Kentucky Alternate Assessment

Kentucky Academic Standards

Alternate Assessment Targets

Grade 8 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 8 Mathematics Kentucky Academic Standards Assessed by Window

Window	Standard
1	KY.8.NS.1
1	KY.8.EE.5
1	KY.8.EE.7
1	KY.8.F.3*
1	KY.8.SP.1

Window	Standard
2	KY.8.F.1
2	KY.8.F.2
2	KY.8.F.3*
2	KY.8.G.1
2	KY.8.G.3
2	KY.8.G.9

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

Math - Grade 8

DOMAIN		Standard Clarifications
	The Number System	Clarifications
KY.8.NS.1 Test Window 1	**Kentucky Academic Standard :** 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. **MP.2, MP.6, MP.7** *Alternate Assessment Target: Limit to numbers up to 20.*	Emphasis is placed on how all rational numbers can be written as an equivalent decimal. The end behavior of the decimal determines the classification of the number. Coherence KY.7.NS.2→ KY.8.NS.1→ KY.HS.N.3
	Expressions & Equations	Clarifications
KY.8.EE.5 Test Window 1	**Kentucky Academic Standard :** Graph proportional relationships, interpreting the unit rate as the slope of the graph. Compare two different proportional relationships represented in different ways. **MP.2, MP.3, MP.4** *Alternate Assessment Target: Limit coordinates of ordered pairs negative 20 to 20.*	Emphasis is on relating previous knowledge of unit rate to slope in tables, graphs, equations and sets of ordered pairs and comparing the slopes of two different proportional relationships. Different ways the proportional relationships can be represented include tables, graphs, equations, or sets of ordered pairs. KY.8.F.2 Coherence KY.7.RP.2→ KY.8.EE.5→ KY.HS.A.23

KY.8.EE.7 Test Window 1	**Kentucky Academic Standard :** Solve linear equations in one variable a. Give examples of linear equations in one variable with one solution, infinitely many solutions, or no solutions. Show which of these possibilities is the case by successively transforming the given equation into simpler forms, until an equivalent equation of the form $x = a$, $a = a$, or $a = b$ results (where a and b are different numbers). b. Solve linear equations with rational number coefficients, including equations whose solutions require expanding expressions using the distributive property and combining like terms. **MP.2, MP.3, MP.7** *Alternate Assessment Target: Limit full standard to equations with one solution and limit the range of solutions to within negative 100 and 100.*	Building upon skills from grade 7, students combine like terms on the same side of the equality and use the distributive property to simplify the equation when solving. Emphasis in this standard is also on using rational number coefficients. Solutions of certain equations may elicit infinitely many or no solutions. Coherence KY.7.EE.1→ KY.8.EE.7→ KY.HS.A.18
	Functions	Clarifications
KY.8.F.1 Test Window 2	**Kentucky Academic Standard :** Understand that a function is a rule that assigns to each input exactly one output. The graph of a function is the set of ordered pairs consisting of an input and the corresponding output. **MP.7, MP.8** *Alternate Assessment Target: Limit coordinates of ordered pairs negative 20 to 20.*	Students understand the reasoning that not all relations are functions. Note: Function notation is not required in grade 8. Coherence KY.8.F.1→ KY.HS.F.1

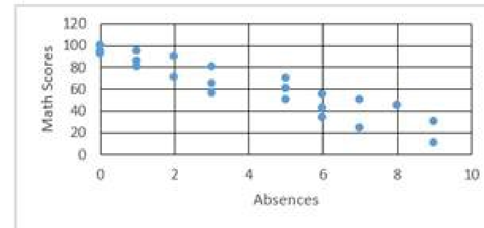
KY.8.F.2 Test Window 2	**Kentucky Academic Standard :** Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions). **MP.1, MP.2, MP.4** *Alternate Assessment Target: Limit coordinates of ordered pairs negative 20 to 20.*	Given a linear function represented using one method listed and another linear function represented by different method listed, determine which function has the greater or lesser rate of change or greater or lesser initial value. Coherence KY.7.RP.2→ KY.8.F.2→ KY.HS.F.1
KY.8.F.3 Test Window 1 Test Window 2	**Kentucky Academic Standard :** Understand properties of linear functions. a. Interpret the equation $y = mx + b$ as defining a linear function, whose graph is a straight line. b. Identify and give examples of functions that are not linear. **MP.7** *Alternate Assessment Target: Limit full standard to linear functions with intercepts between negative 20 and 20.*	a. For example, the equation $c = 3g + 5$ models the linear function for the total cost, *c*, of bowling, where *g* represents the number of games played and shoe rental is $5. b. For example, the function $A = s^2$ giving the area of a square as a function of its side length is not linear because its graph contains the points (1,1), (2,4) and (3,9), which are not on a straight line. Coherence KY.7.EE.4→ KY.8.F.3→ KY.HS.F.11

