Kentucky Alternate Assessment

Kentucky Academic Standards

Alternate Assessment Targets

Grade 5 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 $(x - 1) (x + 1)$, $(x - 1) (x^2 + x + 1)$ and $(x - 1) (x^3 + x^2 + x + 1)$ 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.
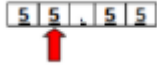
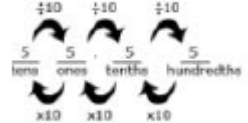**Grade 5 Mathematics Kentucky Academic Standards Assessed by Window**

Window	Standard
1	KY.5.OA.3
1	KY.5.NBT.1
1	KY.5.NBT.2
1	KY.5.NF.1
1	KY.5.MD.2
1	KY.5.G.1

Window	Standard
2	KY.5.OA.1
2	KY.5.NBT.5
2	KY.5.NF.3
2	KY.5.NF.2
2	KY.5.MD.2*

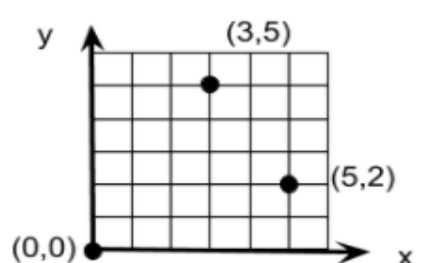* In mathematics, some standards are tested across both testing windows (in both Windows 1 and 2).

Math - Grade 5

DOMAIN	Standard Clarifications
Operations & Algebraic Thinking	Clarifications
KY.5.OA.1 `Test Window 2`	**Kentucky Academic Standard :** Use parentheses, brackets or braces in numerical expressions and evaluate expressions that include symbols. MP.1, MP.3 *Alternate Assessment Target: Limit to parentheses only.*	Students work with the order of first evaluating terms in parentheses, then brackets, [] and then braces, {}. Coherence KY.5.OA.1→ KY.6.EE.2
KY.5.OA.3 `Test Window 1`	**Kentucky Academic Standard :** Generate numerical patterns for situations. a. Generate a rule for growing patterns, identifying the relationship between corresponding terms (x, y). b. Generate patterns using one or two given rules (x, y). c. Use tables, ordered pairs, and graphs to represent the relationship between the quantities. MP.2, MP.4 *Note: Grade 5 limits to quadrant 1 of the coordinate plane.* *Alternate Assessment Target: Limit full standard to one rule.*	Given the rule "Add 3" and the starting number 0, and given the rule "Add 6" and the starting number 0, students generate terms in the resulting sequences (creating ordered pairs). Students observe the terms in one sequence are twice the corresponding terms in the other sequence. Explain informally why this is so. Graph the ordered pairs on a coordinate plane. Coherence KY.4.OA.5→ KY.5.OA.3→ KY.6.EE.9
Numbers & Operations in Base 10	Clarifications
KY.5.NBT.1 `Test Window 1`	**Kentucky Academic Standard :** Recognize that in a multi-digit number, a digit in one place represents 10 times as much as it represents in the place to its right and $\frac{1}{10}$ of what it represents in the place to its left. MP.2, MP.7 *Alternate Assessment Target: Limit to numbers within 1000.*	In the number 55.55, each digit is 5, but the value of each digit is different because of the placement.

		The arrow points to is 1/10 of the 5 to the left and 10 times greater than the 5 to the right. The 5 in the ones place is 1/10 of 50 and 10 times greater than five
		tenths.
		Note: grade 5 expectations in this domain are limited to decimals through the thousandths place.
		Coherence KY.4.NBT.1→KY.5.NBT.1
KY.5.NBT.2 <mark>Test Window 1</mark>	Kentucky Academic Standard : 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. **MP.3, MP.8** *Alternate Assessment Target: Limit full standard to explain patterns in the placement of the decimal point when a decimal is multiplied or divided by a power of 10.*	Students recognize when a number is multiplied by 10, a zero is added to the end because each digit's value became 10 times larger. Students use the same reasoning to explain in the problem. ● $523 \times 10^3 = 523,000$ The place value of 523 is increased by 3 places. ● $5.223 \times 10^2 = 522.3$ The place value of 5.223 is increased by 2 places. ● $52.3 \div 10^1 = 5.23$ The place value of 52.3 is decreased by one place. Note: grade 5 expectations in this domain are limited to decimals through the thousandths place. Coherence KY.5.NBT.2→ KY.6.EE.1

