CollegeBoard

SAT® SUITE
OF ASSESSMENTS

Alignment to Kentucky Academic Standards

COLLEGE BOARD AND KENTUCKY

About College Board

College Board reaches more than 7 million students a year, helping them navigate the path from high school to college and career. Our not-for-profit membership organization was founded more than 120 years ago. We pioneered programs like the SAT® and AP® to expand opportunities for students and help them develop the skills they need. Our BigFuture® program helps students plan for college, pay for college, and explore careers. Learn more at cb.org.

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Executive Summary

This report details College Board's study of the alignment between the Kentucky Academic Standards and the digital SAT® Suite of Assessments. Though not designed to align to any single set of academic content standards, the SAT Suite tests are firmly grounded in the same sorts of high-quality evidence used by states and others to develop their college and career readiness standards, meaning that states such as Kentucky may employ the tests as valid, reliable, and fair assessments of their students' attainment of key postsecondary prerequisites.

The key features of the SAT Suite's Reading and Writing section are

- the use of a range of text complexity consistent with college and workforce training requirements;
- an emphasis on close reading and use of evidence, both textual and quantitative;
- the inclusion of data and informational graphics, which students must analyze in conjunction with text;
- a focus on the use and meaning of high-utility academic words and phrases in context;
- attention to a core set of important Standard English conventions and to effective written expression more generally; and
- the requirement that students work and demonstrate facility with texts across a wide range of disciplines, including literature, history/social studies, the humanities, and science.

The key features of the SAT Suite's Math section are

- a strong focus on the content that matters most for college and career readiness and success;
- an emphasis on rich applied problems in academic and real-life settings in which the use of mathematical practices is integrated with the content;
- a balance of fluency, conceptual understanding, and application items within and across all content topics; and
- an emphasis on problem-solving and data analysis.

Based on a thorough review of the Kentucky Academic Standards, we find that the SAT Suite **strongly aligns** and thereby supports students' progress toward educational and workplace success.[1] The following table provides detail by program and grade level/course:

Kentucky Academic Standards	College Board Assessment	Degree of Alignment
Grade 11-12 **Reading and Writing**	SAT	Strong
Grade 11-12 **Reading and Writing**	PSAT/NMSQT and PSAT 10	Strong
Grade 9-10 **Reading and Writing**	PSAT/NMSQT and PSAT 10	Strong
Grade 9-10 **Reading and Writing**	PSAT 8/9	Strong
Grade 8 **Reading and Writing**	PSAT 8/9	Strong
Algebra 1	SAT	Very Strong
	PSAT/NMSQT and PSAT 10	Very Strong
	PSAT 8/9	Very Strong
Geometry	SAT	Strong
	PSAT/NMSQT and PSAT 10	Strong
	PSAT 8/9	Partial
Algebra 2	SAT	Strong
	PSAT/NMSQT and PSAT 10	Strong
	PSAT 8/9	Strong
Grade 8 **Mathematics**	PSAT 8/9	Strong
KAS Science and Engineering Practices	SAT	Very Strong
KAS Science and Engineering Practices	SAT	Very Strong

In the sections that follow, we offer a description of our alignment methodology and a more detailed summary of our findings in each content area. Appendices to this document provide detailed alignment tables for each grade/course and subject area.

[1] In his widely published research on the alignment of educational expectations with large-scale assessment systems, Norman Webb asserts, among other criteria, that at least 50% of the skills within a content category should have at least one related assessment item. When looking at alignment matches between the standards and the testing domains of the SAT Suite, our team found the alignment to be "strong" (equal to or greater than 50% of standards aligned) to "very strong" (equal to or greater than 75% of standards aligned). Alignments less than 50% are noted above as "partial." See Norman L. Webb, "Issues Related to Judging the Alignment of Curriculum Standards and Assessments," *Applied Measurement in Education* 20, no. 1 (December 2007): 7–25. https://www.cehd.umn.edu/edpsych/c-bas-r/docs/webb2007.pdf.

Section 1: Alignment Summary

In his widely published research on alignment, Norman Webb writes, "Assessments, as well as curricula, designed to fulfill expectations and standards are constrained by very pragmatic factors such as time, sequencing, and a high variation in the rate of learning. These constraints force those who develop assessments to make decisions about the amount of emphasis or weight that will be given to different topics[2] on a test." He goes on to define the criteria by which an assessment program can measure itself, using a "scale of agreement" whereby an acceptable alignment can be achieved when "assessments cover a sufficient number of topics in expectations so that a student judged to have acceptable knowledge on the assessments will have demonstrated some knowledge on nearly all topics in expectations."[3]

Webb goes on to write that "judging alignment is strengthened by using specific criteria to analyze agreement among expectations and assessments." One of these specific criteria is *categorial concurrence*, which is achieved when "the same or consistent categories of content appear in both expectations and assessments."

There is strong concurrence between the SAT Suite and the categories of knowledge defined in the Kentucky Academic Standards. While not every standard is assessed within the SAT Suite, nearly all domains are represented, and a variety of standards are sampled from each domain.

These findings are the result of College Board content expert examination of each Kentucky Academic Standard with respect to the corresponding content within the SAT Suite. College Board content experts reviewed the Kentucky standards in Reading and Writing and Math from grade 8 through high school. Standards were then matched to the corresponding skill/knowledge testing point within each domain of the SAT Suite. In some cases, single standards were found to have multiple matches to SAT Suite testing points; in other cases, no matches were found. Alignment results were then tallied by course/grade band and linked to the SAT Suite testing program(s) whose student populations most closely match the corresponding grade level(s).

[2] Webb defines topics as large categories of knowledge "identified by standards or main areas of content specified."

[3] Norman L. Webb, *Criteria for Alignment of Expectations and Assessments in Mathematics and Science Education* (Council of Chief State School Officers and National Institute for Science Education Research Monograph No. 6). (Madison: University of Wisconsin, Wisconsin Center for Education Research, 1997): 23. https://files.eric.ed.gov/fulltext/ED414305.pdf.

In the sections that follow, we provide a summary of alignment in each content area as well as detailed tables (in Appendices B and C) demonstrating the specific intersections between each Kentucky Academic Standard and each SAT skill/knowledge testing point.

Kentucky Academic Standards for Reading and Writing

The Kentucky Academic Standards for Reading and Writing (2019) represent the essential skills and knowledge students should develop in literacy as they prepare for success in college, career, and life beyond secondary education. The standards require students to read literature as well as informational texts and argumentative texts that address relevant questions in content areas such as science and history/social studies. The standards stress critical thinking, analytical, and reasoning skills that require students to refer to what they have read for evidence and support. Additionally, students are asked to demonstrate proficiency in core conventions of Standard English as well as demonstrate skills in vocabulary, syntax, and other language use.

The SAT Suite's Reading and Writing section—administered as part of the SAT, PSAT/NMSQT and PSAT 10, and PSAT 8/9—measures many of the same skills and knowledge emphasized in the Kentucky Academic Standards. The primary aim of the Reading and Writing section is to assess students' readiness for college and workforce training with respect to literacy. To that end, the Reading and Writing section focuses on key elements of comprehension, rhetoric, writing, and language conventions that have been identified by the best available evidence as necessary for postsecondary readiness and success.

Students who are successful on the Reading and Writing section will be able to

- demonstrate understanding of **information and ideas** in texts across a range of academic disciplines and complexities aligned with college and career readiness requirements;
- effectively evaluate the **craft and structure** of texts, including demonstrating understanding and proficient use of high-utility academic vocabulary in context;
- revise the **expression of ideas** in texts to enhance communicative power in accordance with specified rhetorical goals; and
- edit texts in accordance with **Standard English conventions** in order to meet academic and workplace expectations regarding the use of standardized expression.

College Board's comparison of the SAT Suite Reading and Writing section to the Kentucky Academic Standards for Reading and Writing finds that the alignment is strong. While there are some ELA standards that the SAT Suite is not designed to measure—notably those for speaking and listening, publication, and research—the suite offers a valid, reliable, and fair assessment of the core reading, writing, and language requirements of the Kentucky Academic Standards for Reading and Writing.

College Board's alignment study looked at each SAT Suite program and considered its alignment to the corresponding grade-specific standards in ELA. Specifically, the study examined the following comparisons:

1. SAT to the standards in grades 11–12
2. PSAT/NMSQT and PSAT 10 to the standards in grades 11–12
3. PSAT/NMSQT and PSAT 10 to the standards in grades 9–10

4. PSAT 8/9 to the standards in grades 9–10
5. PSAT 8/9 to the standards in grade 8

Below are summaries of College Board's alignments by grade(s) and test(s).

- **Grades 11–12 standards**: Of the 31 standards in Reading, Composition, and Language, 20 (65%) align to the test design of the SAT and the PSAT/NMSQT and PSAT 10. Like its paper-based predecessor, the digital SAT Suite is not designed to assess publication (C.11-12.4), long-range research (C.11-12.5, C.11-12.6), or writing over extended time frames (C.11-12.7). The digital SAT Suite does, however, assess students' ability to read, analyze, and reason about a wide array of texts in different disciplines; synthesize information across texts; use textual and quantitative evidence; revise writing for development, organization, and style; and edit texts to demonstrate mastery of core conventions of Standard English grammar, usage, and punctuation.
- **Grades 9–10 standards**: The alignment of the grades 9–10 standards closely resembles that of the standards in grades 11–12. Of the 31 standards in Reading, Composition, and Language, 20 (65%) align to the test design of the PSAT/NMSQT and PSAT 10 and the PSAT 8/9.
- **Grade 8 standards**: Of the 31 standards in Reading, Composition, and Language, 19 (61%) align to the test design of the PSAT 8/9. Like its counterparts in the suite, the PSAT 8/9 does not require students to conduct research or write over extended time frames. However, the PSAT 8/9 does assess students' ability to read, analyze, and reason about a wide array of increasingly complex texts (both literary and informational) as well as their ability to revise and edit texts for a wide range of audiences and purposes using core conventions of Standard English.

Readers who wish to review detailed alignments to the SAT Suite can find these in **Appendix B: Alignments of ELA Standards to SAT Suite**.

Kentucky Academic Standards for Mathematics

The Kentucky Academic Standards for Mathematics (2019) represent what students should know and be able to do in math as they become college and career ready. From kindergarten through grade 8, the standards define increasingly sophisticated skills and knowledge that build on one another. In high school, the standards help create a strong foundation in students' mathematical thinking, reasoning, and problem-solving.

The SAT Suite's Math section—administered as part of the SAT, PSAT/NMSQT and PSAT 10, and PSAT 8/9—measures many of the same skills and knowledge emphasized in the Kentucky Academic Standards. Like the Kentucky Academic Standards, the SAT Suite Math section is focused on the skills and knowledge that reflect a student's fluency with, understanding of, and ability to apply the math concepts, skills, and practices that are most essential for postsecondary work.

The Math section of the SAT Suite is designed to elicit evidence from student performance in support of four broad claims about students' math achievement. To be successful on the Math section, students must be able to

- analyze, fluently solve, and create linear equations and inequalities as well as analyze and fluently solve systems of linear equations and inequalities using multiple techniques (**Algebra**);

- exhibit attainment of skills and knowledge central for progression to more advanced math courses, including analyzing and fluently solving absolute value, quadratic, exponential, polynomial, rational, radical, and other nonlinear functions (**Advanced Math**);
- apply quantitative reasoning about ratios, rates, and proportional relationships; understand and apply unit rate; and analyze and interpret one- and two-variable data (**Problem-Solving and Data Analysis**); and
- solve problems that focus on perimeter, area, and volume; angles, triangles, and (PSAT/NMSQT, PSAT 10, and SAT only) trigonometry; and circles (SAT only) (**Geometry and Trigonometry**).

While the Kentucky Academic Standards for Mathematical Practice are not specifically addressed in this report, these standards can be found interwoven throughout the SAT Suite. In order to do well on the varied item types they will see, students must make sense of problems and persevere in solving them (Math Practice 1). Students have many opportunities to make use of structure (Math Practice 7) in the Algebra and Advanced Math content domains, and they must evaluate claims (Math Practice 3) in the Problem-Solving and Data Analysis domain. Students represent quantities in context with mathematical relationships and interpret their results (Math Practice 2) in all three of those domains. Mathematical modeling (Math Practice 4) is especially important in the domains of Algebra, Advanced Math, and Geometry and Trigonometry.

College Board's comparison of the SAT Suite Math section to the Kentucky Academic Standards for Mathematics finds that the alignment overall is strong. College Board's math experts examined each SAT Suite program and considered its alignment to the corresponding math standards from grade 8 through high school. Specifically, the study examined the following comparisons:

1. SAT Suite to Algebra 1
2. SAT Suite to Geometry
3. SAT Suite to Algebra 2
4. PSAT 8/9 to Grade 8 Math

Below are summaries of College Board's alignments by grade and test(s).

- **Algebra 1**: Research shows the distinctive importance of algebra with respect to postsecondary success. As a result, there is a strong alignment of the SAT Suite to the Kentucky Academic Standards in math. Of the 35 standards identified for Algebra I, 30 of these (86%) align to the SAT, 29 of these (83%) align to the PSAT/NMSQT and PSAT 10, and 29 (83%) align to the PSAT 8/9.
- **Geometry**: Geometry is an important domain assessed within the SAT Suite. Each program in the suite assesses a sampling of key Geometry standards. Of the 26 standards in high school Geometry, 15 of these (58%) align to the SAT, 14 of these (54%) align to the PSAT/NMSQT and PSAT 10, and 11 of these (42%) align to the PSAT 8/9.
- **Algebra 2**: Of the 39 standards in Algebra 2, 25 of these (64%) align to the SAT, PSAT/NMSQT and PSAT 10, and 23 of these (59%) align to the PSAT 8/9.
- **Grade 8**: Kentucky's grade 8 standards are well represented on the PSAT 8/9. Of the 27 standards in grade 8, 18 (67%) align to the PSAT 8/9.

Readers who wish to review detailed alignments to the SAT Suite can find these in **Appendix C: Alignments of Math Standards to SAT Suite**.

Kentucky Academic Standards for Science

The Kentucky Academic Standards for Science specify the knowledge and skills required for students to be scientifically literate and to succeed in college, careers, and citizenship. The Science and Engineering Practices, in particular, describe the critical thinking and inquiry-based problem solving that foster scientific thinking and link across disciplines and concepts.

Although the SAT Suite was not designed specifically to measure student achievement in any specific scientific discipline, questions throughout both the Reading and Writing section and the Math section assess students' science reasoning skills.

In the Reading and Writing section, science is, along with the humanities, history/social studies, and literature, one of the four core subject areas sampled in passage content. Science passages in the Reading and Writing section are grounded in authentic contexts—actual studies, real data, and the like. The passages illustrate scientific reasoning and require students to engage in such reasoning to analyze them successfully. Questions associated with science passages require students to demonstrate such skills as reading and understanding hypotheses; locating, analyzing, and making use of data conveyed in words as well as in informational graphics; and using textual information along with logic and reasoning to evaluate the implications of research findings on hypotheses (such as whether data collected by scientists support or refute a given hypothesis).

In the Math section, science contexts (along with those in history/social studies and others about real-world topics) are used to assess students' ability to solve math problems grounded in realistic situations. Although the focus of the science-context questions remains eliciting demonstrations of skills and knowledge in math, topics in science are fertile ground for rich math questions given the close conceptual and practical association between the two fields. Students answering in-context math questions grounded in science topics may be asked to select the equation or function that best describes given data or to identify the portion of an algebraic expression or equation that represents a particular component of a mathematical model of a physical phenomenon. Students answering certain Math questions outside of context may also have to apply the kinds of skills and knowledge commonly called on in science, such as converting between units.

The skills and knowledge assessed as part of an analysis in science domain represent a broad range of reading, writing, math, and reasoning processes grounded in science. These skills and knowledge include but are not necessarily limited to the following:

- Analyzing and evaluating summaries of authentic scientific research studies, including
    - understanding and making use of elements of the scientific method, including problem statements, hypotheses, data collection, findings, and implications.
    - tracing aspects of scientific reasoning (e.g., understanding the reason a given study was conducted, determining the logical consequences of particular findings in relation to a hypothesis).
    - identifying hypotheses and other forms of scientific claims.
    - locating and analyzing relevant experimental and observational data represented in words as well as in informational graphics.

    - understanding findings gathered from experiments and observational studies.
    - using experimental and observational data to evaluate hypotheses (e.g., determining whether data collected support or refute a given hypothesis).
    - assessing the scientific and practical implications of research findings.
- Comparing scientific viewpoints (e.g., determining what one scientist or team would most likely say in response to the findings of a different scientist or team studying the same topic).
- Creating and using algebraic equations, functions, and inequalities to model relationships and solve problems in scientific contexts.
- Interpreting algebraic equations, functions, and inequalities (and/or portions thereof) in scientific contexts.

With input from a review of external science educators, College Board content experts aligned the Kentucky Science and Engineering Practices to the domains and skills of the SAT and found the alignment to be very strong. Of the 8 practices, 7 (88%) aligned to Reading and Writing and 7 (88%) aligned to Math. In Reading and Writing, the most common alignments were to "Obtaining, evaluating, and communicating information" and "Analyzing and interpreting data." Common alignments in Math were to "Using mathematics and computational thinking," "Developing and using models," and "Analyzing and interpreting data."

Readers who wish to see detailed alignments of the KAS Science and Engineering Practices to the SAT can find these in **Appendix D: Alignments of Science Standards to SAT**.

Section 2: The SAT Suite

The following is a brief overview of the SAT Suite of Assessments. An exhaustive discussion of the suite and its tests can be found in the ***Assessment Framework for the Digital SAT Suite***.

The *SAT Suite of Assessments* is College Board's collective term for its flagship suite of college and career readiness testing programs and services. The suite continues and expands on College Board's core commitments to access and opportunity for all students. These commitments include

- offering valid, reliable, fair, and objective assessments of students' academic achievement,
- providing actionable information to students and educators about evidence-based ways to build on academic strengths and to address skill and knowledge shortcomings relevant to college and career readiness,
- connecting students to opportunities they have earned through their hard work in school, such as admission to postsecondary institutions well suited to their achievement and interests as well as scholarships and recognition programs,
- helping state users meet federal accountability requirements through industry-leading assessments, services, and documentation, and
- helping higher education institutions to find and enroll prospective students and then to support those students so that they can be successful on their campuses.

The SAT Suite consists of four testing programs, each with its own purpose(s) and target population.

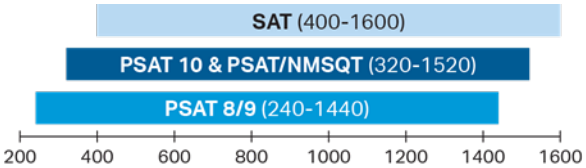
- The **SAT** is typically administered to high school juniors and seniors. The test measures essential prerequisites for postsecondary readiness and success as determined through an extensive, ongoing research process.
- **PSAT/NMSQT** and **PSAT 10** are typically administered to high school sophomores and juniors. PSAT/NMSQT is administered in the fall of each academic year, while PSAT 10 is administered in the spring. The PSAT/NMSQT and PSAT 10 tests are identical in format and content, but only PSAT/NMSQT serves as a qualifying test for the National Merit Scholarship Corporation's annual scholarship program. PSAT/NMSQT and PSAT 10 serve as opportunities to check in on students' progress toward postsecondary readiness and to focus students' preparation for post–high school study.

- **PSAT 8/9** is typically administered to eighth and ninth graders and serves as a baseline for assessing students' readiness for college and career.

The four tests measure the same broad knowledge domains and skills, with slight modifications reflecting differences in the age and attainment of students across the secondary grades, making it easier for students, families, and educators to monitor student progress and address any areas of weakness.

Each test in the SAT Suite consists of two sections: a Reading and Writing (RW) section and a Math section. Correspondingly, each test yields three scores—two section scores and a total score (the last of which is the arithmetic sum of the section scores)—accompanied by test interpretation tools that allow test takers and their families, educators, and other stakeholders to make informed, data-based decisions about students' educational futures. Scores for all the assessments are on the same vertical scale, allowing meaningful interpretations about students' academic growth as they move between testing programs within the suite.

Figure 1 graphically depicts the total score scales of the SAT Suite assessments.



The standard administration[4] for each of the SAT Suite tests employs a multistage adaptive test (MST) model. In the suite's two-stage MST model, each test section (Reading and Writing; Math) is divided into two separately timed, equal-length portions (*stages*), each consisting of a *module* of test questions. The first module of each test section consists of questions across a broad span of difficulty (i.e., easy, medium, and hard questions) so that a robust if provisional assessment of test taker achievement can be obtained. The customized test delivery platform used for the SAT Suite then uses that information to select the second (and final) module to administer to a given test taker. This second module consists of questions that are, on average, more or less difficult than the questions in the first module. Questions from all four Reading and Writing and Math content domains (discussed below) are included in each section's modules; this ensures, in part, that students are sampled fairly on all key content dimensions in the first module prior to being routed to the second in each section. Adaptive testing in this way is highly beneficial to students (and other stakeholders) because the same quality of testing (in terms of desirable content and psychometric properties) is delivered via significantly shorter testing instruments than would be possible if linear (nonadaptive) test forms were used instead.

Question pools for the SAT Suite tests are sufficiently large to permit each student to be administered a unique but highly comparable test form, thereby making the tests highly secure while ensuring that each student receives a form tightly aligned with the test's specifications.

Table 1 below summarizes the basic characteristics of the SAT Suite tests.

[4] Although the vast majority of students will take the SAT Suite tests electronically on a digital device, paper-based and other accommodations, including linear (nonadaptive) test forms, are available for students with approved accommodations who require them to access the tests and their content. Though not discussed further in this document, the linear test specifications closely mirror those for the digital adaptive tests, although each linear test is slightly longer than its counterpart to account for the lack of adaptivity in linear testing. See Appendix D in the Assessment Framework for the Digital SAT Suite for more information on these linear tests and their specifications.