	Geometry	Clarifications
KY.8.G.1 Test Window 2	**Kentucky Academic Standard :** 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. 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.*	Emphasis is congruence transformations preserve corresponding congruent lines, segments and angles. KY.HS.G.2 Coherence KY.8.G.1→ KY.HS.G.3(+)
KY.8.G.3 Test Window 2	**Kentucky Academic Standard :** Describe the effect of dilations, translations, rotations and reflections on two-dimensional figures using coordinates. MP.3, MP.5, MP.6 *Alternate Assessment Target: Limit to translations, rotations and reflections of quadrilaterals (e.g. rectangles, parallelograms, trapezoids) and triangles.*	Emphasis is on noticing patterns across examples, noting how the *x* and *y* values change for different kinds of transformations. Coherence KY.8.G.3→ KY.HS.G.9

KY.8.G.9 Test Window 2	**Kentucky Academic Standard :** Apply the formulas for the volumes and surface areas of cones, cylinders and spheres and use them to solve real-world and mathematical problems. **MP.1, MP.7, MP.8** *Alternate Assessment Target: No limitations. All parts of the Kentucky Academic Standard are eligible to be included as an assessment item.*	Cones: $v = \frac{1}{3}\pi r^2 h.$ $SA = \pi r\,(r^2+\sqrt{(r^2}+h^2))$ Cylinders: V=πr^2h. SA =2$\pi rh + 2\pi r^2$ Spheres: $V = \frac{4}{3}\pi r^3$ $SA = 4\pi r^2$ Coherence KY.7.G.4→ KY.8.G.9→ KY.HS.G.25

<table>
<tr><th></th><th>Statistics and Probability</th><th>Clarifications</th></tr>
<tr>
<td>KY.8.SP.1

Test Window 1</td>
<td>Kentucky Academic Standard :
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.
MP.2, MP.7

Alternate Assessment Target: Limit to positive x, y coordinates.</td>
<td>
<table>
<tr><th>Absences</th><th>Math Scores</th></tr>
<tr><td>3</td><td>65</td></tr>
<tr><td>5</td><td>50</td></tr>
<tr><td>1</td><td>95</td></tr>
<tr><td>1</td><td>85</td></tr>
<tr><td>3</td><td>80</td></tr>
<tr><td>6</td><td>34</td></tr>
<tr><td>5</td><td>70</td></tr>
<tr><td>3</td><td>56</td></tr>
<tr><td>0</td><td>100</td></tr>
<tr><td>7</td><td>24</td></tr>
<tr><td>8</td><td>45</td></tr>
<tr><td>2</td><td>71</td></tr>
<tr><td>9</td><td>30</td></tr>
<tr><td>0</td><td>95</td></tr>
<tr><td>6</td><td>55</td></tr>
<tr><td>6</td><td>42</td></tr>
<tr><td>2</td><td>90</td></tr>
<tr><td>0</td><td>92</td></tr>
<tr><td>5</td><td>60</td></tr>
<tr><td>7</td><td>50</td></tr>
<tr><td>9</td><td>10</td></tr>
<tr><td>1</td><td>80</td></tr>
</table>
Given data from students' math scores and absences, make a scatterplot.


For example, given the data and scatter plot above, students explain the relationship between students' absences and math scores shows a negative, linear association and has no obvious outliers.

KY.HS.SP.6
Coherence KY.8.SP.1→ KY.HS.SP.8
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RESOURCES

Kentucky Academic Standards for Mathematics

CONTACT INFORMATION

Kentucky Department of Education
Office of Assessment and Accountability
Division of Assessment and Accountability Support
(502) 564-4394

KDE DAC Information