to identify important quantities in a practical situation and map their relationships using such tools as diagrams, two-way tables, graphs, flowcharts and formulas. They can analyze those relationships mathematically to draw conclusions. They routinely interpret their mathematical results in the context of the situation and reflect on whether the results make sense, possibly improving the model if it has not served its purpose.

MP.5. Use appropriate tools strategically.

Mathematically proficient students consider the available tools when solving a mathematical problem. These tools might include pencil and paper, concrete models, a ruler, a protractor, a calculator, a spreadsheet, a computer algebra system, a statistical package or dynamic geometry software. Proficient students are sufficiently familiar with appropriate tools to make sound decisions about when each of these tools might be helpful, recognizing both the potential for insight and limitations. For example, mathematically proficient high school students analyze graphs of functions and solutions generated using a graphing calculator. They detect possible errors by strategically using estimation and other mathematical knowledge. When making mathematical models, they know technology can enable them to visualize the results of varying assumptions, explore consequences and compare predictions with data. Mathematically proficient students at various grade levels are able to identify relevant external mathematical resources, such as digital content located on a website and use them to pose or solve problems. They are able to use technological tools to explore and deepen their understanding of concepts.

MP.6. Attend to precision.

Mathematically proficient students try to communicate precisely to others. They try to use clear definitions in discussions with others and in their own reasoning. They state the meaning of the symbols they choose, including using the equal sign consistently and appropriately. They are careful about specifying units of measure and labeling axes to clarify the correspondence with quantities in a problem. They calculate accurately and efficiently, and express numerical answers with a degree of precision appropriate for the problem context. In the elementary grades, students provide carefully formulated explanations to each other. By the time they reach high school, they can examine claims and make explicit use of definitions.

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

Mathematically proficient students look closely to discern a pattern or structure. Young students, for example, might notice that three and seven more is the same amount as seven and three more, or they may sort a collection of shapes according to how many sides the shapes have. Later, students will see 7×8 equals the well-remembered $7 \times 5 + 7 \times 3$, in preparation for learning about the distributive property. In the expression $x2 + 9x + 14$, older students can see the 14 as 2×7 and the 9 as $2 + 7$. They recognize the significance of an existing line in a geometric figure and can use the strategy of drawing an auxiliary line for solving problems. They also are able to shift perspectives. They can see complicated things, such as some algebraic expressions, as single objects or as being composed of several objects. For example, they can see 5 - 3(x - y)2 as 5 minus a positive number times a square and use that to realize that its value cannot be more than 5 for any real numbers x and y.

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

Mathematically proficient students notice if calculations are repeated and look both for general methods and shortcuts. Upper elementary students might notice when dividing 25 by 11 that they are repeating the same calculations and conclude they have a repeating decimal. By paying attention to the calculation of slope as they repeatedly check whether points are on the line through (1, 2) with slope 3, middle school students might abstract the equation (y - 2)/(x - 1) = 3. Noticing the regularity in the way terms cancel when expanding (x - 1) (x + 1), (x - 1) (x2 + x + 1) and (x - 1) (x3 + x2 + x + 1) might lead to awareness of the general formula for the sum of a geometric series. As they work to solve a problem, mathematically proficient students maintain oversight of the process, while attending to the details. They continually evaluate the reasonableness of their intermediate results.

Clarifications:

The Clarification sections communicate expectations more clearly and concisely to teachers, parents, students and stakeholders through examples and illustrations.

Coherence:

- The Coherence/Vertical Alignment indicates a mathematics connection within and across grade levels.
- Coherence/Vertical Alignment is about math making sense. The standards are sequenced in a way that make mathematical sense and are based on the progressions for how students learn.
- The Coherence/Vertical Alignment component should help guide teachers when determining what standards students might need additional support with if they are struggling to understand certain content.

Grade 4 Mathematics Kentucky Academic Standards Assessed by Window

Window	Standard
1	KY.4.OA.2
1	KY.4.NBT.1
1	KY.4.NBT.2
1	KY.4.NBT.3
1	KY.4.MD.1

Window	Standard
2	KY.4.OA.5
2	KY.4.NF.1
2	KY.4.NF.2
2	KY.4.NF.3
2	KY.4.G.1

Math - Grade 4

<table>
<tr><td colspan="2">DOMAIN</td><td>Standard Clarifications</td></tr>
<tr><td></td><td>Operations & Algebraic Thinking</td><td>Clarifications</td></tr>
<tr><td>KY.4.OA.2

Test Window 1</td><td>Kentucky Academic Standard :
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.
MP.1, MP.2, MP.3

Alternate Assessment Target: Limit to multiplicative comparisons within 100.</td><td>Students solve multiplicative comparison problems using drawings and equations to determine situations like the ones below (Table 2 in Appendix A) on which quantity is being multiplied and which factor is telling how many times.