Table 1: Overall Specifications for the SAT Suite Tests

Characteristic	Reading and Writing Section	Math Section
Administration	Two-stage adaptive test design; one Reading and Writing section administered via two separately timed modules	Two-stage adaptive test design; one Math section administered via two separately timed modules
Test length (number of operational and pretest questions)	1st module: 25 operational questions and 2 pretest questions 2nd module: 25 operational questions and 2 pretest questions	1st module: 20 operational questions and 2 pretest questions 2nd module: 20 operational questions and 2 pretest questions
Time per stage	1st module: 32 minutes 2nd module: 32 minutes	1st module: 35 minutes 2nd module: 35 minutes
Total number of questions	54 questions	44 questions
Total time allotted	64 minutes	70 minutes
Average time per question	1.19 minutes	1.59 minutes
Scores reported	Total score Section scores (Reading and Writing; Math)	
Question type(s) used	Discrete; four-option multiple-choice	Discrete; four-option multiple-choice (≈75%) and student-produced response (SPR) (≈25%)
Stimulus subject areas	Literature, history/social studies, humanities, science	Science, social studies, real-world topics
Word count	25–150 (6-character) words per stimulus text	Approximately 30% of questions in context; a majority of in-context questions have 50 (6-character) words or fewer
Informational graphics	Yes; tables, bar graphs, line graphs	Yes
Text complexity bands	Grades 6–8, grades 9–11, grades 12–14 (Grades 12–14 excluded from PSAT 8/9)	N/A[5]

The Reading and Writing Section

The Reading and Writing section of the SAT Suite assessments is designed to measure students' attainment of critical college and career readiness prerequisites in literacy in English language arts as well as in various academic disciplines, including literature, history/social studies, the

[5] Math contexts are not formally rated for text complexity. However, Math test development staff review each context qualitatively to ensure that its linguistic load and demands are consistent with the requirements of the question being posed, and Math (and Reading and Writing) staff have been trained in linguistic modification principles, which seek to relieve students of unnecessary linguistic burdens during test taking through clear and concise word choice in contexts and questions.

humanities, and science. The Reading and Writing section focuses on key elements of comprehension, rhetoric, and language use that the best available evidence identifies as necessary for postsecondary readiness and success. Over the course of a Reading and Writing section of one of the SAT Suite assessments, students answer multiple-choice questions requiring them to read, comprehend, and use information and ideas in texts; analyze the craft and structure of texts; revise texts to improve the rhetorical expression of ideas; and edit texts to conform to core conventions of Standard English.

The construct for the Reading and Writing section is literacy achievement relative to core college and career readiness requirements in English language arts as well as in the academic disciplines of literature, history/social studies, the humanities, and science.

Students who are successful on the Reading and Writing section will be able to

- demonstrate understanding of information and ideas in texts across a range of academic disciplines and complexities aligned with college and career readiness requirements.
- effectively evaluate the craft and structure of texts, including demonstrating understanding and proficient use of high-utility academic vocabulary in context.
- revise the expression of ideas in texts to enhance communicative power in accordance with specified rhetorical goals.
- edit texts in accordance with Standard English conventions in order to meet academic and workplace expectations regarding the use of standardized expression.

Each of the claims listed above corresponds to one of the four content domains that form the architecture of the Reading and Writing section. Table 2 offers a synopsis of the content domain structure of the section, the skill/knowledge testing points addressed in each content domain, and the distribution of operational (non-pretest) questions by domain.

Table 2: SAT Suite Reading and Writing Section Content Domains and Operational Question Distribution

Content Domain	Domain Description (Claim)	Skill/Knowledge Testing Points	Operational Question Distribution
Information and Ideas	Students will use comprehension, analysis, and reasoning skills and knowledge as well as what is stated and implied in texts (including in any accompanying informational graphics) to locate, interpret, evaluate, and integrate information and ideas.	Central Ideas and Details Inferences Command of Evidence • Textual • Quantitative	≈26%/ 12–14 questions
Craft and Structure	Students will use comprehension, vocabulary, analysis, synthesis, and reasoning skills and knowledge to use and determine the meaning of high-utility academic words and phrases in context, evaluate texts rhetorically, and make supportable connections between multiple topically related texts.	Words in Context Text Structure and Purpose Cross-Text Connections	≈28%/ 13–15 questions

Content Domain	Domain Description (Claim)	Skill/Knowledge Testing Points	Operational Question Distribution
Expression of Ideas	Students will use revision skills and knowledge to improve the effectiveness of written expression in accordance with specified rhetorical goals.	Rhetorical Synthesis Transitions	≈20%/ 8–12 questions
Standard English Conventions	Students will use editing skills and knowledge to make text conform to core conventions of Standard English sentence structure, usage, and punctuation.	Boundaries Form, Structure, and Sense	≈26%/ 11–15 questions

All questions on the Reading and Writing section are four-option multiple-choice in format, with a single best answer for each question.

Questions in the Reading and Writing section are broken down into *content domains*, *skills*, and *task groups* and are also associated with one of four *subject areas* representing the content area of the passage(s) used as stimuli. *Content domains*, as discussed above, are the four large categories of skills and knowledge assessed on the SAT Suite tests: Information and Ideas, Craft and Structure, Expression of Ideas, and Standard English Conventions. Each of these domains is further broken down into *skills*, otherwise known as skill/knowledge testing points, which identify the range of skills and knowledge assessed in the section. *Task groups* associated with each skill identify the range of testable approaches within each skill. For example, a Central Ideas and Details question (a skill in the Information and Ideas content domain) may assess either an explicit or implicit central idea or detail. Subject area tags indicate which of the four content areas—literature (LIT), history/social studies (HSS), the humanities (HUM), and science (SCI)—is(are) eligible to be represented in the stimuli associated with each task group. To continue the previous example, Central Ideas and Details questions, whether focused on explicit or implicit ideas and details, may have stimuli from any of the four subject areas represented in the SAT Suite RW section. Table 3 summarizes the RW taxonomy.

Table 3: Reading and Writing Section Taxonomy in Detail

Content Dimension	Description
Text Complexity	The passages (and pairs of passages) on the Reading and Writing section represent a range of text complexities from grades 6–8 through grades 12–14. (Grades 12–14 passages are excluded from appearing on PSAT 8/9.)
Information and Ideas	Students will use comprehension, analysis, and reasoning skills and knowledge as well as what is stated and implied in texts (including in any accompanying informational graphics) to locate, interpret, evaluate, and integrate information and ideas.
Central Ideas and Details	Students will determine the central idea of a text and/or interpret the key details supporting that idea.
Inferences	Students will draw reasonable inferences based on explicit and/or implicit information and ideas in a text.
Command of Evidence	Students will determine the evidence in a text that best supports a specified claim or point.
Textual	Students will determine the textual evidence (e.g., a fact, detail, or example from a text) that best supports a specified claim or point.

Content Dimension	Description
Quantitative	Students will determine the quantitative evidence (i.e., data from an informational graphic) that best supports a specified claim or point.
Craft and Structure	Students will use comprehension, vocabulary, analysis, synthesis, and reasoning skills and knowledge to use and determine the meaning of high-utility words and phrases in context, evaluate texts rhetorically, and make supportable connections between multiple topically related texts.
Words in Context	Students will determine the meaning of a high-utility academic word or phrase in context or use such vocabulary in a contextually appropriate way.
Text Structure and Purpose	Students will analyze the structure of a text or determine the main rhetorical purpose of a text.
Cross-Text Connections	Students will draw reasonable connections between two texts on a related topic.
Expression of Ideas	Students will use revision skills and knowledge to improve the effectiveness of written expression in accordance with specified rhetorical goals.
Rhetorical Synthesis	Students will strategically integrate information and ideas on a topic to form an effective sentence achieving a specified rhetorical aim.
Transitions	Students will determine the most effective transition word or phrase to logically connect information and ideas in a text.
Standard English Conventions	Students will use editing skills and knowledge to make text conform to core conventions of Standard English sentence structure, usage, and punctuation.
Boundaries	Students will edit text to ensure that sentences are conventionally complete.
Form, Structure, and Sense	Students will edit text to conform to conventional usage (e.g., agreement, verb tense/aspect).

The Math Section

The Math section of the SAT Suite assessments is designed to measure students' attainment of critical college and career readiness prerequisites in math. The SAT Suite Math section focuses on key elements of algebra, advanced math, problem-solving and data analysis, and geometry and (SAT, PSAT/NMSQT, and PSAT 10 only) trigonometry that the best available evidence identifies as necessary for postsecondary readiness and success. Over the course of the Math section of one of the SAT Suite assessments, students answer multiple-choice and student-produced response (SPR) questions that measure their fluency with, understanding of, and ability to apply the math concepts, skills, and practices that are most essential for readiness for entry-level postsecondary work.

The construct for the Math section is math achievement relative to core college and career readiness requirements. Although literacy achievement is not directly measured, students are still required to employ such skills and knowledge to a limited, carefully constrained extent when solving math problems set in context.

In general terms, students who are successful on the Math section will be able to

- analyze, fluently solve, interpret, and create linear equations and inequalities as well as analyze and fluently solve systems of equations using multiple techniques.
- demonstrate attainment of skills and knowledge central for successful progression to more advanced math courses, including analyzing, fluently solving, interpreting, and creating

equations, including absolute value, quadratic, exponential, polynomial, rational, radical, and other nonlinear equations, as well as analyzing and fluently solving systems of linear and nonlinear equations in two variables.

- apply quantitative reasoning about ratios, rates, and proportional relationships; understand and apply unit rate; and analyze and interpret one- and two-variable data.
- solve problems that focus on perimeter, area, and volume; angles, triangles, and trigonometry; and circles.

These general suite-level claims are modified to some extent at the individual test program level to account for differences in the age and attainment of the test-taking populations served by each testing program, as elaborated below.

Each of the claims listed above corresponds to one of the four content domains that form the architecture of the Math section. Tables 4 through 6 display the domain structure of the Math section by test program level, beginning with the SAT. The tables include the domains and their associated claims, the skill/knowledge testing points addressed in each domain, and the distribution of operational (scored) questions by domain on each test form.

Table 4: SAT Math Section Content Domains and Operational Question Distribution

Content Domain	Domain Description (Claim)	Skill/Knowledge Testing Points	Operational Question Distribution
Algebra	Students will interpret, create, use, represent, and solve problems using linear representations, and make connections between different representations of linear relationships.	Linear equations in one variable Linear equations in two variables Linear functions Systems of two linear equations in two variables Linear inequalities in one or two variables	≈35%/ 13–15 questions
Advanced Math	Students will interpret, rewrite, fluently solve, make strategic use of structure, and create absolute value, quadratic, exponential, polynomial, rational, radical, and other nonlinear equations and make connections between different representations of a nonlinear relationship between two variables.	Equivalent expressions Nonlinear equations in one variable and systems of equations in two variables Nonlinear functions	≈35%/ 13–15 questions

Content Domain	Domain Description (Claim)	Skill/Knowledge Testing Points	Operational Question Distribution
Problem-Solving and Data Analysis	Using quantitative reasoning, students will fluently solve problems using percentages, proportional relationships, ratios, rates, and units; analyze and interpret distributions of data; use various representations of data to find relative frequency, probabilities, and conditional probabilities; fit models to data and compare linear and exponential growth; and calculate, compare, and interpret mean, median, and range, compare distributions with the same and different standard deviation, understand basic study design, and interpret margin of error.	Ratios, rates, proportional relationships, and units Percentages One-variable data: distributions and measures of center and spread Two-variable data: models and scatterplots Probability and conditional probability Inference from sample statistics and margin of error Evaluating statistical claims: observational studies and experiments	≈15%/ 5–7 questions
Geometry and Trigonometry	Students will solve problems associated with length, area, volume, and scale factors using geometric figures; determine congruence, similarity, and sufficiency using concepts and theorems about vertical angles, triangles, and parallel lines cut by a transversal; solve problems using the Pythagorean theorem, right triangle and unit circle trigonometry, and properties of special right triangles; and use properties and theorems relating to circles to solve problems.	Area and volume Lines, angles, and triangles Right triangles and trigonometry Circles	≈15%/ 5–7 questions

Table 5: PSAT/NMSQT and PSAT 10 Math Section Content Domains and Operational Question Distribution

Content Domain	Domain Description (Claim)	Skill/Knowledge Testing Points	Operational Question Distribution
Algebra	Students will interpret, create, use, represent, and solve problems using linear representations and make connections between different representations of linear relationships.	Linear equations in one variable Linear equations in two variables Linear functions Systems of two linear equations in two variables Linear inequalities in one or two variables	≈35%/ 13–15 questions
Advanced Math	Students will interpret, rewrite, fluently solve, make strategic use of structure, and create absolute value, quadratic, exponential, polynomial, rational, radical, and other nonlinear equations and make connections between different representations of a nonlinear relationship between two variables.	Equivalent expressions Nonlinear equations in one variable and systems of equations in two variables Nonlinear functions	≈32.5%/ 12–14 questions
Problem-Solving and Data Analysis	Using quantitative reasoning, students will fluently solve problems using percentages, proportional relationships, ratios, rates, and units; analyze and interpret distributions of data; use various representations of data to find relative frequency, probabilities, and conditional probabilities; fit models to data and compare linear and exponential growth; and calculate, compare, and interpret mean, median, and range and compare distributions with the same and different standard deviation.	Ratios, rates, proportional relationships, and units Percentages One-variable data: distributions and measures of center and spread Two-variable data: models and scatterplots Probability and conditional probability Inference from sample statistics	≈20%/ 7–9 questions
Geometry and Trigonometry	Students will solve problems associated with length, area, volume, and scale factors using geometric figures; determine congruence, similarity, and sufficiency using concepts and theorems about vertical angles, triangles, and parallel lines cut by a transversal; and solve problems using the Pythagorean theorem and right triangle trigonometry.	Area and volume Lines, angles, and triangles Right triangles and right triangle trigonometry	≈12.5%/ 4–6 questions

Table 6: PSAT 8/9 Math Section Content Domains and Operational Question Distribution

Content Domain	Domain Description (Claim)	Skill/Knowledge Testing Points	Operational Question Distribution
Algebra	Students will interpret, create, use, represent, and solve problems using linear representations and make connections between different representations of linear relationships.	Linear equations in one variable Linear equations in two variables Linear functions Systems of two linear equations in two variables Linear inequalities in one or two variables	≈42.5%/ 16–18 questions
Advanced Math	Students will rewrite, fluently solve, and make strategic use of structure, absolute value, quadratic, exponential, polynomial, and other nonlinear equations and make connections between different representations of a nonlinear relationship between two variables.	Equivalent expressions Nonlinear equations in one variable and systems of equations in two variables Nonlinear functions	≈20%/ 7–9 questions
Problem-Solving and Data Analysis	Using quantitative reasoning, students will fluently solve problems using percentages, proportional relationships, ratios, rates, and units; analyze and interpret distributions of data; use various representations of data to find relative frequency, probabilities, and conditional probabilities; fit models to data; and calculate, compare, and interpret mean, median, and range.	Ratios, rates, proportional relationships, and units Percentages One-variable data: distributions and measures of center and spread Two-variable data: models and scatterplots Probability and conditional probability	≈25%/ 9–11 questions
Geometry	Students will solve problems associated with length, area, volume, and scale factors using geometric figures; apply theorems such as triangle sum; and solve problems using the Pythagorean theorem.	Area and volume Lines, angles, and triangles, including right triangles	≈12.5%/ 4–6 questions

Two question formats are used on the Math section. Approximately 75 percent of the questions are in the four-option multiple-choice (MC) format, for which students are asked to select the single best response from among the four provided answer options. The remaining approximately 25 percent of questions are in the student-produced response (SPR) format, for which students are asked to generate and enter their own responses; while these questions may have more than one possible correct response, students are directed to supply only one answer.

The MC and SPR questions will measure skills and knowledge across the four content dimensions of the tests as shown in table 7.

Table 7: SAT Suite Math Section: Distribution of MC and SPR Question Formats across Content Domains

SAT Suite Testing Program	Question Format	Algebra	Advanced Math	Problem-Solving and Data Analysis	Geometry and Trigonometry (SAT, PSAT/NMSQT, PSAT 10)/Geometry (PSAT 8/9)	Total
SAT	MC	10–11	10–11	4–5	4–5	28–32
	SPR	3–4	3–4	1–2	1–2	8–12
PSAT/NMSQT/10	MC	10–11	10–11	5–6	3–4	28–32
	SPR	3–4	2–3	2–3	1–2	8–12
PSAT 8/9	MC	14–15	5–6	6–7	3–4	28–32
	SPR	2–3	2–3	3–4	1–2	8–12

Detailed views of the Math taxonomy are presented in Appendix A: Math Section Taxonomy in Detail, including the skill/knowledge testing points in each of four domains: Algebra, Advanced Math, Problem-Solving and Data Analysis, and Geometry (and Trigonometry).

Section 3: Evidentiary Foundations

In line with its primary purpose, the SAT Suite of Assessments is founded on the best available evidence concerning essential college and career readiness prerequisites. When designing the digital suite, College Board drew on three main sources of such evidence.

- Research conducted or planned on the design of the SAT Suite itself, which includes an extensive series of one-time and ongoing studies intended to gather evidence in support of design features of the suite.
- Construct and content validity evidence, which affirms the choices College Board has made in determining what skills and knowledge should be assessed by the SAT Suite.
- Subject area evidence, which confirms important content emphases in English language arts/literacy and math assessment on the SAT Suite.

This section briefly summarizes the process used to examine and the findings from each source. A full overview of the evidence, including extensive research citations, may be found in chapter 5 of the ***Assessment Framework for the Digital SAT Suite***.

Research on the SAT Suite. The process of conducting research undergirding key design decisions for the SAT Suite continues College Board's tradition of exhaustively examining every aspect of its tests to ensure that they meet or exceed the highest standards for large-scale standardized assessment. These studies, both one-time and ongoing, assess the validity, reliability, and fairness of the SAT Suite tests from both psychometric and content standpoints and include test section piloting; pretesting of test questions on samples of the suite's test-taking populations; student postexperience surveys and focus groups; timing, SAT concordance, vertical scaling, and predictive and concurrent validity studies; independent state standards alignment studies; curriculum surveys; and cognitive labs. Findings from these various studies have, to date, supported the design decisions behind the SAT Suite and served to confirm that the tests are valid, reliable, and fair measures of students' literacy and math achievement in accordance with college and career readiness outcomes.

Construct and content validity evidence. When evaluating what content to measure on the digital SAT Suite tests, College Board drew on several important sources of information. The first such source was what had been assessed on the paper-based SAT Suite, as those tests were themselves firmly based on evidence regarding essential college and career readiness requirements. Curriculum survey data collected from a nationally representative sample of

postsecondary educators in various subject areas were also extensively consulted to affirm and refine content selection. Finally, College Board internally examined the alignment between the SAT Suite tests' specifications and states' college and career readiness standards to ensure broad and extensive conformity to those expectations, even as the standards vary to some extent from state to state and given that the suite is not intended to measure any one set of such standards. This internal alignment study will be supplemented by independent, third-party alignment studies to be conducted in 2022 for the SAT and in 2023 for the PSAT-related assessments. This work, to date, has confirmed that the SAT Suite tests measure the important constructs of literacy and math achievement and sample a robust range of skills and knowledge elements closely associated with these constructs.

Subject area evidence. College Board has also continued to document and disseminate findings from high-quality third-party research in support of assessment emphases in the SAT Suite. For the Reading and Writing section, these emphases include sustained attention to text complexity; close reading and command of evidence, both textual and quantitative; inference making; high-utility academic (tier two) vocabulary; core Standard English sentence structure, usage, and punctuation conventions; and the literacy demands of a range of academic disciplines (literature, history/social studies, the humanities, and science). In Math, subject area research has strongly influenced the selection of skill/knowledge testing points and the manner in which these points are assessed in the content domains of algebra, advanced math, problem-solving and data analysis, and geometry and trigonometry.