KY.5.NBT.5 **Test Window 2**	Kentucky Academic Standard : Fluently multiply multi-digit whole numbers (not to exceed four-digit by two-digit multiplication) using an algorithm. MP.7, MP.8 *Alternate Assessment Target: Limit to products within 1000.*	Students make connections from previous work with multiplication, using models/representations to develop an efficient algorithm to multiply multi-digit whole numbers. Coherence KY.4.NBT.5→ KY.5.NBT.5→ KY.6.NS.3
	Numbers & Operations – Fractions	Clarifications
KY.5.NF.1 **Test Window 1**	Kentucky Academic Standard : Efficiently 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. MP.2, MP.3 *Alternate Assessment Target: Limit full standard to denominators of 2, 3, 4, 6, 8, 10 and limit to equations where only one fraction has to be converted.*	Using common denominator $\frac{2}{3}+\frac{5}{4}=\frac{8}{12}+\frac{15}{12}=\frac{23}{12}$ In general, $\frac{a}{b}+\frac{c}{d}=\frac{(ad+bc)}{bd}$ KY.4.NF.1 Coherence KY.4.NF.3→ KY.5.NF.1→KY.6.EE.7

	Kentucky Academic Standard :	a. For example: Mary ate ⅓ of the pizza. Tommy ate ⅔ of the pizza. How much of the total pizza did they eat together?
KY.5.NF.2 <mark>Test Window 2</mark>	Solve word problems involving addition and subtraction of fractions. a. Solve word problems involving addition and subtraction of fractions referring to the same whole, including cases of unlike denominators. b. Use benchmark fractions and number sense of fractions to estimate mentally and assess the reasonableness of answers. **MP.1, MP.4** *Alternate Assessment Target: Limit full standard to denominators of 2, 3, 4, 6, 8, 10; if unlike denominators are used, one must be the least common denominator of the other.*	● making equivalent fractions to add/subtract fractions ● using visual representations to add/subtract fractions ○ Area Model ○ Linear Model b. Recognize an incorrect result ⅖ + ½ = 3/7, by observing that 3/7 < ½ . Note: Estimation skills include identifying when estimation is appropriate, determining method of estimation and verifying solutions or determining the reasonableness of situations using various estimation strategies. The skill of estimating within context allows students to further develop their number sense. Coherence KY.4.NF.3→KY.5.NF.2
KY.5.NF.3 <mark>Test Window 2</mark>	Kentucky Academic Standard : Interpret a fraction as division of the numerator by the denominator. $\left(\frac{a}{b} = a \div b\right)$. Solve word problems involving division of whole numbers leading to answers in the form of fractions or mixed numbers by using visual fraction models or equations to represent the problem. **MP.4, MP.8** *Alternate Assessment Target: Limit to denominators of 2, 3, 4, 6, 8, 10.*	For example students interpret ¾ as the result of dividing 3 by 4, noting that ¾ multiplied by 4 equals 3 and when 3 wholes are shared equally among 4 people each person has a share of size ¾. Coherence KY.5.NF.3→KY.6.RP.2

Measurement & Data		Clarifications
KY.5.MD.2 Test Window 1 Test Window 2	**Kentucky Academic Standard :** 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. MP.4, MP.5, MP.6 *Alternate Assessment Target: Limit to bar graph and pictograph.*	Generate questions for which data can be gathered and sort questions that are categorical (Possible question: What is your favorite after-school activity?) and questions that are numerical (Possible question: How many times can you say/write your name in one minute?). After gathering data on a question, students discuss which graphs are possible and which ones are not possible, and why. Students select one type of graph that fits the data gathered and create the graph, by hand or by using technology. KY.6.SP.2 Coherence KY.4.MD.4→ KY.5.MD.2→ KY.6.SP.4
Geometry		Clarifications
KY.5.G.1 Test Window 1	**Kentucky Academic Standard :** 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. MP.4, MP.7 *Note: Grade 5 limits to quadrant 1 of the coordinate plane.* *Alternate Assessment Target: No limitations. All parts of the Kentucky Academic Standard are eligible to be included as an assessment item.*	This standard pertains to the first quadrant only which limits to positive ordered pairs only. Coherence KY.5.G.1→ KY.6.NS.6

CONTACTS/RESOURCES

[Kentucky Academic Standards for Mathematics](#)

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