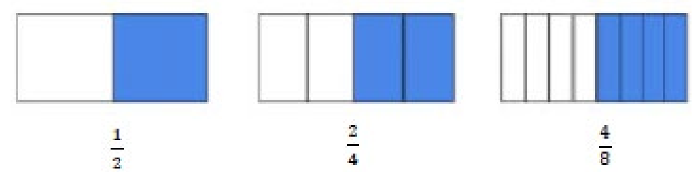
<table>
<tr><th colspan="3">Common Comparison Problems for Multiplication and Division</th></tr>
<tr><th>Unknown product</th><th>Group size unknown</th><th>Number of groups unknown</th></tr>
<tr><td>A blue hat costs $6. A red hat costs 3 times as much as the blue hat. How much does the red hat cost?

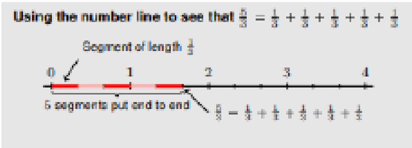
Measurement example: A rubber band is 6 cm long. How long will the rubber band be when it is stretched to be 3 times as long?</td><td>A red hat costs $18 and that is 3 times as much as a blue hat costs. How much does a blue hat cost?
Measurement example: A rubber band is stretched to be 18 cm long and is 3 times as long as it was at first. How long was the rubber band at first?</td><td>A red hat costs $18 and a blue hat costs $6. How many times as much does the red hat cost as the blue?
Measurement example: A rubber band was 6 cm long at first. Now it is stretched to be 18 cm long. How many times as long is the rubber band now as it was at first?</td></tr>
<tr><td>$a \times b = ?$</td><td>$a \times ? = p$ and $p \div a = ?$</td><td>$? \times b = p$ and $p \div b = ?$</td></tr>
</table>

Coherence KY.3.OA.3→ KY.4.OA.2→KY.5.NF.3</td></tr>
</table>

KY.4.OA.5 Test Window 2	**Kentucky Academic Standard :** Generate a number or shape pattern that follows a given rule. Identify apparent features of the pattern not explicit in the rule itself. **MP.2, MP.3** *Alternate Assessment Target: Limit to identifying and extending a rule or pattern.*	For example, given the rule "Add 3" and the starting number 1, generate terms in the resulting sequence and observe the terms appear to alternate between odd and even numbers. Explain informally why the numbers will continue to alternate in this way. Coherence KY.3.OA.9→ KY.4.OA.5→ KY.5.OA.3

	Numbers & Operations in Base 10	Clarifications
KY.4.NBT.1 Test Window 1	**Kentucky Academic Standard :** Recognize in a multi-digit whole number, a digit in one place represents ten times what it represents in the place to its right. **MP.7** *Alternate Assessment Target: Limit to numbers within 1000.*	Students recognize the relationship of same digits located in different places in a whole number. For example, in the number 435, the digit 5 in the ones place, while the digit 5 in 652 is in the tens place. The five in 652 is ten times greater than the five in 435. Coherence KY.2.NBT.1→ KY.4.NBT.1→KY.5.NBT.1
KY.4.NBT.2 Test Window 1	**Kentucky Academic Standard :** Represent and compare multi-digit whole numbers. a. Read and write multi-digit whole numbers using base-ten numerals, number names and expanded form. b. Compare two multi-digit numbers based on meanings of the digit in each place, using >, =, and < symbols to record the results of comparisons. **MP.2, MP.7** *Alternate Assessment Target: Limit full standard to numbers within 1000.*	a. Students write numbers in three different forms. For example, 435, four hundred thirty-five, 400 + 30 + 5. b. Students use different forms of the number to help compare. For example, when students are comparing numbers, they determine that 453 is greater than 435 because the 5 is worth 50 in 453, while the tens place only has 3 worth 30 in 435. So 453 > 435. Coherence KY.4.NBT.2→KY.5.NBT.3