Appendix A: Math Section Taxonomy in Detail

Table 8: Math Section Taxonomy in Detail: Algebra

Content Dimension	SAT Description	PSAT/NMSQT and PSAT 10 Description	PSAT 8/9 Description
Linear equations in one variable	1. Create and use linear equations in one variable to solve problems in a variety of contexts. 2. Identify or create a linear equation in one variable that represents a context. 3. For a linear equation in one variable, interpret a constant, variable, factor, term, or the solution in a context. 4. Solve a linear equation in one variable, making strategic use of algebraic structure. 5. For a linear equation in one variable, determine the conditions under which the equation has no solution, a unique solution, or infinitely many solutions. 6. Fluently solve a linear equation in one variable.	1. Create and use linear equations in one variable to solve problems in a variety of contexts. 2. Identify or create a linear equation in one variable that represents a context. 3. For a linear equation in one variable, interpret a constant, variable, factor, term, or the solution in a context. 4. Solve a linear equation in one variable, making strategic use of algebraic structure. 5. For a linear equation in one variable, determine the conditions under which the equation has no solution, a unique solution, or infinitely many solutions. 6. Fluently solve a linear equation in one variable.	1. Create and use linear equations in one variable to solve problems in a variety of contexts. 2. Identify or create a linear equation in one variable that represents a context. 3. For a linear equation in one variable, interpret a constant, variable, factor, term, or the solution in a context. 4. Solve a linear equation in one variable, making strategic use of algebraic structure. 5. Fluently solve a linear equation in one variable.
Linear functions	1. Create and use linear functions to solve problems in a variety of contexts. 2. Identify or create a linear function to model a relationship between two quantities. 3. For a linear function that represents a context, interpret the meaning of an input/output pair,	1. Create and use linear functions to solve problems in a variety of contexts. 2. Identify or create a linear function to model a relationship between two quantities. 3. For a linear function that represents a context, interpret the meaning of an input/output pair,	1. Create and use linear functions to solve problems in a variety of contexts. 2. Identify or create a linear function to model a relationship between two quantities. 3. For a linear function that represents a context, interpret the meaning of an input/output pair,

Content Dimension	SAT Description	PSAT/NMSQT and PSAT 10 Description	PSAT 8/9 Description
	constant, variable, factor, or term based on the context, including situations where seeing structure provides an advantage. 4. Interpret the graph of a linear function in a context. 5. Make connections between a table, an algebraic representation, or a graph of a linear function not in context. 6. Make connections between a table, an algebraic representation, or a graph of a linear function in context.	constant, variable, factor, or term based on the context, including situations where seeing structure provides an advantage. 4. Interpret the graph of a linear function in a context. 5. Make connections between a table, an algebraic representation, or a graph of a linear function not in context. 6. Make connections between a table, an algebraic representation, or a graph of a linear function in context.	constant, variable, factor, or term based on the context, including situations where seeing structure provides an advantage. 4. Interpret the graph of a linear function in a context. 5. Make connections between a table, an algebraic representation, or a graph of a linear function not in context. 6. Make connections between a table, an algebraic representation, or a graph of a linear function in context.
Linear functions *(continued)*	7. For a linear function that represents a context, given an input value, find and interpret the output value using the given representation, or given an output value, find and interpret the input value using the given representation, if it exists. 8. Write the rule for a linear function given two input/output pairs or one input/output pair and the rate of change. 9. Evaluate a linear function given an input value, or find the input value for a corresponding output.	7. For a linear function that represents a context, given an input value, find and interpret the output value using the given representation, or given an output value, find and interpret the input value using the given representation, if it exists. 8. Write the rule for a linear function given two input/output pairs or one input/output pair and the rate of change. 9. Evaluate a linear function given an input value, or find the input value for a corresponding output.	7. For a linear function that represents a context, given an input value, find and interpret the output value using the given representation, or given an output value, find and interpret the input value using the given representation, if it exists. 8. Write the rule for a linear function given two input/output pairs or one input/output pair and the rate of change. 9. Evaluate a linear function given an input value, or find the input value for a corresponding output.
Linear equations in two variables	1. Create and use a linear equation in two variables to solve problems in a variety of contexts. 2. Identify or create a linear equation in two variables to model a constraint or condition on two quantities. 3. For a linear equation in two variables that represents a context, interpret a solution, constant, variable, factor, or term based on the context, including situations where seeing structure provides an advantage. 4. Interpret the graph of a linear equation in the form $Ax + By = C$ in a context. 5. Make connections between:	1. Create and use a linear equation in two variables to solve problems in a variety of contexts. 2. Identify or create a linear equation in two variables to model a constraint or condition on two quantities. 3. For a linear equation in two variables that represents a context, interpret a solution, constant, variable, factor, or term based on the context, including situations where seeing structure provides an advantage. 4. Interpret the graph of a linear equation in the form $Ax + By = C$ in a context. 5. Make connections between:	1. Create and use a linear equation in two variables to solve problems in a variety of contexts. 2. Identify or create a linear equation in two variables to model a constraint or condition on two quantities. 3. For a linear equation in two variables that represents a context, interpret a solution, constant, variable, factor, or term based on the context, including situations where seeing structure provides an advantage. 4. Interpret the graph of a linear equation in the form $Ax + By = C$ in a context. 5. Make connections between:

Content Dimension	SAT Description	PSAT/NMSQT and PSAT 10 Description	PSAT 8/9 Description
	a. an algebraic representation and a graph of a linear equation in two variables not in context. b. a table and an algebraic representation or between a table and a graph of a linear equation in two variables not in context. 6. Make connections between a table, an algebraic representation, or a graph of a linear equation in two variables in a context. 7. For a linear equation in two variables that represents a context, given a value of one quantity in the relationship, find a value of the other, if it exists.	a. an algebraic representation and a graph of a linear equation in two variables not in context. b. a table and an algebraic representation or between a table and a graph of a linear equation in two variables not in context. 6. Make connections between a table, an algebraic representation, or a graph of a linear equation in two variables in a context. 7. For a linear equation in two variables that represents a context, given a value of one quantity in the relationship, find a value of the other, if it exists.	a. an algebraic representation and a graph of a linear equation in two variables not in context. b. a table and an algebraic representation or between a table and a graph of a linear equation in two variables not in context. 6. Make connections between a table, an algebraic representation, or a graph of a linear equation in two variables in a context. 7. For a linear equation in two variables that represents a context, given a value of one quantity in the relationship, find a value of the other, if it exists.
Linear equations in two variables *(continued)*	8. Write an equation for a line given two points on the line, one point and the slope of the line, or one point and a parallel or perpendicular line.	8. Write an equation for a line given two points on the line, one point and the slope of the line, or one point and a parallel or perpendicular line.	8. Write an equation for a line given two points on the line, one point and the slope of the line, or one point and a parallel or perpendicular line.
Systems of two linear equations in two variables	1. Create and use a system of two linear equations in two variables to solve problems in a variety of contexts. 2. Identify or create a system of linear equations in two variables to model constraints or conditions on two quantities. 3. For a system of linear equations in two variables, interpret a solution, constant, variable, factor, or term based on the context, including situations where seeing structure provides an advantage. 4. Solve a system of two linear equations in two variables, making strategic use of algebraic structure. 5. For a system of linear equations in two variables, determine the conditions under which the system has no solution, a unique solution, or infinitely many solutions. 6. Make connections between an algebraic representation and a graph of a system of linear equations in two variables not in context.	1. Create and use a system of two linear equations in two variables to solve problems in a variety of contexts. 2. Identify or create a system of linear equations in two variables to model constraints or conditions on two quantities. 3. For a system of linear equations in two variables, interpret a solution, constant, variable, factor, or term based on the context, including situations where seeing structure provides an advantage. 4. Solve a system of two linear equations in two variables, making strategic use of algebraic structure. 5. For a system of linear equations in two variables, determine the conditions under which the system has no solution, a unique solution, or infinitely many solutions. 6. Make connections between an algebraic representation and a graph of a system of linear equations in two variables not in context.	1. Create and use a system of two linear equations in two variables to solve problems in a variety of contexts. 2. Identify or create a system of linear equations in two variables to model constraints or conditions on two quantities. 3. Solve a system of two linear equations in two variables, making strategic use of algebraic structure. 4. Make connections between an algebraic representation and a graph of a system of linear equations in two variables not in context. 5. Make connections between an algebraic representation and a graph of a system of linear equations in two variables in a context. 6. Fluently solve a system of linear equations in two variables.

Content Dimension	SAT Description	PSAT/NMSQT and PSAT 10 Description	PSAT 8/9 Description
	7. Make connections between an algebraic representation and a graph of a system of linear equations in two variables in a context. 8. Fluently solve a system of linear equations in two variables.	7. Make connections between an algebraic representation and a graph of a system of linear equations in two variables in a context. 8. Fluently solve a system of linear equations in two variables.	
Linear inequalities in one or two variables	1. Create and use linear inequalities in one or two variables to solve problems in a variety of contexts. 2. Identify or create linear inequalities in one or two variables to model constraints or conditions on two quantities.	1. Create and use linear inequalities in one or two variables to solve problems in a variety of contexts. 2. Identify or create linear inequalities in one or two variables to model constraints or conditions on two quantities.	1. Create and use linear inequalities in one or two variables to solve problems in a variety of contexts. 2. Identify or create linear inequalities in one or two variables to model constraints or conditions on two quantities.

Content Dimension	SAT Description	PSAT/NMSQT and PSAT 10 Description	PSAT 8/9 Description
Linear inequalities in one or two variables *(continued)*	3. For linear inequalities in one or two variables, interpret a constant, variable, factor, term, or solution, including situations where seeing structure provides an advantage. 4. Given a linear inequality or system of linear inequalities, interpret a point in the *xy*-plane in terms of the solution set. 5. Make connections between tabular, algebraic, and graphical representations of linear inequalities in one or two variables by deriving one from the other.	3. For linear inequalities in one or two variables, interpret a constant, variable, factor, term, or solution, including situations where seeing structure provides an advantage. 4. Given a linear inequality or system of linear inequalities, interpret a point in the *xy*-plane in terms of the solution set. 5. Make connections between tabular, algebraic, and graphical representations of linear inequalities in one or two variables by deriving one from the other.	3. For linear inequalities in one or two variables, interpret a constant, variable, factor, term, or solution, including situations where seeing structure provides an advantage. 4. Given a linear inequality or system of linear inequalities, interpret a point in the *xy*-plane in terms of the solution set.

Table 9: Math Section Taxonomy in Detail: Advanced Math

Content Dimension	SAT Description	PSAT/NMSQT and PSAT 10 Description	PSAT 8/9 Description
Equivalent expressions	1. Make strategic use of algebraic structure and the properties of operations to identify and create equivalent expressions: a. by factoring polynomials limited to finding a common factor, rewriting binomials that represent a difference of two squares, and rewriting trinomials as the product of two binomials. b. including rewriting simple rational expressions, rewriting expressions with rational exponents in radical form, and factoring polynomials not included in 1a. 2. Fluently add, subtract, and multiply polynomials.	1. Make strategic use of algebraic structure and the properties of operations to identify and create equivalent expressions by factoring polynomials limited to finding a common factor, rewriting binomials that represent a difference of two squares, and rewriting trinomials as the product of two binomials. 2. Fluently add, subtract, and multiply polynomials.	1. Make strategic use of algebraic structure and the properties of operations to identify and create equivalent expressions by factoring polynomials limited to finding a common factor, rewriting binomials that represent a difference of two squares, and rewriting trinomials as the product of two binomials. 2. Fluently add, subtract, and multiply polynomials.
Nonlinear equations in one variable and systems of equations in two variables	1. Make strategic use of algebraic structure, the properties of operations, and/or reasoning about equality to solve: a. quadratic equations in one variable presented in a wide variety of forms. b. linear absolute value equations in one variable or simple rational and radical equations in one variable. c. polynomial equations in one variable that are written in factored form. 2. Make strategic use of algebraic structure, the properties of operations, and reasoning about equality to solve systems of linear and nonlinear equations in two variables. 3. Determine the conditions under which a quadratic equation has no real solutions, one real solution, or two real solutions. 4. Relate the solutions of a system of a linear and a nonlinear equation in two variables to the graphs of the equations in the system.	1. Make strategic use of algebraic structure, the properties of operations, and/or reasoning about equality to solve: a. quadratic equations in one variable presented in a wide variety of forms. b. linear absolute value equations in one variable or simple rational and radical equations in one variable. 2. Make strategic use of algebraic structure, the properties of operations, and reasoning about equality to solve systems of linear and nonlinear equations in two variables. 3. Determine the conditions under which a quadratic equation has no real solutions, one real solution, or two real solutions. 4. Relate the solutions of a system of a linear and a nonlinear equation in two variables to the graphs of the equations in the system.	1. Make strategic use of algebraic structure, the properties of operations, and/or reasoning about equality to solve quadratic equations in one variable presented in a wide variety of forms. 2. Make strategic use of algebraic structure, the properties of operations, and reasoning about equality to solve systems of linear and nonlinear equations in two variables. 3. Relate the solutions of a system of a linear and a nonlinear equation in two variables to the graphs of the equations in the system. 4. Given an equation or formula in two or more variables, view it as an equation in a single variable of interest where the other variables are parameters, and solve for the variable of interest.

Content Dimension	SAT Description	PSAT/NMSQT and PSAT 10 Description	PSAT 8/9 Description
Nonlinear equations in one variable and systems of equations in two variables *(continued)*	5. Given an equation or formula in two or more variables, view it as an equation in a single variable of interest where the other variables are parameters, and solve for the variable of interest. 6. Fluently solve quadratic equations in one variable, written as a quadratic expression in standard form, where using the quadratic formula or completing the square is the most efficient method for solving the equation.	5. Given an equation or formula in two or more variables, view it as an equation in a single variable of interest where the other variables are parameters, and solve for the variable of interest. 6. Fluently solve quadratic equations in one variable, written as a quadratic expression in standard form, where using the quadratic formula or completing the square is the most efficient method for solving the equation.	5. Fluently solve quadratic equations in one variable, written as a quadratic expression in standard form, where using the quadratic formula or completing the square is the most efficient method for solving the equation.
Nonlinear functions	1. Create and use quadratic or exponential functions to solve problems in a variety of contexts. 2. Identify or create an appropriate quadratic or exponential function to model a relationship between quantities. 3. For a quadratic or exponential function that represents a context: a. interpret the meaning of an input/output pair including an intercept or initial value, including situations where seeing structure provides an advantage. b. interpret the meaning of a constant, variable, factor, or term based on the context, including situations where seeing structure provides an advantage. 4. For a quadratic or exponential function in a context: a. interpret a point on the graph. b. interpret parts of the graph (other than a point or intercept).	1. Create and use quadratic or exponential functions to solve problems in a variety of contexts. 2. Identify or create an appropriate quadratic or exponential function to model a relationship between quantities. 3. For a quadratic or exponential function that represents a context: a. interpret the meaning of an input/output pair including an intercept or initial value, including situations where seeing structure provides an advantage. b. interpret the meaning of a constant, variable, factor, or term based on the context, including situations where seeing structure provides an advantage. 4. For a quadratic or exponential function in a context: a. interpret a point on the graph. b. interpret parts of the graph (other than a point or intercept).	1. For a quadratic or exponential function that represents a context, interpret the meaning of an input/output pair including an intercept or initial value, including situations where seeing structure provides an advantage. 2. For a quadratic or exponential function in a context, interpret a point on the graph. 3. Make connections between a table, an algebraic representation, or a graph of a quadratic or exponential function that does not involve a transformation, not in context. 4. Make connections between a table, an algebraic representation, or a graph of a quadratic or exponential function that does not involve a transformation, in a context.

Content Dimension	SAT Description	PSAT/NMSQT and PSAT 10 Description	PSAT 8/9 Description
Nonlinear functions *(continued)*	5. Make connections between a table, an algebraic representation, or a graph of a: a. quadratic or exponential function that does not involve a transformation, not in context. b. polynomial function, simple rational function, or quadratic or exponential function that involves a transformation, not in context. 6. Make connections between a table, an algebraic representation, or a graph of a: a. quadratic or exponential function that does not involve a transformation, in a context. b. polynomial function, simple rational function, or other nonlinear function in a context, or a quadratic or exponential function that involves a transformation in a context. 7. Determine the most suitable form of the expression representing the output of the function to display key features for: a. a quadratic function. b. an exponential function. 8. Understand and use the fact that for the graph of $y = f(x)$, the solutions to $f(x) = 0$ correspond to x-intercepts of the graph and $f(0)$ corresponds to the y-intercept of the graph; make connections between the input/output pairs and points on a graph; interpret this information in a context. 9. Use function notation to represent and interpret input/output pairs: a. evaluate a nonlinear function given an input value; or, for a quadratic function, find the input value for a corresponding output. b. for exponential, polynomial, radical, and rational functions, find the input value for a corresponding output.	5. Make connections between a table, an algebraic representation, or a graph of a: a. quadratic or exponential function that does not involve a transformation, not in context. b. polynomial function, simple rational function, or quadratic or exponential function that involves a transformation, not in context. 6. Make connections between a table, an algebraic representation, or a graph of a: a. quadratic or exponential function that does not involve a transformation, in a context. b. polynomial function, simple rational function, or other nonlinear function in a context, or a quadratic or exponential function that involves a transformation in a context. 7. Determine the most suitable form of the expression representing the output of the function to display key features for: a. a quadratic function. b. an exponential function. 8. Use function notation to represent and interpret input/output pairs: a. evaluate a nonlinear function given an input value; or, for a quadratic function, find the input value for a corresponding output. b. for exponential, polynomial, radical, and rational functions, find the input value for a corresponding output.	5. Use function notation to represent and interpret input/output pairs. Evaluate a nonlinear function given an input value; or, for a quadratic function, find the input value for a corresponding output.

Table 10: Math Section Taxonomy in Detail: Problem-Solving and Data Analysis

Content Dimension	SAT Description	PSAT/NMSQT and PSAT 10 Description	PSAT 8/9 Description
Ratios, rates, proportional relationships, and units	1. Apply proportional relationships, ratios, and rates in a wide variety of contexts. Examples include, but are not limited to, scale drawings and problems in the natural and social sciences. 2. Solve problems involving derived units, including those that arise from products (e.g., kilowatt-hours) and quotients (e.g., population per square kilometer). 3. Solve problems involving: a. a one-step unit conversion. b. a multistep or multidimensional unit conversion. 4. Understand and use the fact that when two quantities are in a proportional relationship, if one changes by a scale factor, then the other also changes by the same scale factor.	1. Apply proportional relationships, ratios, and rates in a wide variety of contexts. Examples include, but are not limited to, scale drawings and problems in the natural and social sciences. 2. Solve problems involving derived units, including those that arise from products (e.g., kilowatt-hours) and quotients (e.g., population per square kilometer). 3. Solve problems involving: a. a one-step unit conversion. b. a multistep or multidimensional unit conversion. 4. Understand and use the fact that when two quantities are in a proportional relationship, if one changes by a scale factor, then the other also changes by the same scale factor.	1. Apply proportional relationships, ratios, and rates in a wide variety of contexts. Examples include, but are not limited to, scale drawings and problems in the natural and social sciences. 2. Solve problems involving derived units, including those that arise from products (e.g., kilowatt-hours) and quotients (e.g., population per square kilometer). 3. Solve problems involving: a. a one-step unit conversion. b. a multistep or multidimensional unit conversion. 4. Understand and use the fact that when two quantities are in a proportional relationship, if one changes by a scale factor, then the other also changes by the same scale factor.
Percentages	1. Use percentages to solve problems in a variety of contexts: a. including, but not limited to, discounts, interest, taxes, and tips. b. including those that involve percent increases and decreases for many different quantities. 2. Understand and use the relationship between percent change and growth factor (5% and 1.05, for example); include percentages greater than or equal to 100%.	1. Use percentages to solve problems in a variety of contexts: a. including, but not limited to, discounts, interest, taxes, and tips. b. including those that involve percent increases and decreases for many different quantities. 2. Understand and use the relationship between percent change and growth factor (5% and 1.05, for example); include percentages greater than or equal to 100%.	1. Use percentages to solve problems in a variety of contexts: a. including, but not limited to, discounts, interest, taxes, and tips. b. including those that involve percent increases and decreases for many different quantities. 2. Understand and use the relationship between percent change and growth factor (5% and 1.05, for example); include percentages greater than or equal to 100%.

Content Dimension	SAT Description	PSAT/NMSQT and PSAT 10 Description	PSAT 8/9 Description
One-variable data: Distributions and measures of center and spread	1. Analyze and interpret numerical data distributions represented with frequency tables, histograms, dot plots, and box plots. 2. For quantitative variables, calculate, compare, and interpret mean, median, and range. 3. Compare distributions using measures of center and spread, including: a. distributions with different means and the same standard deviations. b. distributions with different standard deviations. 4. Understand and describe the effect of outliers on mean and median.	1. Analyze and interpret numerical data distributions represented with frequency tables, histograms, dot plots, and box plots. 2. For quantitative variables, calculate, compare, and interpret mean, median, and range. 3. Compare distributions using measures of center and spread, including: a. distributions with different means and the same standard deviations. b. distributions with different standard deviations. 4. Understand and describe the effect of outliers on mean and median.	1. Analyze and interpret numerical data distributions represented with frequency tables, histograms, dot plots, and box plots. 2. For quantitative variables, calculate, compare, and interpret mean, median, and range. 3. Compare distributions using measures of center and spread, including distributions with different means and the same standard deviations. 4. Understand and describe the effect of outliers on mean and median.
Two-variable data: Models and scatterplots	1. Analyze and interpret data represented in a scatterplot, but do not make predictions. 2. Analyze and interpret data represented in a scatterplot to make predictions. 3. Fit linear models to data represented in a scatterplot. 4. Fit quadratic and exponential models to data represented in a scatterplot. 5. Given a relationship between two quantities, read and interpret graphs modeling the relationship. 6. Compare linear and exponential growth.	1. Analyze and interpret data represented in a scatterplot, but do not make predictions. 2. Analyze and interpret data represented in a scatterplot to make predictions. 3. Fit linear models to data represented in a scatterplot. 4. Fit quadratic and exponential models to data represented in a scatterplot. 5. Given a relationship between two quantities, read and interpret graphs modeling the relationship. 6. Compare linear and exponential growth.	1. Analyze and interpret data represented in a scatterplot, but do not make predictions. 2. Fit linear models to data represented in a scatterplot. 3. Given a relationship between two quantities, read and interpret graphs modeling the relationship.
Probability and conditional probability	Use one- and two-way tables, area models, and other representations to find relative frequency, probabilities, and conditional probabilities. 1. Calculate, express, or interpret the probability or conditional probability of an event using a data display showing frequencies for a single variable, a two-way table, an area model, or a description of a situation. Infrequently, given a probability, determine an unknown number in a data display showing frequencies for a single variable, a two-way table, or a description of a situation, including using a probability to determine the frequency of an event.	Use one- and two-way tables, area models, and other representations to find relative frequency, probabilities, and conditional probabilities. 1. Calculate, express, or interpret the probability or conditional probability of an event using a data display showing frequencies for a single variable, a two-way table, an area model, or a description of a situation. Infrequently, given a probability, determine an unknown number in a data display showing frequencies for a single variable, a two-way table, or a description of a situation, including using a probability to determine the frequency of an event.	Use one- and two-way tables, area models, and other representations to find relative frequency, probabilities, and conditional probabilities. 1. Calculate, express, or interpret the probability or conditional probability of an event using a data display showing frequencies for a single variable, a two-way table, an area model, or a description of a situation. Infrequently, given a probability, determine an unknown number in a data display showing frequencies for a single variable, a two-way table, or a description of a situation, including using a probability to determine the frequency of an event.

Content Dimension	SAT Description	PSAT/NMSQT and PSAT 10 Description	PSAT 8/9 Description
Inference from sample statistics and margin of error	1. Use sample mean and sample proportion to estimate population mean and population proportion. 2. Interpret margin of error. Understand that a larger sample size generally leads to a smaller margin of error.	1. Use sample mean and sample proportion to estimate population mean and population proportion.	
Evaluating statistical claims: Observational studies and experiments	1. With random samples, identify or describe which population the results can be extended to. Given a description of a study with or without random assignment, determine whether there is evidence for a causal relationship. 2. Understand why random assignment provides evidence for a causal relationship in an experimental study. 3. Understand issues related to sampling methods and why a result can be extended only to the population from which the sample was selected.		

Table 11: Math Section Taxonomy in Detail: Geometry (and Trigonometry)

Content Dimension	SAT Description	PSAT/NMSQT and PSAT 10 Description	PSAT 8/9 Description
Area and volume	1. Solve real-world and mathematical problems about the: a. area or perimeter of a geometric figure or an object that can be modeled by a geometric figure using given information. b. surface area or volume of a geometric figure or an object that can be modeled by a geometric figure using given information such as length, area, surface area, or volume. 2. Apply knowledge that changing by a scale factor of k changes all lengths by a factor of k, changes all areas by a factor of k^2, and changes all volumes by a factor of k^3 . 3. Demonstrate procedural fluency by selecting the correct: a. area formula and correctly calculating a specified value. b. surface area or volume formula and correctly calculating a specified value.	1. Solve real-world and mathematical problems about the: a. area or perimeter of a geometric figure or an object that can be modeled by a geometric figure using given information. b. surface area or volume of a geometric figure or an object that can be modeled by a geometric figure using given information such as length, area, surface area, or volume. 2. Apply knowledge that changing by a scale factor of k changes all lengths by a factor of k, changes all areas by a factor of k^2, and changes all volumes by a factor of k^3. 3. Demonstrate procedural fluency by selecting the correct: a. area formula and correctly calculating a specified value. b. surface area or volume formula and correctly calculating a specified value.	1. Solve real-world and mathematical problems about the: a. area or perimeter of a geometric figure or an object that can be modeled by a geometric figure using given information. b. surface area or volume of a geometric figure or an object that can be modeled by a geometric figure using given information such as length, area, surface area, or volume. 2. Apply knowledge that changing by a scale factor of k changes all lengths by a factor of k, changes all areas by a factor of k^2, and changes all volumes by a factor of k^3. 3. Demonstrate procedural fluency by selecting the correct: a. area formula and correctly calculating a specified value. b. surface area or volume formula and correctly calculating a specified value.
Lines, angles, and triangles	1. Use concepts and theorems relating to congruence and similarity of triangles to solve problems. 2. Determine which statements may be required to prove certain relationships or to satisfy a given theorem. 3. Apply knowledge that changing by a scale factor of k changes all lengths by a factor of k, but angle measures remain unchanged. 4. Know and directly apply relevant theorems such as the: a. triangle angle sum theorem. b. vertical angle theorem and the relationship of angles formed when a transversal cuts parallel lines.	1. Use concepts and theorems relating to congruence and similarity of triangles to solve problems. 2. Determine which statements may be required to prove certain relationships or to satisfy a given theorem. 3. Apply knowledge that changing by a scale factor of k changes all lengths by a factor of k, but angle measures remain unchanged. 4. Know and directly apply relevant theorems such as the: a. triangle angle sum theorem. b. vertical angle theorem and the relationship of angles formed when a transversal cuts parallel lines.	1. Know and directly apply the triangle angle sum theorem.

Content Dimension	SAT Description	PSAT/NMSQT and PSAT 10 Description	PSAT 8/9 Description
Right triangles and trigonometry	1. Solve problems in a variety of contexts using: a. the Pythagorean theorem. b. properties of special right triangles. c. right triangle trigonometry. 2. Use similarity to calculate values of sine, cosine, and tangent. 3. Solve problems using the relationship between sine and cosine of complementary angles.	1. Solve problems in a variety of contexts using: a. the Pythagorean theorem. b. properties of special right triangles. c. right triangle trigonometry.	1. Solve problems in a variety of contexts using the Pythagorean theorem.
Circles	1. Use definitions, properties, and theorems relating to circles and parts of circles such as radii, diameters, tangents, angles, arc lengths, and sector areas to solve problems. 2. Solve problems using either radian measure or trigonometric ratios in the unit circle. 3. Create an equation to represent a circle in the *xy*-plane. 4. Describe how a change to the equation representing a circle affects the graph of the circle in the *xy*-plane or how a change to the graph of a circle affects the equation that represents the circle. 5. Understand that the ordered pairs that satisfy an equation of the form $(x-h)^2+(y-k)^2=r^2$ form a circle when plotted in the *xy*-plane. 6. Convert between angle measures in degrees and radians. 7. Complete the square in an equation representing a circle to determine properties of the circle when it is graphed in the *xy*-plane and use the distance formula in problems related to circles.		

Appendix B: Alignments of ELA Standards to SAT Suite

The following tables detail the Kentucky Academic Standards–SAT Suite alignments using the standards as the organizing principle.

Table 12: Grades 11–12 Aligned to SAT

Kentucky Academic Standards			Information and Ideas			Craft and Structure			Expression of Ideas		Standard English Conventions	
			Central Ideas and Details	Inferences	Command of Evidence	Words in Context	Text Structure and Purpose	Cross-Text Connections	Rhetorical Synthesis	Transitions	Boundaries	Form, Structure, and Sense
Reading Literature	RL.11-12.1	Cite relevant and thorough textual evidence to support analysis of what the text says explicitly as well as inferences drawn from the text.	✓		✓							
Reading Literature	RL.11-12.2	Determine two or more themes or central ideas of a text and analyze their development over the course of the text, including how they interact and build on one another to produce a complex account.										
Reading Literature	RL.11-12.3	Analyze the impact of the author's choices over the course of a text regarding how to develop and relate elements of a story or drama.	✓				✓					
Reading Literature	RL.11-12.4	Determine the meaning of words and phrases as they are used in the text, including figurative and connotative meanings; analyze the cumulative impact of specific word choices on meaning and tone and on the text as a whole.	✓			✓						
Reading Literature	RL.11-12.5	Analyze how an author's choices concerning how to structure specific parts of a text contribute to its overall structure and meaning as well as its aesthetic impact.					✓					
Reading Literature	RL.11-12.6	Analyze how point of view and perspective are used to manipulate the reader for a specific purpose or effect, including but not limited to satire, sarcasm, irony and understatement.										
Reading Literature	RL.11-12.7	Analyze diverse media interpretations of a story, drama or poem, evaluating how each version interprets the source text.										

Kentucky Academic Standards			Information and Ideas			Craft and Structure			Expression of Ideas		Standard English Conventions	
			Central Ideas and Details	Inferences	Command of Evidence	Words in Context	Text Structure and Purpose	Cross-Text Connections	Rhetorical Synthesis	Transitions	Boundaries	Form, Structure, and Sense
Reading Literature	RL.11-12.9	Demonstrate knowledge of various time periods to analyze how two or more texts from the same period treat similar themes or topics.										
Reading Literature	RL.11-12.10	By the end of the year, flexibly use a variety of comprehension strategies (i.e., questioning, monitoring, visualizing, inferencing, summarizing, synthesizing, using prior knowledge, determining importance) to read, comprehend and analyze grade-level appropriate, complex literary texts independently and proficiently.	✓		✓	✓	✓					
Reading Informational Text	RI.11-12.1	Cite relevant and thorough textual evidence to support analysis of what the text says explicitly as well as inferences drawn from the text.	✓	✓	✓							
Reading Informational Text	RI.11-12.2	Determine two or more central ideas of a text and analyze their development over the course of the text, including how they interact and build on one another to produce a complex account.										
Reading Informational Text	RI.11-12.3	Analyze a complex set of ideas or sequence of events, and explain how specific individuals, ideas or events interact and develop over the course of the text.	✓	✓			✓					
Reading Informational Text	RI.11-12.4	Determine the meaning of words and phrases as they are used in a text, including figurative, connotative and technical meanings; analyze how an author uses and refines the meaning of a key term or terms over the course of a text.	✓	✓		✓						
Reading Informational Text	RI.11-12.5	Analyze and evaluate the effectiveness of the structure an author uses in his or her exposition or argument.					✓					
Reading Informational Text	RI.11-12.6	Determine an author's point of view, perspective and purpose in a text in which the rhetoric is particularly effective, analyzing how style and content contribute to the effectiveness of the text.					✓	✓				
Reading Informational Text	RI.11-12.7	Integrate and evaluate multiple sources of information presented in different print and non-			✓							

Kentucky Academic Standards			Information and Ideas			Craft and Structure			Expression of Ideas		Standard English Conventions	
			Central Ideas and Details	Inferences	Command of Evidence	Words in Context	Text Structure and Purpose	Cross-Text Connections	Rhetorical Synthesis	Transitions	Boundaries	Form, Structure, and Sense
		print formats in order to address a question or solve a problem.										
Reading Informational Text	RI.11-12.8	Evaluate the argument, specific claims and evidence in a text, assessing the validity, reasoning, relevance and sufficiency; analyze false statements and fallacious reasoning.	✓	✓	✓							
Reading Informational Text	RI.11-12.9	Analyze documents of historical and literary significance, including how they address related themes and concepts.										
Reading Informational Text	RI.11-12.10	By the end of the year, flexibly use a variety of comprehension strategies (i.e., questioning, monitoring, visualizing, inferencing, summarizing, synthesizing, using prior knowledge, determining importance) to read, comprehend, and analyze grade-level appropriate, complex informational texts independently and proficiently.	✓	✓	✓	✓	✓	✓				
Composition	C.11-12.1	Compose arguments to support claims in an analysis of substantive topics or texts, using valid reasoning and relevant and sufficient evidence. a. Produce clear and coherent writing in which the development, organization and style are appropriate to task, purpose and audience. b. Introduce precise, knowledgeable claim(s), establish the significance of the claim(s), distinguish the claim(s) from alternate or opposing claims and create an organization that logically sequences claim(s), counterclaims, reasons and evidence. c. Develop claim(s) and opposing claims fairly and thoroughly, supplying the most relevant evidence for each while pointing out the strengths and limitations of both in a manner that anticipates the audience's knowledge level, concerns, values and possible biases. d. Use words, phrases and clauses as well as varied syntax to link the major sections of the text, create cohesion and clarify the relationships							✓	✓	✓	✓

Kentucky Academic Standards			Information and Ideas			Craft and Structure			Expression of Ideas		Standard English Conventions	
			Central Ideas and Details	Inferences	Command of Evidence	Words in Context	Text Structure and Purpose	Cross-Text Connections	Rhetorical Synthesis	Transitions	Boundaries	Form, Structure, and Sense
		between claim(s) and reasons, between reasons and evidence and between claim(s) and opposing claims. e. Establish and maintain a task appropriate writing style. f. Provide a concluding statement or section that follows from and supports the argument presented. g. Develop and strengthen writing as needed by planning, revising, editing, rewriting or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience.										
Composition	C.11-12.2	Compose informative/explanatory texts to examine and/or convey complex ideas, concepts and information clearly and accurately through the effective selection, organization and analysis of content. a. Produce clear and coherent writing in which the development, organization and style are appropriate to task, purpose and audience. b. Introduce a topic; organize complex ideas, concepts and information so that each new element builds on that which precedes it to create a unified whole; include formatting, graphics and multimedia when useful to aiding comprehension. c. Develop the topic thoroughly by selecting the most significant and relevant facts, extended definitions, concrete details, quotations or other information and examples appropriate to the audience's knowledge of the topic. d. Use appropriate and varied transitions and syntax to link the major sections of the text, create cohesion and clarify the relationships among complex ideas and concepts. e. Use precise language, domain-specific vocabulary and techniques such as metaphor,							✓	✓	✓	✓

Kentucky Academic Standards			Information and Ideas			Craft and Structure			Expression of Ideas		Standard English Conventions	
			Central Ideas and Details	Inferences	Command of Evidence	Words in Context	Text Structure and Purpose	Cross-Text Connections	Rhetorical Synthesis	Transitions	Boundaries	Form, Structure, and Sense
		simile and analogy to manage the complexity of the topic. f. Establish and maintain a formal style and objective tone while attending to the norms and conventions of the discipline in which they are writing. g. Provide a concluding statement or section that follows from and supports the information or explanation presented. h. Develop and strengthen writing as needed by planning, revising, editing, rewriting or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience.										
Composition	C.11-12.3	Use narratives strategically in other modes of writing utilizing effective technique, well-chosen details and well-structured sequences for an intended purpose, including but not limited to introducing an issue and/or supporting a claim. a. Produce clear and coherent writing in which the development, organization and style are appropriate to task, purpose and audience. b. Engage and orient the reader by setting up a problem, situation or observation and its significance, establishing one or multiple point(s) of view and introducing a narrator and/or characters; create a smooth progression of experiences or events. c. Use narrative techniques, such as dialogue, pacing, description, reflection and multiple plot lines, to develop experiences, events and/or characters. d. Use a variety of techniques to sequence events so that they build on one another to create a coherent whole and build toward a particular tone and										

Kentucky Academic Standards			Information and Ideas			Craft and Structure			Expression of Ideas		Standard English Conventions	
			Central Ideas and Details	Inferences	Command of Evidence	Words in Context	Text Structure and Purpose	Cross-Text Connections	Rhetorical Synthesis	Transitions	Boundaries	Form, Structure, and Sense
		outcome. e. Use precise words and phrases, telling details and sensory language to convey a vivid picture of the experiences, events, setting and/or characters. f. Provide a conclusion that explicitly connects the narrative's relevance to the intended purpose of the writing. g. Develop and strengthen writing as needed by planning, revising, editing, rewriting or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience.										
Composition	C.11-12.4	Use digital resources to create, publish and update individual or shared products, taking advantage of technology's capacity to link to other information and to display information flexibly and dynamically. Use a variety of formats to cite sources.										
Composition	C.11-12.5	Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation.										
Composition	C.11-12.6	Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the strengths and limitations of each source in terms of the task, purpose and audience; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and overreliance on any one source and following a standard format for citation.										

Kentucky Academic Standards			Information and Ideas			Craft and Structure			Expression of Ideas		Standard English Conventions	
			Central Ideas and Details	Inferences	Command of Evidence	Words in Context	Text Structure and Purpose	Cross-Text Connections	Rhetorical Synthesis	Transitions	Boundaries	Form, Structure, and Sense
Composition	C.11-12.7	Compose routinely over extended time frames and shorter time frames for a variety of tasks, purposes and audiences.										
Language	L.11-12.1	In both written and oral expression: a. Demonstrate the understanding that usage is a matter of convention, can change over time and may be contested. b. Resolve issues of complex or contested usage, consulting references as needed.									✓	✓
Language	L.11-12.2	When writing: a. Demonstrate command of the conventions of standard English capitalization, punctuation and spelling when writing.									✓	✓
Language	L.11-12.3	Apply knowledge of language to understand how language functions in different contexts, to make effective choices for meaning or style and to comprehend more fully when reading or listening. a. Apply an understanding of syntax to the study of complex texts when reading. b. Vary syntax for effect in writing and speaking, consulting references for guidance as needed.	✓	✓		✓			✓	✓		
Language	L.11-12.4	Determine or clarify the meaning of unknown and multiple-meaning words and phrases based on grade 11-12 reading and content, choosing flexibility from an array of strategies. a. Use context (e.g., the overall meaning of a sentence or paragraph; a word's position or function in a sentence) as a clue to the meaning of a word or phrase. b. Identify and correctly use patterns of word changes that indicate different meanings or parts of speech. c. Consult general and specialized reference materials to find the pronunciation of a word or determine or clarify its precise meaning or its part of speech. d. Acquire and use accurately general academic	✓	✓		✓						

Kentucky Academic Standards			Information and Ideas			Craft and Structure			Expression of Ideas		Standard English Conventions	
			Central Ideas and Details	Inferences	Command of Evidence	Words in Context	Text Structure and Purpose	Cross-Text Connections	Rhetorical Synthesis	Transitions	Boundaries	Form, Structure, and Sense
		and domain-specific words and phrases, sufficient for reading, writing, speaking and listening at the college and career readiness level: demonstrate independence in gathering vocabulary knowledge when considering a word or phrase important to comprehension or expression.										
Language	L.11-12.5	Demonstrate understanding of figurative language, word relationships and nuances in word meanings. a. Interpret figures of speech in context, including but not limited to hyperbole and paradox, and analyze their function in the text. b. Analyze nuances in the meaning of words with similar denotations.	✓	✓		✓			✓	✓		

Table 13: Grades 11–12 Aligned to PSAT/NMSQT and PSAT 10

Kentucky Academic Standards			Information and Ideas			Craft and Structure			Expression of Ideas		Standard English Conventions	
			Central Ideas and Details	Inferences	Command of Evidence	Words in Context	Text Structure and Purpose	Cross-Text Connections	Rhetorical Synthesis	Transitions	Boundaries	Form, Structure, and Sense
Reading Literature	RL.11-12.1	Cite relevant and thorough textual evidence to support analysis of the text says explicitly as well as inferences drawn from the text.	✓		✓							
Reading Literature	RL.11-12.2	Determine two or more themes or central ideas of a text and analyze their development over the course of the text, including how they interact and build on one another to produce a complex account.										
Reading Literature	RL.11-12.3	Analyze the impact of the author's choices over the course of a text regarding how to develop and relate elements of a story or drama.	✓				✓					
Reading Literature	RL.11-12.4	Determine the meaning of words and phrases as they are used in the text, including figurative and connotative meanings; analyze the cumulative impact of specific word choices on meaning and tone and on the text as a whole.	✓			✓						
Reading Literature	RL.11-12.5	Analyze how an author's choices concerning how to structure specific parts of a text contribute to its overall structure and meaning as well as its aesthetic impact.					✓					
Reading Literature	RL.11-12.6	Analyze how point of view and perspective are used to manipulate the reader for a specific purpose or effect, including but not limited to satire, sarcasm, irony and understatement.										
Reading Literature	RL.11-12.7	Analyze diverse media interpretations of a story, drama or poem, evaluating how each version interprets the source text.										
Reading Literature	RL.11-12.9	Demonstrate knowledge of various time periods to analyze how two or more texts from the same period treat similar themes or topics.										
Reading Literature	RL.11-12.10	By the end of the year, flexibly use a variety of comprehension strategies (i.e., questioning, monitoring, visualizing, inferencing, summarizing, synthesizing, using prior knowledge, determining	✓		✓	✓	✓					

Kentucky Academic Standards			Information and Ideas			Craft and Structure			Expression of Ideas		Standard English Conventions	
			Central Ideas and Details	Inferences	Command of Evidence	Words in Context	Text Structure and Purpose	Cross-Text Connections	Rhetorical Synthesis	Transitions	Boundaries	Form, Structure, and Sense
		importance) to read, comprehend and analyze grade-level appropriate, complex literary texts independently and proficiently.										
Reading Informational Text	RI.11-12.1	Cite relevant and thorough textual evidence to support analysis of what the text says explicitly as well as inferences drawn from the text.	✓	✓	✓							
Reading Informational Text	RI.11-12.2	Determine two or more central ideas of a text and analyze their development over the course of the text, including how they interact and build on one another to produce a complex account.										
Reading Informational Text	RI.11-12.3	Analyze a complex set of ideas or sequence of events, and explain how specific individuals, ideas or events interact and develop over the course of the text.	✓	✓			✓					
Reading Informational Text	RI.11-12.4	Determine the meaning of words and phrases as they are used in a text, including figurative, connotative and technical meanings; analyze how an author uses and refines the meaning of a key term or terms over the course of a text.	✓	✓		✓						
Reading Informational Text	RI.11-12.5	Analyze and evaluate the effectiveness of the structure an author uses in his or her exposition or argument.					✓					
Reading Informational Text	RI.11-12.6	Determine an author's point of view, perspective and purpose in a text in which the rhetoric is particularly effective, analyzing how style and content contribute to the effectiveness of the text.					✓	✓				
Reading Informational Text	RI.11-12.7	Integrate and evaluate multiple sources of information presented in different print and non-print formats in order to address a question or solve a problem.			✓							
Reading Informational Text	RI.11-12.8	Evaluate the argument, specific claims and evidence in a text, assessing the validity, reasoning, relevance and sufficiency; analyze false statements and fallacious reasoning.	✓	✓	✓							

Kentucky Academic Standards			Information and Ideas			Craft and Structure			Expression of Ideas		Standard English Conventions	
			Central Ideas and Details	Inferences	Command of Evidence	Words in Context	Text Structure and Purpose	Cross-Text Connections	Rhetorical Synthesis	Transitions	Boundaries	Form, Structure, and Sense
Reading Informational Text	RI.11-12.9	Analyze documents of historical and literary significance, including how they address related themes and concepts.										
Reading Informational Text	RI.11-12.10	By the end of the year, flexibly use a variety of comprehension strategies (i.e., questioning, monitoring, visualizing, inferencing, summarizing, synthesizing, using prior knowledge, determining importance) to read, comprehend, and analyze grade-level appropriate, complex informational texts independently and proficiently.	✓	✓	✓	✓	✓	✓				
Composition	C.11-12.1	Compose arguments to support claims in an analysis of substantive topics or texts, using valid reasoning and relevant and sufficient evidence. a. Produce clear and coherent writing in which the development, organization and style are appropriate to task, purpose and audience. b. Introduce precise, knowledgeable claim(s), establish the significance of the claim(s), distinguish the claim(s) from alternate or opposing claims and create an organization that logically sequences claim(s), counterclaims, reasons and evidence. c. Develop claim(s) and opposing claims fairly and thoroughly, supplying the most relevant evidence for each while pointing out the strengths and limitations of both in a manner that anticipates the audience's knowledge level, concerns, values and possible biases. d. Use words, phrases and clauses as well as varied syntax to link the major sections of the text, create cohesion and clarify the relationships between claim(s) and reasons, between reasons and evidence and between claim(s) and opposing claims. e. Establish and maintain a task appropriate writing style. f. Provide a concluding statement or section that							✓	✓	✓	✓

Kentucky Academic Standards			Information and Ideas			Craft and Structure			Expression of Ideas		Standard English Conventions	
			Central Ideas and Details	Inferences	Command of Evidence	Words in Context	Text Structure and Purpose	Cross-Text Connections	Rhetorical Synthesis	Transitions	Boundaries	Form, Structure, and Sense
		follows from and supports the argument presented. g. Develop and strengthen writing as needed by planning, revising, editing, rewriting or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience.										
Composition	C.11-12.2	Compose informative/explanatory texts to examine and/or convey complex ideas, concepts and information clearly and accurately through the effective selection, organization and analysis of content. a. Produce clear and coherent writing in which the development, organization and style are appropriate to task, purpose and audience. b. Introduce a topic; organize complex ideas, concepts and information so that each new element builds on that which precedes it to create a unified whole; include formatting, graphics and multimedia when useful to aiding comprehension. c. Develop the topic thoroughly by selecting the most significant and relevant facts, extended definitions, concrete details, quotations or other information and examples appropriate to the audience's knowledge of the topic. d. Use appropriate and varied transitions and syntax to link the major sections of the text, create cohesion and clarify the relationships among complex ideas and concepts. e. Use precise language, domain-specific vocabulary and techniques such as metaphor, simile and analogy to manage the complexity of the topic. f. Establish and maintain a formal style and objective tone while attending to the norms and conventions of the discipline in which they are writing.							✓	✓	✓	✓