KY.4.NBT.3 Test Window 1	**Kentucky Academic Standard :** Use place value understanding to round multi-digit whole numbers to any place. **MP.2, MP.6** *Alternate Assessment Target: Limit to numbers within 1000. Limit place values to tens and hundreds.*	Students go beyond the application of a procedure when rounding. Students demonstrate a deeper understanding of number sense and place value when they explain and reason about the answers they get when rounding. KY.4.OA.3 Coherence KY.3.NBT.1→ KY.4.NBT.3→KY.5.NBT.4
	Numbers & Operations - Fractions	Clarifications
KY.4.NF.1 Test Window 2	**Kentucky Academic Standard :** Understand and generate equivalent fractions. a. Use visual fraction models to recognize and generate equivalent fractions that have different numerators/denominators even though they are the same size. b. Explain why a fraction $\frac{a}{b}$ is equivalent to a fraction $(n\ x\ a)(n\ x\ b)$. **MP.4, MP.7, MP.8** *Alternate Assessment Target: Limit full standard to using visual fraction models to identify equivalent fractions with denominators 2, 3, 4, 6, 8, 10.*	Students draw fractions and see equivalent fractions.  Coherence KY.3.NF.3→ KY.4.NF.1→ KY.5.NF.1

KY.4.NF.2 Test Window 2	**Kentucky Academic Standard :** Compare two fractions with different numerators and different denominators using the symbols <, =, or >. Recognize comparisons are valid only when the two fractions refer to the same whole. Justify the conclusions. MP.2, MP.3 *Alternate Assessment Target: Limit to comparing two fractions with the same numerator or the same denominator by reasoning about their size. Record the results of comparisons with the symbols >, = or <. Limit denominators to 2, 3, 4, 6, 8, 10.*	Students use a variety of representations to compare fractions including concrete models, benchmarks, common denominators and common numerators. Note: Students determine which strategy makes the most sense to them, realizing they use different strategies for different situations. Coherence KY.3.NF.3d→ KY.4.NF.2→KY.5.NF.2
KY.4.NF.3 Test Window 2	**Kentucky Academic Standard :** Understand a fraction $\frac{a}{b}$ with a > 1 as a sum of fractions $\frac{1}{b}$. a. Understand addition and subtraction of fractions as joining and separating parts referring to the same whole. 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. c. Add and subtract mixed numbers with like denominators. d. Solve word problems involving addition and subtraction of fractions referring to the same whole and having like denominators. MP.1, MP.5, MP.7 *Alternate Assessment Target: Limit full standard to solving word problems involving addition and subtraction of fractions of the same whole with like denominators and limit denominators to 2, 3, 4, 6, 8, 10.*	b. $\frac{3}{5}=\frac{1}{5}+\frac{1}{5}+\frac{1}{5}$ OR $\frac{3}{5}=\frac{2}{5}+\frac{1}{5}$ $3\frac{1}{4}=1+1+1+\frac{1}{4}$ OR $3\frac{1}{4}=\frac{4}{4}+\frac{4}{4}+\frac{4}{4}+\frac{1}{4}$ c/d. Adding and subtracting using visual fraction models and/or equations to represent the problem.  KY.5.NF.1 Coherence KY.3.NF.1→ KY.4.NF.3→ KY.5.NF.2

	Measurement & Data	Clarifications
KY.4.MD.1 Test Window 1	**Kentucky Academic Standard :** 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). a. Understand the relationship of measurement units within any given measurement system. b. Within any given measurement system, express measurements in a larger unit in terms of a smaller unit. c. Record measurement equivalents in a two-column table. **MP.5, MP.6** *Alternate Assessment Target: Limit full standard to the U.S. Standard System, express measurements of length and time.*	c. Two- column tables may include: <table><tr><th>kg</th><th>g</th></tr><tr><td>1</td><td>1000</td></tr><tr><td>2</td><td>2000</td></tr><tr><td>3</td><td>3000</td></tr></table><table><tr><th>ft</th><th>in</th></tr><tr><td>1</td><td>12</td></tr><tr><td>2</td><td>24</td></tr><tr><td>3</td><td>36</td></tr></table><table><tr><th>lb</th><th>oz</th></tr><tr><td>1</td><td>16</td></tr><tr><td>2</td><td>32</td></tr><tr><td>3</td><td>48</td></tr></table> Coherence KY.4.MD.1→KY.5.MD.1
	Geometry	Clarifications
KY.4.G.1 Test Window 2	**Kentucky Academic Standard :** Draw points, lines, line segments, rays, angles (right, acute, obtuse) and perpendicular and parallel lines. Identify these in two-dimensional figures. **MP.5, MP.6** *Alternate Assessment Target: No limitations. All parts of the Kentucky Academic Standard are eligible to be included as an assessment item.*	Coherence KY.3.G.1→KY.4.G.1

RESOURCES

[Kentucky Academic Standards for Mathematics]

CONTACT INFORMATION

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KDE DAC Information