Kentucky Academic Standards			Information and Ideas			Craft and Structure			Expression of Ideas		Standard English Conventions	
			Central Ideas and Details	Inferences	Command of Evidence	Words in Context	Text Structure and Purpose	Cross-Text Connections	Rhetorical Synthesis	Transitions	Boundaries	Form, Structure, and Sense
		g. Provide a concluding statement or section that follows from and supports the information or explanation presented. h. Develop and strengthen writing as needed by planning, revising, editing, rewriting or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience.										
Composition	C.11-12.3	Use narratives strategically in other modes of writing utilizing effective technique, well-chosen details and well-structured sequences for an intended purpose, including but not limited to introducing an issue and/or supporting a claim. a. Produce clear and coherent writing in which the development, organization and style are appropriate to task, purpose and audience. b. Engage and orient the reader by setting up a problem, situation or observation and its significance, establishing one or multiple point(s) of view and introducing a narrator and/or characters; create a smooth progression of experiences or events. c. Use narrative techniques, such as dialogue, pacing, description, reflection and multiple plot lines, to develop experiences, events and/or characters. d. Use a variety of techniques to sequence events so that they build on one another to create a coherent whole and build toward a particular tone and outcome. e. Use precise words and phrases, telling details and sensory language to convey a vivid picture of the experiences, events, setting and/or characters. f. Provide a conclusion that explicitly connects the										

Kentucky Academic Standards			Information and Ideas			Craft and Structure			Expression of Ideas		Standard English Conventions	
			Central Ideas and Details	Inferences	Command of Evidence	Words in Context	Text Structure and Purpose	Cross-Text Connections	Rhetorical Synthesis	Transitions	Boundaries	Form, Structure, and Sense
		narrative's relevance to the intended purpose of the writing. g. Develop and strengthen writing as needed by planning, revising, editing, rewriting or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience.										
Composition	C.11-12.4	Use digital resources to create, publish and update individual or shared products, taking advantage of technology's capacity to link to other information and to display information flexibly and dynamically. Use a variety of formats to cite sources.										
Composition	C.11-12.5	Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation.										
Composition	C.11-12.6	Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the strengths and limitations of each source in terms of the task, purpose and audience; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and overreliance on any one source and following a standard format for citation.										
Composition	C.11-12.7	Compose routinely over extended time frames and shorter time frames for a variety of task, purposes and audiences.										
Language	L.11-12.1	In both written and oral expression: a. Demonstrate the understanding that usage is a matter of convention, can change over time and									✓	✓

Kentucky Academic Standards			Information and Ideas			Craft and Structure			Expression of Ideas		Standard English Conventions	
			Central Ideas and Details	Inferences	Command of Evidence	Words in Context	Text Structure and Purpose	Cross-Text Connections	Rhetorical Synthesis	Transitions	Boundaries	Form, Structure, and Sense
		may be contested. b. Resolve issues of complex or contested usage, consulting references as needed.										
Language	L.11-12.2	When writing: a. Demonstrate command of the conventions of standard English capitalization, punctuation and spelling when writing.									✓	✓
Language	L.11-12.3	Apply knowledge of language to understand how language functions in different contexts, to make effective choices for meaning or style and to comprehend more fully when reading or listening. a. Apply an understanding of syntax to the study of complex texts when reading. b. Vary syntax for effect in writing and speaking, consulting references for guidance as needed.	✓	✓		✓			✓	✓		
Language	L.11-12.4	Determine or clarify the meaning of unknown and multiple-meaning words and phrases based on grade 11-12 reading and content, choosing flexibility from an array of strategies. a. Use context (e.g., the overall meaning of a sentence or paragraph; a word's position or function in a sentence) as a clue to the meaning of a word or phrase. b. Identify and correctly use patterns of word changes that indicate different meanings or parts of speech. c. Consult general and specialized reference materials to find the pronunciation of a word or determine or clarify its precise meaning or its part of speech. d. Acquire and use accurately general academic and domain-specific words and phrases, sufficient for reading, writing, speaking and listening at the college and career readiness level: demonstrate independence in gathering vocabulary knowledge when considering a word or phrase important to comprehension or expression.	✓	✓		✓						

Kentucky Academic Standards			Information and Ideas			Craft and Structure			Expression of Ideas		Standard English Conventions	
			Central Ideas and Details	Inferences	Command of Evidence	Words in Context	Text Structure and Purpose	Cross-Text Connections	Rhetorical Synthesis	Transitions	Boundaries	Form, Structure, and Sense
Language	L.11-12.5	Demonstrate understanding of, figurative language, word relationships and nuances in word meanings. a. Interpret figures of speech in context, including but not limited to hyperbole and paradox, and analyze their function in the text. b. Analyze nuances in the meaning of words with similar denotations.	✓	✓		✓			✓	✓		

Table 14: Grades 9–10 Aligned to PSAT/NMSQT and PSAT 10

Kentucky Academic Standards			Information and Ideas			Craft and Structure			Expression of Ideas		Standard English Conventions	
			Central Ideas and Details	Inferences	Command of Evidence	Words in Context	Text Structure and Purpose	Cross-Text Connections	Rhetorical Synthesis	Transitions	Boundaries	Form, Structure, and Sense
Reading Literature	RL.9-10.1	Cite relevant and thorough textual evidence to support analysis of what the text says explicitly as well as inferences drawn from the text.	✓		✓							
Reading Literature	RL.9-10.2	Determine a theme or central idea of a text, and analyze in detail its development over the course of the text, including how it emerges and is shaped and refined by specific details.	✓									
Reading Literature	RL.9-10.3	Analyze how complex characters develop over the course of a text, interact with other characters and advance the plot or develop themes.	✓				✓					
Reading Literature	RL.9-10.4	Determine the meaning of words and phrases as they are used in the text, including figurative and connotative meanings; analyze the cumulative impact of specific word choices on meaning and tone.	✓			✓						
Reading Literature	RL.9-10.5	Analyze how an author's choices concerning how to structure a text, order events within it and manipulate time create such effects as mystery, tension or surprise.					✓					
Reading Literature	RL.9-10.6	Analyze a particular author's perspective or cultural experience reflected in a work of literature by drawing on a wide reading of world literature.										
Reading Literature	RL.9-10.7	Analyze the representation of a subject or a key scene in two different artistic mediums, including what is emphasized or absent in each treatment.										
Reading Literature	RL.9-10.9	Analyze how an author draws on and transforms source material in a specific work.										
Reading Literature	RL.9-10.10	By the end of the year, flexibly use a variety of comprehension strategies (i.e., questioning, monitoring, visualizing, inferencing, summarizing, synthesizing, using prior knowledge, determining importance) to read, comprehend and analyze grade-level appropriate, complex literary texts independently and proficiently.	✓		✓	✓	✓					

Kentucky Academic Standards			Information and Ideas			Craft and Structure			Expression of Ideas		Standard English Conventions	
			Central Ideas and Details	Inferences	Command of Evidence	Words in Context	Text Structure and Purpose	Cross-Text Connections	Rhetorical Synthesis	Transitions	Boundaries	Form, Structure, and Sense
Reading Informational Text	RI.9-10.1	Cite relevant and thorough textual evidence to support analysis of what the text says explicitly as well as inferences drawn from the text.	✓	✓	✓							
Reading Informational Text	RI.9-10.2	Determine central ideas of a text and analyze in detail their development over the course of a text, including how they emerge and are shaped and refined by specific details.										
Reading Informational Text	RI.9-10.3	Analyze how the author unfolds an analysis or series of ideas or events over the course of a text, including the order in which the points are made, how they are introduced and developed and the connections that are drawn between them.	✓	✓			✓					
Reading Informational Text	RI.9-10.4	Determine the meaning of words and phrases as they are used in a text, including figurative, connotative and technical meanings; analyze the cumulative impact of specific word choices on meaning and tone.	✓	✓		✓						
Reading Informational Text	RI.9-10.5	Analyze in detail how an author's ideas or claims are developed and refined by particular sentences, paragraphs or larger portions of a text.					✓					
Reading Informational Text	RI.9-10.6	Determine an author's point of view, perspective and purpose in a text, and analyze how an author uses rhetoric to advance that point of view or purpose.					✓	✓				
Reading Informational Text	RI.9-10.7	Analyze various accounts of a subject presented in different print and non-print formats, determining which details are emphasized in each account.										
Reading Informational Text	RI.9-10.8	Evaluate the argument, specific claims and evidence in a text, assessing the validity, reasoning, relevancy and sufficiency of the evidence; identify false statements and fallacious reasoning.	✓	✓	✓							
Reading Informational Text	RI.9-10.9	Analyze documents of historical and literary significance, including how they address related themes and concepts.										
Reading Informational Text	RI.9-10.10	By the end of the year, flexibly use a variety of comprehension strategies (i.e., questioning,	✓	✓	✓	✓	✓	✓				

Kentucky Academic Standards			Information and Ideas			Craft and Structure			Expression of Ideas		Standard English Conventions	
			Central Ideas and Details	Inferences	Command of Evidence	Words in Context	Text Structure and Purpose	Cross-Text Connections	Rhetorical Synthesis	Transitions	Boundaries	Form, Structure, and Sense
		monitoring, visualizing, inferencing, summarizing, synthesizing, using prior knowledge, determining importance) to read, comprehend and analyze grade-level appropriate, complex informational texts independently and proficiently.										
Composition	C.9-10.1	Compose arguments to support claims in an analysis of substantive topics or texts, using valid reasoning and relevant and sufficient evidence. a. Produce clear and coherent writing in which the development, organization and style are appropriate to task, purpose and audience. b. Introduce precise claim(s), distinguish the claim(s) from alternate or opposing claims and create an organization that establishes clear relationships among claim(s), counterclaims, reasons and evidence. c. Develop claim(s) and counterclaims fairly, supplying evidence for each while pointing out the strengths and limitations of both in a manner that anticipates the audience's knowledge level and concerns. d. Link the major sections of the text cohesively, and clarify the relationships among claim(s), counterclaims, reasons and evidence. e. Establish and maintain a task appropriate writing style. f. Provide a concluding statement or section that follows from and supports the argument presented. g. Develop and strengthen writing as needed by planning, revising, editing, rewriting or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience.							✓	✓	✓	✓
Composition	C.9-10.2	Compose informative and/or explanatory texts to examine and convey complex ideas, concepts, and information clearly and accurately through the effective selection, organization and analysis of content.							✓	✓	✓	✓

Kentucky Academic Standards			Information and Ideas			Craft and Structure			Expression of Ideas		Standard English Conventions	
			Central Ideas and Details	Inferences	Command of Evidence	Words in Context	Text Structure and Purpose	Cross-Text Connections	Rhetorical Synthesis	Transitions	Boundaries	Form, Structure, and Sense
		a. Produce writing in which the development and organization are appropriate to task and purpose. b. Introduce a topic; organize complex ideas, concepts, and information to make important connections and distinctions; include formatting, graphics and multimedia when useful to aiding comprehension. c. Develop the topic with well-chosen, relevant and sufficient facts, extended definitions, concrete details, quotations or other information and examples appropriate to the audience's knowledge of the topic. d. Use appropriate and varied transitions to link the major sections of the text, create cohesion, and clarify the relationships among complex ideas and concepts. e. Use precise language and domain-specific vocabulary to manage the complexity of the topic. f. Establish and maintain a formal style and objective tone while attending to the norms and conventions of the discipline in which they are writing. g. Provide a concluding statement or section that follows from and supports the information or explanation presented. h. Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience.									
Composition	C.9-10.3	Use narratives strategically in other modes of writing, utilizing effective technique, well-chosen details and well-structured sequences for an intended purpose, including but not limited to introducing an idea and/or supporting a claim. a. Produce clear and coherent writing in which the development, organization and style are appropriate to task and purpose. b. Engage and orient the reader by setting out a										

Kentucky Academic Standards			Information and Ideas			Craft and Structure			Expression of Ideas		Standard English Conventions	
			Central Ideas and Details	Inferences	Command of Evidence	Words in Context	Text Structure and Purpose	Cross-Text Connections	Rhetorical Synthesis	Transitions	Boundaries	Form, Structure, and Sense
		problem, situation or observation, establishing one or multiple point(s) of view and introducing a narrator and/or characters; create a smooth progression of experiences or events. c. Use narrative techniques, such as dialogue, pacing, description, reflection and multiple plot lines, to develop experiences, events and/or characters. d. Use a variety of techniques to sequence events so that they build on one another to create a coherent whole. e. Use precise words and phrases, telling details, and sensory language to convey a vivid picture of the experiences, events, setting and/or characters. f. Provide a conclusion that explicitly connects the narrative's relevance to the intended purpose of the writing. g. Develop and strengthen writing as needed by planning, revising, editing, rewriting or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience.										
Composition	C.9-10.4	Use digital resources to create, publish and update individual or shared products, taking advantage of technology's capacity to link to other information and to display information flexibly and dynamically. Use a variety of formats to cite sources.										
Composition	C.9-10.5	Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation.										
Composition	C.9-10.6	Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the usefulness of each										

Kentucky Academic Standards			Information and Ideas			Craft and Structure			Expression of Ideas		Standard English Conventions	
			Central Ideas and Details	Inferences	Command of Evidence	Words in Context	Text Structure and Purpose	Cross-Text Connections	Rhetorical Synthesis	Transitions	Boundaries	Form, Structure, and Sense
		source in answering the research question; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and following a standard format for citation.										
Composition	C.9-10.7	Compose routinely over extended time frames and shorter time frames for a variety of tasks, purposes, and audiences.										
Language	L.9-10.1	In both written and oral expression: a. Demonstrate appropriate use of parallel structure. b. Demonstrate appropriate use of various types of phrases (noun, verb, adjectival, adverbial, participial, prepositional, absolute) and clauses (independent, dependent; noun, relative, adverbial) to convey specific meanings and add variety and interest to writing or presentations.									✓	✓
Language	L.9-10.2	When writing: a. Demonstrate appropriate use of a semicolon with and without a conjunctive adverb to link two or more closely related independent clauses. b. Demonstrate appropriate use of a colon to introduce a list or quotation. c. Demonstrate appropriate use of strategies and resources (print and electronic) to identify and correct spelling errors.									✓	
Language	L.9-10.3	Apply knowledge of language to understand how language functions in different contexts, to make effective choices for meaning or style and to comprehend more fully when reading or listening. a. Write and edit work so that it conforms to the guidelines in a style manual appropriate for the discipline and writing type.	✓	✓		✓			✓	✓		
Language	L.9-10.4	Determine or clarify the meaning of unknown and multiple-meaning words and phrases based on grades 9-10 reading and content, choosing flexibly from an	✓	✓		✓						

Kentucky Academic Standards			Information and Ideas			Craft and Structure			Expression of Ideas		Standard English Conventions	
			Central Ideas and Details	Inferences	Command of Evidence	Words in Context	Text Structure and Purpose	Cross-Text Connections	Rhetorical Synthesis	Transitions	Boundaries	Form, Structure, and Sense
		array of strategies. a. Use context (e.g., the overall meaning of a sentence, paragraph or text; a word's position or function in a sentence) as a clue to the meaning of a word or phrase. b. Identify and correctly use patterns of word changes that indicate different meanings or parts of speech. c. Consult general and specialized reference materials to find the pronunciation of a word or determine or clarify its precise meaning or its part of speech. d. Acquire and use accurately general academic and domain-specific words and phrases, sufficient for reading, writing, speaking and listening in order to be transition ready; demonstrate independence in gathering vocabulary knowledge when considering a word or phrase important to comprehension or expression.									
Language	L.9-10.5	Demonstrate understanding of figurative language, word relationships and nuances in word meanings. a. Interpret figures of speech in context, including but not limited to euphemism and oxymoron, and analyze their rhetorical function in the text. b. Analyze nuances in the meaning of words with similar denotations.	✓	✓		✓			✓	✓		

Table 15: Grades 9–10 Aligned to PSAT 8/9

Kentucky Academic Standards			Information and Ideas			Craft and Structure			Expression of Ideas		Standard English Conventions	
			Central Ideas and Details	Inferences	Command of Evidence	Words in Context	Text Structure and Purpose	Cross-Text Connections	Rhetorical Synthesis	Transitions	Boundaries	Form, Structure, and Sense
Reading Literature	RL.9-10.1	Cite relevant and thorough textual evidence to support analysis of what the text says explicitly as well as inferences drawn from the text.	✓		✓							
Reading Literature	RL.9-10.2	Determine a theme or central idea of a text, and analyze in detail its development over the course of the text, including how it emerges and is shaped and refined by specific details.	✓									
Reading Literature	RL.9-10.3	Analyze how complex characters develop over the course of a text, interact with other characters and advance the plot or develop themes.	✓				✓					
Reading Literature	RL.9-10.4	Determine the meaning of words and phrases as they are used in the text, including figurative and connotative meanings; analyze the cumulative impact of specific word choices on meaning and tone.	✓			✓						
Reading Literature	RL.9-10.5	Analyze how an author's choices concerning how to structure a text, order events within it and manipulate time create such effects as mystery, tension or surprise.					✓					
Reading Literature	RL.9-10.6	Analyze a particular author's perspective or cultural experience reflected in a work of literature by drawing on a wide reading of world literature.										
Reading Literature	RL.9-10.7	Analyze the representation of a subject or a key scene in two different artistic mediums, including what is emphasized or absent in each treatment.										
Reading Literature	RL.9-10.9	Analyze how an author draws on and transforms source material in a specific work.										
Reading Literature	RL.9-10.10	By the end of the year, flexibly use a variety of comprehension strategies (i.e., questioning, monitoring, visualizing, inferencing, summarizing, synthesizing, using prior knowledge, determining importance) to read, comprehend and analyze grade-level appropriate, complex literary texts independently and proficiently.	✓		✓	✓	✓					

Kentucky Academic Standards			Information and Ideas			Craft and Structure			Expression of Ideas		Standard English Conventions	
			Central Ideas and Details	Inferences	Command of Evidence	Words in Context	Text Structure and Purpose	Cross-Text Connections	Rhetorical Synthesis	Transitions	Boundaries	Form, Structure, and Sense
Reading Informational Text	RI.9-10.1	Cite relevant and thorough textual evidence to support analysis of what the text says explicitly as well as inferences drawn from the text.	✓	✓	✓							
Reading Informational Text	RI.9-10.2	Determine central ideas of a text and analyze in detail their development over the course of a text, including how they emerge and are shaped and refined by specific details.										
Reading Informational Text	RI.9-10.3	Analyze how the author unfolds an analysis or series of ideas or events over the course of a text, including the order in which the points are made, how they are introduced and developed and the connections that are drawn between them.	✓	✓			✓					
Reading Informational Text	RI.9-10.4	Determine the meaning of words and phrases as they are used in a text, including figurative, connotative and technical meanings; analyze the cumulative impact of specific word choices on meaning and tone.	✓	✓		✓						
Reading Informational Text	RI.9-10.5	Analyze in detail how an author's ideas or claims are developed and refined by particular sentences, paragraphs or larger portions of a text.					✓					
Reading Informational Text	RI.9-10.6	Determine an author's point of view, perspective and purpose in a text, and analyze how an author uses rhetoric to advance that point of view or purpose.					✓	✓				
Reading Informational Text	RI.9-10.7	Analyze various accounts of a subject presented in different print and non-print formats, determining which details are emphasized in each account.										
Reading Informational Text	RI.9-10.8	Evaluate the argument, specific claims and evidence in a text, assessing the validity, reasoning, relevancy and sufficiency of the evidence; identify false statements and fallacious reasoning.	✓	✓	✓							
Reading Informational Text	RI.9-10.9	Analyze documents of historical and literary significance, including how they address related themes and concepts.										
Reading Informational Text	RI.9-10.10	By the end of the year, flexibly use a variety of comprehension strategies (i.e., questioning,	✓	✓	✓	✓	✓	✓				

Kentucky Academic Standards			Information and Ideas			Craft and Structure			Expression of Ideas		Standard English Conventions	
			Central Ideas and Details	Inferences	Command of Evidence	Words in Context	Text Structure and Purpose	Cross-Text Connections	Rhetorical Synthesis	Transitions	Boundaries	Form, Structure, and Sense
		monitoring, visualizing, inferencing, summarizing, synthesizing, using prior knowledge, determining importance) to read, comprehend and analyze grade-level appropriate, complex informational texts independently and proficiently.										
Composition	C.9-10.1	Compose arguments to support claims in an analysis of substantive topics or texts, using valid reasoning and relevant and sufficient evidence. a. Produce clear and coherent writing in which the development, organization and style are appropriate to task, purpose and audience. b. Introduce precise claim(s), distinguish the claim(s) from alternate or opposing claims and create an organization that establishes clear relationships among claim(s), counterclaims, reasons and evidence. c. Develop claim(s) and counterclaims fairly, supplying evidence for each while pointing out the strengths and limitations of both in a manner that anticipates the audience's knowledge level and concerns. d. Link the major sections of the text cohesively, and clarify the relationships among claim(s), counterclaims, reasons and evidence. e. Establish and maintain a task appropriate writing style. f. Provide a concluding statement or section that follows from and supports the argument presented. g. Develop and strengthen writing as needed by planning, revising, editing, rewriting or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience.							✓	✓	✓	✓
Composition	C.9-10.2	Compose informative and/or explanatory texts to examine and convey complex ideas, concepts, and information clearly and accurately through the effective selection, organization and analysis of content.							✓	✓	✓	✓

Kentucky Academic Standards			Information and Ideas			Craft and Structure			Expression of Ideas		Standard English Conventions	
			Central Ideas and Details	Inferences	Command of Evidence	Words in Context	Text Structure and Purpose	Cross-Text Connections	Rhetorical Synthesis	Transitions	Boundaries	Form, Structure, and Sense
		a. Produce writing in which the development and organization are appropriate to task and purpose. b. Introduce a topic; organize complex ideas, concepts, and information to make important connections and distinctions; include formatting, graphics and multimedia when useful to aiding comprehension. c. Develop the topic with well-chosen, relevant and sufficient facts, extended definitions, concrete details, quotations or other information and examples appropriate to the audience's knowledge of the topic. d. Use appropriate and varied transitions to link the major sections of the text, create cohesion, and clarify the relationships among complex ideas and concepts. e. Use precise language and domain-specific vocabulary to manage the complexity of the topic. f. Establish and maintain a formal style and objective tone while attending to the norms and conventions of the discipline in which they are writing. g. Provide a concluding statement or section that follows from and supports the information or explanation presented. h. Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience.									
Composition	C.9-10.3	Use narratives strategically in other modes of writing, utilizing effective technique, well-chosen details and well-structured sequences for an intended purpose, including but not limited to introducing an idea and/or supporting a claim. a. Produce clear and coherent writing in which the development, organization and style are appropriate to task and purpose. b. Engage and orient the reader by setting out a										

Kentucky Academic Standards			Information and Ideas			Craft and Structure			Expression of Ideas		Standard English Conventions	
			Central Ideas and Details	Inferences	Command of Evidence	Words in Context	Text Structure and Purpose	Cross-Text Connections	Rhetorical Synthesis	Transitions	Boundaries	Form, Structure, and Sense
		problem, situation or observation, establishing one or multiple point(s) of view and introducing a narrator and/or characters; create a smooth progression of experiences or events. c. Use narrative techniques, such as dialogue, pacing, description, reflection and multiple plot lines, to develop experiences, events and/or characters. d. Use a variety of techniques to sequence events so that they build on one another to create a coherent whole. e. Use precise words and phrases, telling details, and sensory language to convey a vivid picture of the experiences, events, setting and/or characters. f. Provide a conclusion that explicitly connects the narrative's relevance to the intended purpose of the writing. g. Develop and strengthen writing as needed by planning, revising, editing, rewriting or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience.										
Composition	C.9-10.4	Use digital resources to create, publish and update individual or shared products, taking advantage of technology's capacity to link to other information and to display information flexibly and dynamically. Use a variety of formats to cite sources.										
Composition	C.9-10.5	Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation.										
Composition	C.9-10.6	Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the usefulness of each										

Kentucky Academic Standards			Information and Ideas			Craft and Structure			Expression of Ideas		Standard English Conventions	
			Central Ideas and Details	Inferences	Command of Evidence	Words in Context	Text Structure and Purpose	Cross-Text Connections	Rhetorical Synthesis	Transitions	Boundaries	Form, Structure, and Sense
		source in answering the research question; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and following a standard format for citation.										
Composition	C.9-10.7	Compose routinely over extended time frames and shorter time frames for a variety of tasks, purposes, and audiences.										
Language	L.9-10.1	In both written and oral expression: a. Demonstrate appropriate use of parallel structure. b. Demonstrate appropriate use of various types of phrases (noun, verb, adjectival, adverbial, participial, prepositional, absolute) and clauses (independent, dependent; noun, relative, adverbial) to convey specific meanings and add variety and interest to writing or presentations.									✓	✓
Language	L.9-10.2	When writing: a. Demonstrate appropriate use of a semicolon with and without a conjunctive adverb to link two or more closely related independent clauses. b. Demonstrate appropriate use of a colon to introduce a list or quotation. c. Demonstrate appropriate use of strategies and resources (print and electronic) to identify and correct spelling errors.									✓	
Language	L.9-10.3	Apply knowledge of language to understand how language functions in different contexts, to make effective choices for meaning or style and to comprehend more fully when reading or listening. a. Write and edit work so that it conforms to the guidelines in a style manual appropriate for the discipline and writing type.	✓	✓		✓			✓	✓		
Language	L.9-10.4	Determine or clarify the meaning of unknown and multiple-meaning words and phrases based on grades 9- 10 reading and content, choosing flexibly from an	✓	✓		✓						

Kentucky Academic Standards			Information and Ideas			Craft and Structure			Expression of Ideas		Standard English Conventions	
			Central Ideas and Details	Inferences	Command of Evidence	Words in Context	Text Structure and Purpose	Cross-Text Connections	Rhetorical Synthesis	Transitions	Boundaries	Form, Structure, and Sense
		array of strategies. a. Use context (e.g., the overall meaning of a sentence, paragraph or text; a word's position or function in a sentence) as a clue to the meaning of a word or phrase. b. Identify and correctly use patterns of word changes that indicate different meanings or parts of speech. c. Consult general and specialized reference materials to find the pronunciation of a word or determine or clarify its precise meaning or its part of speech. d. Acquire and use accurately general academic and domain-specific words and phrases, sufficient for reading, writing, speaking and listening in order to be transition ready; demonstrate independence in gathering vocabulary knowledge when considering a word or phrase important to comprehension or expression.									
Language	L.9-10.5	Demonstrate understanding of figurative language, word relationships and nuances in word meanings. a. Interpret figures of speech in context, including but not limited to euphemism and oxymoron, and analyze their rhetorical function in the text. b. Analyze nuances in the meaning of words with similar denotations.	✓	✓		✓			✓	✓		

Table 16: Grade 8 Aligned to PSAT 8/9

Kentucky Academic Standards			Information and Ideas			Craft and Structure			Expression of Ideas		Standard English Conventions	
			Central Ideas and Details	Inferences	Command of Evidence	Words in Context	Text Structure and Purpose	Cross-Text Connections	Rhetorical Synthesis	Transitions	Boundaries	Form, Structure, and Sense
Reading Literature	RL.8.1	Cite relevant textual evidence to support analysis of what the text says explicitly as well as inferences drawn from the text.	✓		✓							
Reading Literature	RL.8.2	Determine themes of a text, and analyze how they are developed through relationships of characters, setting and plot, citing textual evidence, paraphrasing or summarizing.										
Reading Literature	RL.8.3	Analyze how particular lines of dialogue or incidents in a story or drama propel the action, reveal aspects of a character or provoke a decision.	✓				✓					
Reading Literature	RL.8.4	Determine the meaning of words and phrases as they are used in a text, including figurative and connotative meanings; analyze the impact of specific word choices on meaning and tone, including but not limited to analogies or allusions to other texts.	✓			✓						
Reading Literature	RL.8.5	Compare/contrast the structure of two or more texts, and analyze how the differing structure of each text contributes to its meaning and style.										
Reading Literature	RL.8.6	Analyze characters' and readers' perspectives and how the differences create effects, including but not limited to suspense, humor and empathy.										
Reading Literature	RL.8.7	Analyze the extent to which a filmed/live production of a story or drama stays faithful to or departs from the text or script, evaluating choices made by the director or actors.										
Reading Literature	RL.8.9	Analyze how a modern work of fiction draws on themes, patterns of events or character types from myths, traditional stories or religious works, including describing how the material is rendered new.										
Reading Literature	RL.8.10	By the end of the year, flexibly use a variety of comprehension strategies (i.e., questioning,	✓		✓	✓	✓					

Kentucky Academic Standards			Information and Ideas			Craft and Structure			Expression of Ideas		Standard English Conventions	
			Central Ideas and Details	Inferences	Command of Evidence	Words in Context	Text Structure and Purpose	Cross-Text Connections	Rhetorical Synthesis	Transitions	Boundaries	Form, Structure, and Sense
		monitoring, visualizing, inferencing, summarizing, synthesizing, using prior knowledge, determining importance) to read, comprehend and analyze grade-level appropriate, complex literary texts independently and proficiently.										
Reading Informational Text	RI.8.1	Cite relevant textual evidence to support analysis of what the text says explicitly as well as inferences drawn from the text.	✓	✓	✓							
Reading Informational Text	RI.8.2	Determine central ideas of a text, and analyze how they are developed through relationships of key details, citing textual evidence, paraphrasing or summarizing.										
Reading Informational Text	RI.8.3	Analyze how an author uses comparisons, analogies or categories to make connections among and distinctions between ideas over the course of a text.	✓	✓			✓					
Reading Informational Text	RI.8.4	Determine the meaning of words and phrases as they are used in a text, including figurative, connotative and technical meanings; analyze the impact of specific word choices on meaning and tone.	✓	✓		✓						
Reading Informational Text	RI.8.5	Analyze in detail the structure of a specific paragraph in a text, including the role of particular sentences in developing and refining a key concept.					✓					
Reading Informational Text	RI.8.6	Determine an author's perspective and purpose in a text, and analyze how the author acknowledges and responds to conflicting evidence or viewpoints.					✓	✓				
Reading Informational Text	RI.8.7	Evaluate the advantages and disadvantages of using print and non-print formats for presenting particular topics or ideas.										
Reading Informational Text	RI.8.8	Identify and evaluate the argument and specific claims in a text, assessing whether the reasoning is sound and the evidence is relevant and	✓	✓	✓							

Kentucky Academic Standards			Information and Ideas			Craft and Structure			Expression of Ideas		Standard English Conventions	
			Central Ideas and Details	Inferences	Command of Evidence	Words in Context	Text Structure and Purpose	Cross-Text Connections	Rhetorical Synthesis	Transitions	Boundaries	Form, Structure, and Sense
		sufficient; recognize when irrelevant evidence is introduced.										
Reading Informational Text	RI.8.9	Analyze two or more texts with conflicting information on the same topic and identify where the texts disagree in fact or interpretation.						✓				
Reading Informational Text	RI.8.10	By the end of the year, flexibly use a variety of comprehension strategies (i.e., questioning, monitoring, visualizing, inferencing, summarizing, synthesizing, using prior knowledge, determining importance) to read, comprehend, and analyze grade-level appropriate, complex informational texts independently and proficiently.	✓	✓	✓	✓	✓	✓				
Composition	C.8.1	Compose arguments to support claims with clear reasons and relevant evidence. a. Produce clear and coherent writing in which the development, organization and style are appropriate to task, purpose and audience. b. Introduce claim(s), acknowledge and distinguish opposing claim(s) and counter/refute them, and organize the reasons and evidence logically. c. Support claim(s) with logical reasoning and relevant evidence, using accurate, credible sources and demonstrating an understanding of the topic or text. d. Use transitions to create cohesion and clarify the relationships among claim(s), counterclaims, reasons and evidence. e. Establish and maintain a task appropriate writing style. f. Provide a concluding statement or section that supports the argument presented. g. With some guidance, develop and strengthen writing as needed by planning, revising, editing, rewriting or trying a new approach, focusing on							✓	✓	✓	✓

Kentucky Academic Standards			Information and Ideas			Craft and Structure			Expression of Ideas		Standard English Conventions	
			Central Ideas and Details	Inferences	Command of Evidence	Words in Context	Text Structure and Purpose	Cross-Text Connections	Rhetorical Synthesis	Transitions	Boundaries	Form, Structure, and Sense
		how well purpose and audience have been addressed.										
Composition	C.8.2	Compose informative and/or explanatory texts to examine a topic and convey ideas, concepts and information through the selection, organization and analysis of relevant content. a. Produce clear and coherent writing in which the development, organization and style are appropriate to task, purpose and audience. b. Introduce a topic clearly; organize ideas, concepts and information into broader categories; include formatting, graphics and multimedia when useful to aiding comprehension. c. Develop the topic with relevant, well-chosen facts, definitions, concrete details, quotations or other information and examples. d. Use appropriate and varied transitions to create cohesion and clarify the relationships among ideas and concepts. e. Use precise language and domain-specific vocabulary to inform about or explain the topic. f. Establish and maintain a formal style. g. Provide a concluding statement or section that follows from and supports the information or explanation presented. h. With some guidance, develop and strengthen writing as needed by planning, revising, editing, rewriting or trying a new approach, focusing on how well purpose and audience have been addressed.							✓	✓	✓	✓
Composition	C.8.3	Use narratives strategically in other modes of writing, utilizing effective technique, well-chosen details and well-structured sequences for an intended purpose. a. Produce clear and coherent writing in which										

Kentucky Academic Standards			Information and Ideas			Craft and Structure			Expression of Ideas		Standard English Conventions	
			Central Ideas and Details	Inferences	Command of Evidence	Words in Context	Text Structure and Purpose	Cross-Text Connections	Rhetorical Synthesis	Transitions	Boundaries	Form, Structure, and Sense
		the development, organization and style are appropriate to task, purpose and audience. b. Engage the reader by setting out a problem, situation or observation, establishing a point of view and introducing a narrator and/or characters; create a smooth progression of experiences or events. c. Use narrative techniques, such as dialogue, pacing, description and reflection, to develop experiences, events and/or characters. d. Use a variety of transitions to convey sequence, signal shifts from one time frame or setting to another and show the relationships among experiences and events. e. Use precise words and phrases, relevant descriptive details and sensory language to capture the action and convey experiences and events. f. Provide a conclusion that connects the narrative's relevance to the intended purpose of the writing. g. With guidance, develop and strengthen writing as needed by planning, revising, editing, rewriting or trying a new approach.										
Composition	C.8.4	Use digital resources to create and publish products as well as to interact and collaborate with others; cite sources using MLA or APA format.										
Composition	C.8.5	Conduct short research projects to answer a question (including a self-generated question), drawing on several sources and generating new avenues for inquiry.										
Composition	C.8.6	Gather relevant information from multiple print and digital sources, using search terms effectively; assess the credibility and accuracy of each source; and, in order to reflect, analyze or										

Kentucky Academic Standards			Information and Ideas			Craft and Structure			Expression of Ideas		Standard English Conventions	
			Central Ideas and Details	Inferences	Command of Evidence	Words in Context	Text Structure and Purpose	Cross-Text Connections	Rhetorical Synthesis	Transitions	Boundaries	Form, Structure, and Sense
		complete short research projects, quote or paraphrase the data and conclusions of others while avoiding plagiarism by providing in-text and bibliographic MLA or APA citation.										
Composition	C.8.7	Compose routinely over extended time frames and shorter time frames for a variety of tasks, purposes and audiences.										
Language	L.8.1	In both written and oral expression: a. Identify verbals correctly based on their intended function. b. Demonstrate appropriate use of verbs in the active and passive voice. c. Demonstrate appropriate use of verbs in the indicative, imperative, interrogative, conditional and subjunctive mood, while recognizing and correcting inappropriate shifts.										✓
Language	L.8.2	When writing: a. Demonstrate appropriate use of punctuation to indicate a pause or break. b. Demonstrate appropriate use of an ellipsis to indicate an omission. c. Demonstrate appropriate use of strategies and resources (print and electronic) to identify and correct spelling errors.									✓	
Language	L.8.3	Use knowledge of language and its conventions when writing, speaking, reading or listening. a. Use verbs in the active and passive voice and in the conditional and subjunctive mood to achieve particular effects (e.g., emphasizing the actor or the action, expressing uncertainty or describing a state contrary to fact).	✓	✓		✓			✓	✓		
Language	L.8.4	Determine or clarify the meaning of unknown and multiple-meaning words and phrases based on grade 8 reading and content, choosing flexibly from an array of strategies. a. Use context (e.g., the overall meaning of a	✓	✓		✓						

Kentucky Academic Standards			Information and Ideas			Craft and Structure			Expression of Ideas		Standard English Conventions	
			Central Ideas and Details	Inferences	Command of Evidence	Words in Context	Text Structure and Purpose	Cross-Text Connections	Rhetorical Synthesis	Transitions	Boundaries	Form, Structure, and Sense
		sentence or paragraph; a word's position or function in a sentence) as a clue to the meaning of a word or phrase. b. Use Greek and Latin affixes and roots as clues to the meaning of a word. c. Consult print and digital reference materials to find the pronunciation and determine or clarify the precise meaning of key words and phrases. d. Acquire and use accurately grade-appropriate general academic and domain-specific words and phrases; gather vocabulary knowledge when considering a word or phrase important to comprehension or expression.									
Language	L.8.5	Demonstrate understanding of figurative language, word relationships and nuances in word meanings. a. Interpret figurative language, including but not limited to irony, in context. b. Use the relationship between particular words to better understand each of the words. c. Distinguish among the connotations of words with similar denotations.	✓	✓		✓			✓	✓		

Appendix C: Alignments of Math Standards to SAT Suite

The following tables detail the Kentucky Academic Standards–SAT Suite alignments using the standards as the organizing principle.

Table 17: Algebra 1 Aligned to SAT

Kentucky Academic Standards			Algebra					Advanced Math			Problem Solving and Data Analysis							Geometry and Trigonometry			
			Linear equations in one variable	Linear functions	Linear equations in two variables	Systems of two linear equations in two variables	Linear equations in one or two variables	Equivalent expressions	Nonlinear equations in one variable and systems of equations in two variables	Nonlinear functions	Ratios, rates, proportional relationships, and units	Percentages	One variable data	Two-variable data	Probability and conditional probability	Inference from sample statistics and margin of error	Evaluating statistical claim	Area and volume	Lines, angles, and triangles	Right triangles and trigonometry	Circles
Seeing Structure in Expressions	KY.HS.A.1	Interpret expressions that represent a quantity in terms of its context. a. Interpret parts of an expression, such as terms, factors and coefficients. b. Interpret complicated expressions, given a context, by viewing one or more of their parts as a single entity.	✓	✓	✓	✓	✓			✓											
Seeing Structure in Expressions	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.	✓	✓	✓			✓	✓												
Seeing Structure in Expressions	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.						✓		✓											

Kentucky Academic Standards			Algebra					Advanced Math			Problem Solving and Data Analysis							Geometry and Trigonometry			
			Linear equations in one variable	Linear functions	Linear equations in two variables	Systems of two linear equations in two variables	Linear equations in one or two variables	Equivalent expressions	Nonlinear equations in one variable and systems of equations in two variables	Nonlinear functions	Ratios, rates, proportional relationships, and units	Percentages	One variable data	Two-variable data	Probability and conditional probability	Inference from sample statistics and margin of error	Evaluating statistical claim	Area and volume	Lines, angles, and triangles	Right triangles and trigonometry	Circles
		a. Write the standard form of a given polynomial and identify the terms, coefficients, degree, leading coefficient and constant term. b. Factor a quadratic expression to reveal the zeros of the function it defines. c. Use the properties of exponents to rewrite exponential expressions.																			
Arithmetic with Polynomials and Rational Expressions	KY.HS.A.5	Add, subtract and multiply polynomials.						✓													
Arithmetic with Polynomials and Rational Expressions	KY.HS.A.7	Identify roots of polynomials when suitable factorizations are available. Know these roots become the zeros (x-intercepts) for the corresponding polynomial function.								✓											
Creating Equations	KY.HS.A.12	Create equations and inequalities in one variable and use them to solve problems.	✓				✓			✓											
Creating Equations	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.		✓	✓					✓											
Creating Equations	KY.HS.A.14	Create a system of equations or inequalities to represent constraints				✓	✓														

Kentucky Academic Standards			Algebra					Advanced Math			Problem Solving and Data Analysis							Geometry and Trigonometry			
			Linear equations in one variable	Linear functions	Linear equations in two variables	Systems of two linear equations in two variables	Linear equations in one or two variables	Equivalent expressions	Nonlinear equations in one variable and systems of equations in two variables	Nonlinear functions	Ratios, rates, proportional relationships, and units	Percentages	One variable data	Two-variable data	Probability and conditional probability	Inference from sample statistics and margin of error	Evaluating statistical claim	Area and volume	Lines, angles, and triangles	Right triangles and trigonometry	Circles
		within a modeling context. Interpret the solution(s) to the corresponding system as viable or nonviable options within the context.																			
Creating Equations	KY.HS.A.15	Rearrange formulas to solve a literal equation, highlighting a quantity of interest, using the same reasoning as in solving equations.							✓												
Reasoning with Equations and Inequalities	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.	✓		✓	✓	✓		✓	✓											
Reasoning with Equations and Inequalities	KY.HS.A.18	Solve linear equations and inequalities in one variable, including literal equations with coefficients represented by letters.	✓				✓				✓										
Reasoning with Equations and Inequalities	KY.HS.A.19	Solve quadratic equations in one variable. a. Solve quadratic equations by taking square roots, the quadratic formula and factoring, as appropriate to the initial form of the equation. Recognize when the quadratic formula gives complex solutions and write them as a ± bi for real numbers							✓												

Kentucky Academic Standards			Algebra					Advanced Math			Problem Solving and Data Analysis							Geometry and Trigonometry			
			Linear equations in one variable	Linear functions	Linear equations in two variables	Systems of two linear equations in two variables	Linear equations in one or two variables	Equivalent expressions	Nonlinear equations in one variable and systems of equations in two variables	Nonlinear functions	Ratios, rates, proportional relationships, and units	Percentages	One variable data	Two-variable data	Probability and conditional probability	Inference from sample statistics and margin of error	Evaluating statistical claim	Area and volume	Lines, angles, and triangles	Right triangles and trigonometry	Circles
		a and b.																			
Reasoning with Equations and Inequalities	KY.HS.A.20	Solve systems of linear equations in two variables. 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. b. Solve systems of linear equations with graphs, substitution and elimination, focusing on pairs of linear equations in two variables.				✓															
Reasoning with Equations and Inequalities	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.		✓	✓					✓											
Reasoning with Equations and Inequalities	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.				✓			✓												
Reasoning with Equations and Inequalities	KY.HS.A.25	Graph linear inequalities in two variables. a. Graph the solutions to a linear inequality as a half-plane (excluding the boundary in the case of a strict					✓														

Kentucky Academic Standards			Algebra					Advanced Math			Problem Solving and Data Analysis							Geometry and Trigonometry			
			Linear equations in one variable	Linear functions	Linear equations in two variables	Systems of two linear equations in two variables	Linear equations in one or two variables	Equivalent expressions	Nonlinear equations in one variable and systems of equations in two variables	Nonlinear functions	Ratios, rates, proportional relationships, and units	Percentages	One variable data	Two-variable data	Probability and conditional probability	Inference from sample statistics and margin of error	Evaluating statistical claim	Area and volume	Lines, angles, and triangles	Right triangles and trigonometry	Circles
		inequality). b. Graph the solution set to a system of linear inequalities as the intersection of the corresponding half-planes.																			
Interpreting Functions	KY.HS.F.1	Understand properties and key features of functions and the different ways functions can be represented. 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. b. Using appropriate function notation, evaluate functions for inputs in their domains and interpret statements that use function notation in terms of a context. 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.		✓						✓											

Kentucky Academic Standards			Algebra					Advanced Math			Problem Solving and Data Analysis							Geometry and Trigonometry			
			Linear equations in one variable	Linear functions	Linear equations in two variables	Systems of two linear equations in two variables	Linear equations in one or two variables	Equivalent expressions	Nonlinear equations in one variable and systems of equations in two variables	Nonlinear functions	Ratios, rates, proportional relationships, and units	Percentages	One variable data	Two-variable data	Probability and conditional probability	Inference from sample statistics and margin of error	Evaluating statistical claim	Area and volume	Lines, angles, and triangles	Right triangles and trigonometry	Circles
		d. Relate the domain of a function to its graph and, where applicable, to the quantitative relationship it describes. e. Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions).																			
Interpreting Functions	KY.HS.F.2	Recognize that arithmetic and geometric sequences are functions, sometimes defined recursively, whose domain is a subset of the integers.																			
Interpreting Functions	KY.HS.F.3	Understand average rate of change of a function over an interval. a. Calculate and interpret the average rate of change of a function (presented symbolically or as a table) over a specified interval. b. Estimate the rate of change from a graph.			✓									✓							
Interpreting Functions	KY.HS.F.4	Graph functions expressed symbolically and show key features of the graph, with and without using technology (computer, graphing calculator). a. Graph linear and quadratic functions and show intercepts,		✓						✓											

Kentucky Academic Standards			Algebra					Advanced Math			Problem Solving and Data Analysis							Geometry and Trigonometry			
			Linear equations in one variable	Linear functions	Linear equations in two variables	Systems of two linear equations in two variables	Linear equations in one or two variables	Equivalent expressions	Nonlinear equations in one variable and systems of equations in two variables	Nonlinear functions	Ratios, rates, proportional relationships, and units	Percentages	One variable data	Two-variable data	Probability and conditional probability	Inference from sample statistics and margin of error	Evaluating statistical claim	Area and volume	Lines, angles, and triangles	Right triangles and trigonometry	Circles
		maxima and minima.																			
Interpreting Functions	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. a. Identify zeros, extreme values and symmetry of the graph within the context of a quadratic function. b. Use the properties of exponents to interpret expressions for exponential functions and classify the exponential function as representing growth or decay.								✓											
Building Functions	KY.HS.F.6	Write a function that describes a relationship between two quantities. a. Determine an explicit expression, a recursive process, or steps for calculation from a context. b. Combine standard function types using arithmetic operations.		✓						✓											
Building Functions	KY.HS.F.7	Use arithmetic and geometric sequences to model situations and scenarios. a. Use formulas (explicit and recursive) to generate terms for arithmetic and geometric sequences. b. Write formulas to model arithmetic and geometric sequences																			

Kentucky Academic Standards			Algebra					Advanced Math			Problem Solving and Data Analysis							Geometry and Trigonometry			
			Linear equations in one variable	Linear functions	Linear equations in two variables	Systems of two linear equations in two variables	Linear equations in one or two variables	Equivalent expressions	Nonlinear equations in one variable and systems of equations in two variables	Nonlinear functions	Ratios, rates, proportional relationships, and units	Percentages	One variable data	Two-variable data	Probability and conditional probability	Inference from sample statistics and margin of error	Evaluating statistical claim	Area and volume	Lines, angles, and triangles	Right triangles and trigonometry	Circles
		and apply those formulas in realistic situations.																			
Linear, Quadratic, and Exponential Models	KY.HS.F.11	Distinguish between situations that can be modeled with linear functions and with exponential functions. 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. b. Recognize situations in which one quantity changes at a constant rate per unit interval relative to another. c. Recognize situations in which a quantity grows or decays by a constant percent rate per unit interval relative to another.		✓						✓				✓							
Linear, Quadratic, and Exponential Models	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).		✓						✓											
Linear, Quadratic, and Exponential Models	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.								✓				✓							

Kentucky Academic Standards			Algebra					Advanced Math			Problem Solving and Data Analysis							Geometry and Trigonometry			
			Linear equations in one variable	Linear functions	Linear equations in two variables	Systems of two linear equations in two variables	Linear equations in one or two variables	Equivalent expressions	Nonlinear equations in one variable and systems of equations in two variables	Nonlinear functions	Ratios, rates, proportional relationships, and units	Percentages	One variable data	Two-variable data	Probability and conditional probability	Inference from sample statistics and margin of error	Evaluating statistical claim	Area and volume	Lines, angles, and triangles	Right triangles and trigonometry	Circles
Linear, Quadratic, and Exponential Models	KY.HS.F.14	Interpret the parameters in a linear or exponential function in terms of a context.		✓						✓											
The Real Number System	KY.HS.N.1	Extend the properties of integer exponents to rational exponents, allowing for the expression of radicals in terms of rational exponents.						✓													
The Real Number System	KY.HS.N.2	Rewrite expressions involving radicals and rational exponents using the properties of exponents.						✓													
Quantities	KY.HS.N.4	Use units in context as a way to understand problems and to guide the solution of multi-step problems; a. Choose and interpret units consistently in formulas; b. Choose and interpret the scale and the origin in graphs and data displays.									✓										
Quantities	KY.HS.N.5	Define appropriate units in context for the purpose of descriptive modeling.																			
Quantities	KY.HS.N.6	Choose a level of accuracy appropriate to limitations on measurement when reporting quantities.																			
Interpreting Categorical	KY.HS.SP.6	Represent data on two quantitative variables on a scatter plot and												✓							

Kentucky Academic Standards			Algebra					Advanced Math			Problem Solving and Data Analysis							Geometry and Trigonometry			
			Linear equations in one variable	Linear functions	Linear equations in two variables	Systems of two linear equations in two variables	Linear equations in one or two variables	Equivalent expressions	Nonlinear equations in one variable and systems of equations in two variables	Nonlinear functions	Ratios, rates, proportional relationships, and units	Percentages	One variable data	Two-variable data	Probability and conditional probability	Inference from sample statistics and margin of error	Evaluating statistical claim	Area and volume	Lines, angles, and triangles	Right triangles and trigonometry	Circles
and Quantitative Data		describe how the explanatory and response variables are related. a. Calculate an appropriate mathematical model, or use a given mathematical model, for data to solve problems in context. b. Informally assess the fit of a model (through calculating correlation for linear data, plotting, calculating and/or analyzing residuals).																			
Interpreting Categorical and Quantitative Data	KY.HS.SP.7	Interpret the slope (rate of change) and the intercept (constant term) of a linear model in the context of the data.												✓							
Interpreting Categorical and Quantitative Data	KY.HS.SP.8	Understand the role and purpose of correlation in linear regression. a. Use technology to compute correlation coefficient of a linear fit. b. Interpret the meaning of the correlation within the context of the data. c. Describe the limitations of correlation when establishing causation.																			

Table 18: Geometry Aligned to SAT

Kentucky Academic Standards			Algebra					Advanced Math			Problem Solving and Data Analysis							Geometry and Trigonometry			
			Linear equations in one variable	Linear functions	Linear equations in two variables	Systems of two linear equations in two variables	Linear equations in one or two variables	Equivalent expressions	Nonlinear equations in one variable and systems of equations in two variables	Nonlinear functions	Ratios, rates, proportional relationships, and units	Percentages	One variable data	Two-variable data	Probability and conditional probability	Inference from sample statistics and margin of error	Evaluating statistical claim	Area and volume	Lines, angles, and triangles	Right triangles and trigonometry	Circles
Congruence	KY.HS.G.1	Know and apply precise definitions of the language of Geometry: a. Understand properties of line segments, angles and circle. b. Understand properties of and differences between perpendicular and parallel lines.			✓														✓	✓	
Congruence	KY.HS.G.2	Representing transformations in the plane. a. Describe transformations as functions that take points in the plane as inputs and give other points as outputs b. Compare transformations that preserve distance and angle measures to those that do not. c. Given a rectangle, parallelogram, trapezoid, or regular polygon, formally describe the rotations and reflections that carry it onto itself, using properties of these figures.																			
Congruence	KY.HS.G.4	Understand the effects of transformations of geometric figures. a. Given a geometric figure and a rotation, reflection, or translation, draw the transformed figure. b. Specify a sequence of																			

Kentucky Academic Standards			Algebra					Advanced Math			Problem Solving and Data Analysis							Geometry and Trigonometry			
			Linear equations in one variable	Linear functions	Linear equations in two variables	Systems of two linear equations in two variables	Linear equations in one or two variables	Equivalent expressions	Nonlinear equations in one variable and systems of equations in two variables	Nonlinear functions	Ratios, rates, proportional relationships, and units	Percentages	One variable data	Two-variable data	Probability and conditional probability	Inference from sample statistics and margin of error	Evaluating statistical claim	Area and volume	Lines, angles, and triangles	Right triangles and trigonometry	Circles
		transformations that will carry a given figure onto another. 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.																			
Congruence	KY.HS.G.5	Know and apply the concepts of triangle congruence: a. Use the definition of congruence in terms of rigid motions to show that two triangles are congruent if and only if corresponding pairs of sides and corresponding pairs of angles are congruent. b. Explain how the criteria for triangle congruence (ASA, SAS and SSS) follow from the definition of congruence in terms of rigid motions.																	✓		
Congruence	KY.HS.G.6	Apply theorems for lines, angles, triangles, parallelograms.																	✓		
Congruence	KY.HS.G.7	Prove theorems about geometric figures. a. Construct formal proofs to justify theorems for lines, angles and triangles.																	✓		

Kentucky Academic Standards			Algebra					Advanced Math			Problem Solving and Data Analysis							Geometry and Trigonometry			
			Linear equations in one variable	Linear functions	Linear equations in two variables	Systems of two linear equations in two variables	Linear equations in one or two variables	Equivalent expressions	Nonlinear equations in one variable and systems of equations in two variables	Nonlinear functions	Ratios, rates, proportional relationships, and units	Percentages	One variable data	Two-variable data	Probability and conditional probability	Inference from sample statistics and margin of error	Evaluating statistical claim	Area and volume	Lines, angles, and triangles	Right triangles and trigonometry	Circles
Congruence	KY.HS.G.8	Create and apply geometric constructions. a. Make formal geometric constructions with a variety of tools and methods. b. Apply basic construction procedures to construct more complex figures.																			
Similarity, Right Triangles, and Trigonometry	KY.HS.G.9	Understand properties of dilations. a. Verify the properties that result from that dilations given by a center and a scale factor. b. Verify that a dilation produces an image that is similar to the pre-image.																✓	✓		
Similarity, Right Triangles, and Trigonometry	KY.HS.G.10	Apply the properties of similarity transformations to establish the AA criterion for two triangles to be similar.																			
Similarity, Right Triangles, and Trigonometry	KY.HS.G.11	Understand theorems about triangles. a. Apply theorems about triangles. c. Use similarity criteria for triangles to solve problems and to prove relationships in geometric figures.																	✓	✓	
Similarity, Right Triangles, and Trigonometry	KY.HS.G.12	Understand properties of right triangles. a. Understand that by similarity, side ratios in right triangles are properties of the angles in the triangle, leading to definitions of trigonometric ratios for acute angles																		✓	

Kentucky Academic Standards			Algebra					Advanced Math			Problem Solving and Data Analysis							Geometry and Trigonometry			
			Linear equations in one variable	Linear functions	Linear equations in two variables	Systems of two linear equations in two variables	Linear equations in one or two variables	Equivalent expressions	Nonlinear equations in one variable and systems of equations in two variables	Nonlinear functions	Ratios, rates, proportional relationships, and units	Percentages	One variable data	Two-variable data	Probability and conditional probability	Inference from sample statistics and margin of error	Evaluating statistical claim	Area and volume	Lines, angles, and triangles	Right triangles and trigonometry	Circles
		(sine, cosine and tangent). b. Explain and use the relationship between the sine and cosine of complementary angles. c. Use trigonometric ratios and the Pythagorean Theorem to solve right triangles in applied problems.																			
Circles	KY.HS.G.15	Verify using dilations that all circles are similar.																			
Circles	KY.HS.G.16	Identify and describe relationships among angles and segments within the context of circles involving: a. Recognize differences between and properties of inscribed, central and circumscribed angles. b. Understand relationships between inscribed angles and the diameter of a circle. c. Understand the relationship between the radius of a circle and the line drawn through the point of tangency on that radius.																			
Expressing Geometric Properties with Equations	KY.HS.G.19	Understand the relationship between the algebraic form and the geometric representation of a circle. a. Write the equation of a circle of given center and radius using the Pythagorean Theorem.																			✓

Kentucky Academic Standards			Algebra					Advanced Math			Problem Solving and Data Analysis							Geometry and Trigonometry			
			Linear equations in one variable	Linear functions	Linear equations in two variables	Systems of two linear equations in two variables	Linear equations in one or two variables	Equivalent expressions	Nonlinear equations in one variable and systems of equations in two variables	Nonlinear functions	Ratios, rates, proportional relationships, and units	Percentages	One variable data	Two-variable data	Probability and conditional probability	Inference from sample statistics and margin of error	Evaluating statistical claim	Area and volume	Lines, angles, and triangles	Right triangles and trigonometry	Circles
Expressing Geometric Properties with Equations	KY.HS.G.21	Use coordinates to justify and prove simple geometric theorems algebraically.																✓			
Expressing Geometric Properties with Equations	KY.HS.G.22	Justify and apply the slope criteria for parallel and perpendicular lines and use them to solve geometric problems.			✓													✓			
Expressing Geometric Properties with Equations	KY.HS.G.23	Find measurements among points within the coordinate plane. a. Use points from the coordinate plane to find the coordinates of a midpoint of a line segment and the distance between the endpoints of a line segment. b. Find the point on a directed line segment between two given points that partitions the segment in a given ratio.																✓		✓	
Expressing Geometric Properties with Equations	KY.HS.G.24	Use coordinates within the coordinate plane to calculate measurements of two dimensional figures. a. Compute the perimeters of various polygons. b. Compute the areas of triangles, rectangles and other quadrilaterals.																✓			
Geometric Measurement	KY.HS.G.25	Analyze and determine the validity of arguments for the formulas for the																			

Kentucky Academic Standards			Algebra					Advanced Math			Problem Solving and Data Analysis							Geometry and Trigonometry			
			Linear equations in one variable	Linear functions	Linear equations in two variables	Systems of two linear equations in two variables	Linear equations in one or two variables	Equivalent expressions	Nonlinear equations in one variable and systems of equations in two variables	Nonlinear functions	Ratios, rates, proportional relationships, and units	Percentages	One variable data	Two-variable data	Probability and conditional probability	Inference from sample statistics and margin of error	Evaluating statistical claim	Area and volume	Lines, angles, and triangles	Right triangles and trigonometry	Circles
and Dimensions		various figures and shapes. a. Finding the circumference and area of a circle. b. Finding the volume of a sphere, prism, cylinder, pyramid and cone.																			
Geometric Measurement and Dimensions	KY.HS.G.27	Use volume formulas to solve problems for cylinders, pyramids, cones, spheres, prisms.																✓			
Geometric Measurement and Dimensions	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.																			
Modeling with Geometry	KY.HS.G.29	Use geometric shapes, their measures and their properties to describe objects in real world settings.																✓			
Modeling with Geometry	KY.HS.G.30	Apply concepts of density based on area and volume in modeling situations, using appropriate units of measurement.									✓										
Modeling with Geometry	KY.HS.G.31	Apply geometric methods to solve design problems.																			
Quantities	KY.HS.N.5	Define appropriate units in context for the purpose of descriptive modeling.																			

Kentucky Academic Standards			Algebra					Advanced Math			Problem Solving and Data Analysis							Geometry and Trigonometry			
			Linear equations in one variable	Linear functions	Linear equations in two variables	Systems of two linear equations in two variables	Linear equations in one or two variables	Equivalent expressions	Nonlinear equations in one variable and systems of equations in two variables	Nonlinear functions	Ratios, rates, proportional relationships, and units	Percentages	One variable data	Two-variable data	Probability and conditional probability	Inference from sample statistics and margin of error	Evaluating statistical claim	Area and volume	Lines, angles, and triangles	Right triangles and trigonometry	Circles
Quantities	KY.HS.N.6	Choose a level of accuracy appropriate to limitations on measurement when reporting quantities.																			

Table 19: Algebra 2 Aligned to SAT

Kentucky Academic Standards			Algebra					Advanced Math			Problem Solving and Data Analysis							Geometry and Trigonometry			
			Linear equations in one variable	Linear functions	Linear equations in two variables	Systems of two linear equations in two variables	Linear equations in one or two variables	Equivalent expressions	Nonlinear equations in one variable and systems of equations in two variables	Nonlinear functions	Ratios, rates, proportional relationships, and units	Percentages	One variable data	Two-variable data	Probability and conditional probability	Inference from sample statistics and margin of error	Evaluating statistical claim	Area and volume	Lines, angles, and triangles	Right triangles and trigonometry	Circles
Seeing Structure in Expressions	KY.HS.A.1	Interpret expressions that represent a quantity in terms of its context. a. Interpret parts of an expression, such as terms, factors and coefficients. b. Interpret complicated expressions, given a context, by viewing one or more of their parts as a single entity.	✓	✓	✓	✓	✓			✓											
Seeing Structure in Expressions	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.	✓	✓	✓			✓	✓												
Seeing Structure in Expressions	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. a. Write the standard form of a given polynomial and identify the terms, coefficients, degree, leading coefficient and constant term.						✓		✓											
Arithmetic with Polynomials and Rational Expressions	KY.HS.A.7	Identify roots of polynomials when suitable factorizations are available. Know these roots become the zeros (x-intercepts) for the corresponding polynomial function.								✓											

Kentucky Academic Standards			Algebra					Advanced Math			Problem Solving and Data Analysis							Geometry and Trigonometry			
			Linear equations in one variable	Linear functions	Linear equations in two variables	Systems of two linear equations in two variables	Linear equations in one or two variables	Equivalent expressions	Nonlinear equations in one variable and systems of equations in two variables	Nonlinear functions	Ratios, rates, proportional relationships, and units	Percentages	One variable data	Two-variable data	Probability and conditional probability	Inference from sample statistics and margin of error	Evaluating statistical claim	Area and volume	Lines, angles, and triangles	Right triangles and trigonometry	Circles
Creating Equations	KY.HS.A.12	Create equations and inequalities in one variable and use them to solve problems.	✓				✓			✓											
Creating Equations	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.		✓	✓					✓											
Creating Equations	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.				✓	✓														
Creating Equations	KY.HS.A.15	Rearrange formulas to solve a literal equation, highlighting a quantity of interest, using the same reasoning as in solving equations.							✓												
Reasoning with Equations and Inequalities	KY.HS.A.17	Solve and justify equations in one variable. Justify the solutions and give examples showing how extraneous solutions may arise. a. Solve rational equations written as proportions in one variable. b. Solve radical equations in one variable.							✓												
Reasoning with Equations and Inequalities	KY.HS.A.19	Solve quadratic equations in one variable. a. Solve quadratic equations by taking square roots, the quadratic							✓												

Kentucky Academic Standards			Algebra					Advanced Math			Problem Solving and Data Analysis							Geometry and Trigonometry			
			Linear equations in one variable	Linear functions	Linear equations in two variables	Systems of two linear equations in two variables	Linear equations in one or two variables	Equivalent expressions	Nonlinear equations in one variable and systems of equations in two variables	Nonlinear functions	Ratios, rates, proportional relationships, and units	Percentages	One variable data	Two-variable data	Probability and conditional probability	Inference from sample statistics and margin of error	Evaluating statistical claim	Area and volume	Lines, angles, and triangles	Right triangles and trigonometry	Circles
		formula and factoring, as appropriate to the initial form of the equation. Recognize when the quadratic formula gives complex solutions and write them as a ± bi for real numbers a and b.																			
Reasoning with Equations and Inequalities	KY.HS.A.21	Solve a simple system consisting of a linear equation and a quadratic equation in two variables algebraically and graphically.							✓												
Reasoning with Equations and Inequalities	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.				✓			✓												
Interpreting Functions	KY.HS.F.1	Understand properties and key features of functions and the different ways functions can be represented. 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. d. Relate the domain of a function to		✓						✓											

Kentucky Academic Standards			Algebra					Advanced Math			Problem Solving and Data Analysis							Geometry and Trigonometry			
			Linear equations in one variable	Linear functions	Linear equations in two variables	Systems of two linear equations in two variables	Linear equations in one or two variables	Equivalent expressions	Nonlinear equations in one variable and systems of equations in two variables	Nonlinear functions	Ratios, rates, proportional relationships, and units	Percentages	One variable data	Two-variable data	Probability and conditional probability	Inference from sample statistics and margin of error	Evaluating statistical claim	Area and volume	Lines, angles, and triangles	Right triangles and trigonometry	Circles
		its graph and, where applicable, to the quantitative relationship it describes. e. Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions).																			
Interpreting Functions	KY.HS.F.3	Understand average rate of change of a function over an interval. a. Calculate and interpret the average rate of change of a function (presented symbolically or as a table) over a specified interval. b. Estimate the rate of change from a graph.			✓									✓							
Interpreting Functions	KY.HS.F.4	Graph functions expressed symbolically and show key features of the graph, with and without using technology (computer, graphing calculator). b. Graph square root, cube root and absolute value functions. c. Graph polynomial functions, identifying zeros when suitable factorizations are available and showing end behavior. d. Graph exponential and logarithmic functions, showing intercepts and		✓						✓											

Kentucky Academic Standards			Algebra					Advanced Math			Problem Solving and Data Analysis							Geometry and Trigonometry			
			Linear equations in one variable	Linear functions	Linear equations in two variables	Systems of two linear equations in two variables	Linear equations in one or two variables	Equivalent expressions	Nonlinear equations in one variable and systems of equations in two variables	Nonlinear functions	Ratios, rates, proportional relationships, and units	Percentages	One variable data	Two-variable data	Probability and conditional probability	Inference from sample statistics and margin of error	Evaluating statistical claim	Area and volume	Lines, angles, and triangles	Right triangles and trigonometry	Circles
		end behavior.																			
Building Functions	KY.HS.F.6	Write a function that describes a relationship between two quantities. b. Combine standard function types using arithmetic operations.		✓						✓											
Building Functions	KY.HS.F.8	Understand the effects of transformations on the graph of a function. 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 of k (both positive and negative); find the value of k given the graphs. b. Experiment with cases and illustrate an explanation of the effects on the graph using technology.		✓						✓											
Building Functions	KY.HS.F.9	Find inverse functions. a. Given the equation of an invertible function, find the inverse.																			
Building Functions	KY.HS.F.10	Understand the inverse relationship between exponents and logarithms and use this relationship to solve problems involving logarithms and exponents with the use of technology.																			
Linear, Quadratic, and	KY.HS.F.13	Observe using graphs and tables that a quantity increasing exponentially eventually exceeds a quantity								✓				✓							

Kentucky Academic Standards			Algebra					Advanced Math			Problem Solving and Data Analysis							Geometry and Trigonometry			
			Linear equations in one variable	Linear functions	Linear equations in two variables	Systems of two linear equations in two variables	Linear equations in one or two variables	Equivalent expressions	Nonlinear equations in one variable and systems of equations in two variables	Nonlinear functions	Ratios, rates, proportional relationships, and units	Percentages	One variable data	Two-variable data	Probability and conditional probability	Inference from sample statistics and margin of error	Evaluating statistical claim	Area and volume	Lines, angles, and triangles	Right triangles and trigonometry	Circles
Exponential Models		increasing linearly, quadratically, or (more generally) as a polynomial function.																			
Quantities	KY.HS.N.5	Define appropriate units in context for the purpose of descriptive modeling.																			
Quantities	KY.HS.N.6	Choose a level of accuracy appropriate to limitations on measurement when reporting quantities.																			
Complex Number System	KY.HS.N.7	Understanding properties of complex numbers. a. Know there is a complex number i such that $i^2 = –1$ and every complex number has the form a + bi with a and b real. b. Use the relation $i^2 = –1$ and the commutative, associative and distributive properties to add, subtract and multiply complex numbers.																			
Complex Number System	KY.HS.N.9	Solve quadratic equations with real coefficients that have complex solutions.																			
Number and Quantity	KY.HS.N.14	Use matrices to represent and manipulate data.																			
Number and Quantity	KY.HS.N.15	Perform operations with matrices. a. Add, subtract and multiply matrices of appropriate dimensions.																			

Kentucky Academic Standards			Algebra					Advanced Math			Problem Solving and Data Analysis								Geometry and Trigonometry			
			Linear equations in one variable	Linear functions	Linear equations in two variables	Systems of two linear equations in two variables	Linear equations in one or two variables	Equivalent expressions	Nonlinear equations in one variable and systems of equations in two variables	Nonlinear functions	Ratios, rates, proportional relationships, and units	Percentages	One variable data	Two-variable data	Probability and conditional probability	Inference from sample statistics and margin of error	Evaluating statistical claim	Area and volume	Lines, angles, and triangles	Right triangles and trigonometry	Circles
		b. Multiply matrices by scalars to produce new matrices.																			
Interpreting Categorical and Quantitative Data	KY.HS.SP.1	Represent the distribution of data with plots on the real number line (stem plots, dot plots, histograms and box plots).											✓								
Interpreting Categorical and Quantitative Data	KY.HS.SP.2	Use statistics appropriate to the shape of the numerical data distribution to compare center (median, mean) and spread (interquartile range when comparing medians and standard deviation when comparing means) of different data distributions.											✓								
Interpreting Categorical and Quantitative Data	KY.HS.SP.3	Interpret differences in shape, center and spread in the context of the distributions of the numerical data, accounting for the presence and possible effects of extreme data points (outliers).											✓								
Interpreting Categorical and Quantitative Data	KY.HS.SP.5	Summarize categorical data for two or more categories in frequency tables. Calculate and interpret joint, marginal and conditional relative frequencies (probabilities) in the context of the data, recognizing possible associations and trends in the data.													✓						

Kentucky Academic Standards			Algebra					Advanced Math			Problem Solving and Data Analysis							Geometry and Trigonometry			
			Linear equations in one variable	Linear functions	Linear equations in two variables	Systems of two linear equations in two variables	Linear equations in one or two variables	Equivalent expressions	Nonlinear equations in one variable and systems of equations in two variables	Nonlinear functions	Ratios, rates, proportional relationships, and units	Percentages	One variable data	Two-variable data	Probability and conditional probability	Inference from sample statistics and margin of error	Evaluating statistical claim	Area and volume	Lines, angles, and triangles	Right triangles and trigonometry	Circles
Making Inferences and Justifying Conclusions	KY.HS.SP.9	Understand statistics as a process for making inferences and justifying conclusions about population parameters based on a random sample from that population.														✓					
Making Inferences and Justifying Conclusions	KY.HS.SP.10	Decide if a specified model is consistent with the results from a simulation.																			
Making Inferences and Justifying Conclusions	KY.HS.SP.11	Recognize the purposes of and differences among sample surveys, experiments and observational studies; explain how randomization relates to each.																			
Making Inferences and Justifying Conclusions	KY.HS.SP.12	Use data from a sample survey to estimate a population mean or proportion and explain how bias may be involved in the process.																			
Making Inferences and Justifying Conclusions	KY.HS.SP.13	Use data from a randomized experiment to compare two treatments; use simulations to decide if differences between estimates or statistics are significant.																			
Conditional Probability and the Rules of Probability	KY.HS.SP.14	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-													✓						

Kentucky Academic Standards			Algebra					Advanced Math			Problem Solving and Data Analysis							Geometry and Trigonometry			
			Linear equations in one variable	Linear functions	Linear equations in two variables	Systems of two linear equations in two variables	Linear equations in one or two variables	Equivalent expressions	Nonlinear equations in one variable and systems of equations in two variables	Nonlinear functions	Ratios, rates, proportional relationships, and units	Percentages	One variable data	Two-variable data	Probability and conditional probability	Inference from sample statistics and margin of error	Evaluating statistical claim	Area and volume	Lines, angles, and triangles	Right triangles and trigonometry	Circles
		mutually exclusive events and • as intersections, “A and B,” and • as complements of other events, “not A.” to calculate basic probabilities.																			
Conditional Probability and the Rules of Probability	KY.HS.SP.15	Understand the concept of independence. a. 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) x P(B) c. Recognize and explain the concept of independence in everyday language and everyday situations.																			
Conditional Probability and the Rules of Probability	KY.HS.SP.16	Understand the concept of conditional probability. a. Understand the conditional probability of A given B as P(A and B)/P(B). c. Recognize and explain the concept of conditional probability in everyday language and everyday situations. d. Find the conditional probability of A given B as the fraction of B’s outcomes that also belong to A and interpret the answer in terms of the model.																			

Kentucky Academic Standards			Algebra					Advanced Math			Problem Solving and Data Analysis								Geometry and Trigonometry			
			Linear equations in one variable	Linear functions	Linear equations in two variables	Systems of two linear equations in two variables	Linear equations in one or two variables	Equivalent expressions	Nonlinear equations in one variable and systems of equations in two variables	Nonlinear functions	Ratios, rates, proportional relationships, and units	Percentages	One variable data	Two-variable data	Probability and conditional probability	Inference from sample statistics and margin of error	Evaluating statistical claim	Area and volume	Lines, angles, and triangles	Right triangles and trigonometry	Circles
Number and Quantity	KY.HS.SP.19	Use permutations and combinations to compute probabilities. a. Distinguish between situations that can be modeled using counting techniques, including Fundamental Counting Principle, permutations and combinations. b. Perform calculations using the appropriate counting technique, including simple probabilities.													✓						

Table 20: Algebra 1 Aligned to PSAT/NMSQT and PSAT 10

Kentucky Academic Standards			Algebra					Advanced Math			Problem Solving and Data Analysis						Geometry and Trigonometry		
			Linear equations in one variable	Linear functions	Linear equations in two variables	Systems of two linear equations in two variables	Linear equations in one or two variables	Equivalent expressions	Nonlinear equations in one variable / Systems of equations in two variables	Nonlinear functions	Ratios, rates, proportional relationships, and units	Percentages	One variable data: Distributions and measures of center and spread	Two-variable data: Models and scatterplots	Probability and conditional probability	Inference from sample statistics	Area and volume	Lines, angles, and triangles	Right triangles
Seeing Structure in Expressions	KY.HS.A.1	Interpret expressions that represent a quantity in terms of its context. a. Interpret parts of an expression, such as terms, factors and coefficients. b. Interpret complicated expressions, given a context, by viewing one or more of their parts as a single entity.	✓	✓	✓	✓	✓			✓									
Seeing Structure in Expressions	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.	✓	✓	✓			✓	✓										
Seeing Structure in Expressions	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. a. Write the standard form of a given polynomial and identify the terms, coefficients, degree, leading coefficient and constant term. b. Factor a quadratic expression to reveal the zeros of the function it defines. c. Use the properties of exponents to rewrite exponential expressions.						✓		✓									
Arithmetic with Polynomials	KY.HS.A.5	Add, subtract and multiply polynomials.						✓											

Kentucky Academic Standards			Algebra					Advanced Math			Problem Solving and Data Analysis						Geometry and Trigonometry		
			Linear equations in one variable	Linear functions	Linear equations in two variables	Systems of two linear equations in two variables	Linear equations in one or two variables	Equivalent expressions	Nonlinear equations in one variable / Systems of equations in two variables	Nonlinear functions	Ratios, rates, proportional relationships, and units	Percentages	One variable data: Distributions and measures of center and spread	Two-variable data: Models and scatterplots	Probability and conditional probability	Inference from sample statistics	Area and volume	Lines, angles, and triangles	Right triangles
and Rational Expressions																			
Arithmetic with Polynomials and Rational Expressions	KY.HS.A.7	Identify roots of polynomials when suitable factorizations are available. Know these roots become the zeros (x-intercepts) for the corresponding polynomial function.								✓									
Creating Equations	KY.HS.A.12	Create equations and inequalities in one variable and use them to solve problems.	✓				✓			✓									
Creating Equations	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.		✓	✓					✓									
Creating Equations	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.				✓	✓												
Creating Equations	KY.HS.A.15	Rearrange formulas to solve a literal equation, highlighting a quantity of interest, using the same reasoning as in solving equations.							✓										
Reasoning with Equations and Inequalities	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	✓		✓	✓	✓		✓	✓									

Kentucky Academic Standards			Algebra					Advanced Math			Problem Solving and Data Analysis						Geometry and Trigonometry		
			Linear equations in one variable	Linear functions	Linear equations in two variables	Systems of two linear equations in two variables	Linear equations in one or two variables	Equivalent expressions	Nonlinear equations in one variable / Systems of equations in two variables	Nonlinear functions	Ratios, rates, proportional relationships, and units	Percentages	One variable data: Distributions and measures of center and spread	Two-variable data: Models and scatterplots	Probability and conditional probability	Inference from sample statistics	Area and volume	Lines, angles, and triangles	Right triangles
		assumption that the original equation has a solution. Construct a viable argument to justify a solution method.																	
Reasoning with Equations and Inequalities	KY.HS.A.18	Solve linear equations and inequalities in one variable, including literal equations with coefficients represented by letters.	✓				✓				✓								
Reasoning with Equations and Inequalities	KY.HS.A.19	Solve quadratic equations in one variable. a. Solve quadratic equations by taking square roots, the quadratic formula and factoring, as appropriate to the initial form of the equation. Recognize when the quadratic formula gives complex solutions and write them as a ± bi for real numbers a and b.							✓										
Reasoning with Equations and Inequalities	KY.HS.A.20	Solve systems of linear equations in two variables. 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. b. Solve systems of linear equations with graphs, substitution and elimination, focusing on pairs of linear equations in two variables.				✓													

Kentucky Academic Standards			Algebra					Advanced Math			Problem Solving and Data Analysis						Geometry and Trigonometry		
			Linear equations in one variable	Linear functions	Linear equations in two variables	Systems of two linear equations in two variables	Linear equations in one or two variables	Equivalent expressions	Nonlinear equations in one variable / Systems of equations in two variables	Nonlinear functions	Ratios, rates, proportional relationships, and units	Percentages	One variable data: Distributions and measures of center and spread	Two-variable data: Models and scatterplots	Probability and conditional probability	Inference from sample statistics	Area and volume	Lines, angles, and triangles	Right triangles
Reasoning with Equations and Inequalities	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.		✓	✓					✓									
Reasoning with Equations and Inequalities	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.				✓			✓										
Reasoning with Equations and Inequalities	KY.HS.A.25	Graph linear inequalities in two variables. a. Graph the solutions to a linear inequality as a half-plane (excluding the boundary in the case of a strict inequality). b. Graph the solution set to a system of linear inequalities as the intersection of the corresponding half-planes.					✓												
Interpreting Functions	KY.HS.F.1	Understand properties and key features of functions and the different ways functions can be represented. 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		✓						✓									

Kentucky Academic Standards			Algebra					Advanced Math			Problem Solving and Data Analysis						Geometry and Trigonometry		
			Linear equations in one variable	Linear functions	Linear equations in two variables	Systems of two linear equations in two variables	Linear equations in one or two variables	Equivalent expressions	Nonlinear equations in one variable / Systems of equations in two variables	Nonlinear functions	Ratios, rates, proportional relationships, and units	Percentages	One variable data: Distributions and measures of center and spread	Two-variable data: Models and scatterplots	Probability and conditional probability	Inference from sample statistics	Area and volume	Lines, angles, and triangles	Right triangles
		f(x) denotes the output of f corresponding to the input x. b. Using appropriate function notation, evaluate functions for inputs in their domains and interpret statements that use function notation in terms of a context. 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. d. Relate the domain of a function to its graph and, where applicable, to the quantitative relationship it describes. e. Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions).																
Interpreting Functions	KY.HS.F.2	Recognize that arithmetic and geometric sequences are functions, sometimes defined recursively, whose domain is a subset of the integers.																	
Interpreting Functions	KY.HS.F.3	Understand average rate of change of a function over an interval. a. Calculate and interpret the average			✓									✓					

Kentucky Academic Standards			Algebra					Advanced Math			Problem Solving and Data Analysis						Geometry and Trigonometry		
			Linear equations in one variable	Linear functions	Linear equations in two variables	Systems of two linear equations in two variables	Linear equations in one or two variables	Equivalent expressions	Nonlinear equations in one variable / Systems of equations in two variables	Nonlinear functions	Ratios, rates, proportional relationships, and units	Percentages	One variable data: Distributions and measures of center and spread	Two-variable data: Models and scatterplots	Probability and conditional probability	Inference from sample statistics	Area and volume	Lines, angles, and triangles	Right triangles
		rate of change of a function (presented symbolically or as a table) over a specified interval. b. Estimate the rate of change from a graph.																	
Interpreting Functions	KY.HS.F.4	Graph functions expressed symbolically and show key features of the graph, with and without using technology (computer, graphing calculator). a. Graph linear and quadratic functions and show intercepts, maxima and minima.		✓						✓									
Interpreting Functions	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. a. Identify zeros, extreme values and symmetry of the graph within the context of a quadratic function. b. Use the properties of exponents to interpret expressions for exponential functions and classify the exponential function as representing growth or decay.								✓									
Building Functions	KY.HS.F.6	Write a function that describes a relationship between two quantities. a. Determine an explicit expression, a recursive process, or steps for		✓						✓									

Kentucky Academic Standards			Algebra					Advanced Math			Problem Solving and Data Analysis						Geometry and Trigonometry		
			Linear equations in one variable	Linear functions	Linear equations in two variables	Systems of two linear equations in two variables	Linear equations in one or two variables	Equivalent expressions	Nonlinear equations in one variable / Systems of equations in two variables	Nonlinear functions	Ratios, rates, proportional relationships, and units	Percentages	One variable data: Distributions and measures of center and spread	Two-variable data: Models and scatterplots	Probability and conditional probability	Inference from sample statistics	Area and volume	Lines, angles, and triangles	Right triangles
		calculation from a context. b. Combine standard function types using arithmetic operations.																	
Building Functions	KY.HS.F.7	Use arithmetic and geometric sequences to model situations and scenarios. a. Use formulas (explicit and recursive) to generate terms for arithmetic and geometric sequences. b. Write formulas to model arithmetic and geometric sequences and apply those formulas in realistic situations.																	
Linear, Quadratic, and Exponential Models	KY.HS.F.11	Distinguish between situations that can be modeled with linear functions and with exponential functions. 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. b. Recognize situations in which one quantity changes at a constant rate per unit interval relative to another. c. Recognize situations in which a quantity grows or decays by a constant percent rate per unit interval relative to another.		✓						✓				✓					

Kentucky Academic Standards			Algebra					Advanced Math			Problem Solving and Data Analysis						Geometry and Trigonometry		
			Linear equations in one variable	Linear functions	Linear equations in two variables	Systems of two linear equations in two variables	Linear equations in one or two variables	Equivalent expressions	Nonlinear equations in one variable / Systems of equations in two variables	Nonlinear functions	Ratios, rates, proportional relationships, and units	Percentages	One variable data: Distributions and measures of center and spread	Two-variable data: Models and scatterplots	Probability and conditional probability	Inference from sample statistics	Area and volume	Lines, angles, and triangles	Right triangles
Linear, Quadratic, and Exponential Models	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).		✓						✓									
Linear, Quadratic, and Exponential Models	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.								✓				✓					
Linear, Quadratic, and Exponential Models	KY.HS.F.14	Interpret the parameters in a linear or exponential function in terms of a context.		✓						✓									
The Real Number System	KY.HS.N.1	Extend the properties of integer exponents to rational exponents, allowing for the expression of radicals in terms of rational exponents.																	
The Real Number System	KY.HS.N.2	Rewrite expressions involving radicals and rational exponents using the properties of exponents.						✓											
Quantities	KY.HS.N.4	Use units in context as a way to understand problems and to guide the solution of multi-step problems; a. Choose and interpret units consistently in formulas;									✓								

Kentucky Academic Standards			Algebra					Advanced Math			Problem Solving and Data Analysis						Geometry and Trigonometry		
			Linear equations in one variable	Linear functions	Linear equations in two variables	Systems of two linear equations in two variables	Linear equations in one or two variables	Equivalent expressions	Nonlinear equations in one variable / Systems of equations in two variables	Nonlinear functions	Ratios, rates, proportional relationships, and units	Percentages	One variable data: Distributions and measures of center and spread	Two-variable data: Models and scatterplots	Probability and conditional probability	Inference from sample statistics	Area and volume	Lines, angles, and triangles	Right triangles
		b. Choose and interpret the scale and the origin in graphs and data displays.																	
Quantities	KY.HS.N.5	Define appropriate units in context for the purpose of descriptive modeling.																	
Quantities	KY.HS.N.6	Choose a level of accuracy appropriate to limitations on measurement when reporting quantities.																	
Interpreting Categorical and Quantitative Data	KY.HS.SP.6	Represent data on two quantitative variables on a scatter plot and describe how the explanatory and response variables are related. a. Calculate an appropriate mathematical model, or use a given mathematical model, for data to solve problems in context. b. Informally assess the fit of a model (through calculating correlation for linear data, plotting, calculating and/or analyzing residuals).												✓					
Interpreting Categorical and Quantitative Data	KY.HS.SP.7	Interpret the slope (rate of change) and the intercept (constant term) of a linear model in the context of the data.												✓					
Interpreting Categorical and Quantitative Data	KY.HS.SP.8	Understand the role and purpose of correlation in linear regression. a. Use technology to compute correlation coefficient of a linear fit. b. Interpret the meaning of the																	

Kentucky Academic Standards			Algebra					Advanced Math			Problem Solving and Data Analysis						Geometry and Trigonometry		
			Linear equations in one variable	Linear functions	Linear equations in two variables	Systems of two linear equations in two variables	Linear equations in one or two variables	Equivalent expressions	Nonlinear equations in one variable / Systems of equations in two variables	Nonlinear functions	Ratios, rates, proportional relationships, and units	Percentages	One variable data: Distributions and measures of center and spread	Two-variable data: Models and scatterplots	Probability and conditional probability	Inference from sample statistics	Area and volume	Lines, angles, and triangles	Right triangles
		correlation within the context of the data. c. Describe the limitations of correlation when establishing causation.																	

Table 21: Geometry Aligned to PSAT/NMSQT and PSAT 10

Kentucky Academic Standards			Algebra					Advanced Math			Problem Solving and Data Analysis						Geometry and Trigonometry		
			Linear equations in one variable	Linear functions	Linear equations in two variables	Systems of two linear equations in two variables	Linear equations in one or two variables	Equivalent expressions	Nonlinear equations in one variable / Systems of equations in two variables	Nonlinear functions	Ratios, rates, proportional relationships, and units	Percentages	One variable data: Distributions and measures of center and spread	Two-variable data: Models and scatterplots	Probability and conditional probability	Inference from sample statistics	Area and volume	Lines, angles, and triangles	Right triangles
Congruence	KY.HS.G.1	Know and apply precise definitions of the language of Geometry: a. Understand properties of line segments, angles and circle. b. Understand properties of and differences between perpendicular and parallel lines.			✓													✓	✓
Congruence	KY.HS.G.2	Representing transformations in the plane. a. Describe transformations as functions that take points in the plane as inputs and give other points as outputs b. Compare transformations that preserve distance and angle measures to those that do not. c. Given a rectangle, parallelogram, trapezoid, or regular polygon, formally describe the rotations and reflections that carry it onto itself, using properties of these figures.																	
Congruence	KY.HS.G.4	Understand the effects of transformations of geometric figures. a. Given a geometric figure and a rotation, reflection, or translation, draw the transformed figure. b. Specify a sequence of																	

Kentucky Academic Standards			Algebra					Advanced Math			Problem Solving and Data Analysis						Geometry and Trigonometry		
			Linear equations in one variable	Linear functions	Linear equations in two variables	Systems of two linear equations in two variables	Linear equations in one or two variables	Equivalent expressions	Nonlinear equations in one variable / Systems of equations in two variables	Nonlinear functions	Ratios, rates, proportional relationships, and units	Percentages	One variable data: Distributions and measures of center and spread	Two-variable data: Models and scatterplots	Probability and conditional probability	Inference from sample statistics	Area and volume	Lines, angles, and triangles	Right triangles
		transformations that will carry a given figure onto another. 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.																	
Congruence	KY.HS.G.5	Know and apply the concepts of triangle congruence: a. Use the definition of congruence in terms of rigid motions to show that two triangles are congruent if and only if corresponding pairs of sides and corresponding pairs of angles are congruent. b. Explain how the criteria for triangle congruence (ASA, SAS and SSS) follow from the definition of congruence in terms of rigid motions.																✓	
Congruence	KY.HS.G.6	Apply theorems for lines, angles, triangles, parallelograms.																✓	
Congruence	KY.HS.G.7	Prove theorems about geometric figures. a. Construct formal proofs to justify theorems for lines, angles and triangles.																✓	
Congruence	KY.HS.G.8	Create and apply geometric constructions.																	

Kentucky Academic Standards			Algebra					Advanced Math			Problem Solving and Data Analysis						Geometry and Trigonometry		
			Linear equations in one variable	Linear functions	Linear equations in two variables	Systems of two linear equations in two variables	Linear equations in one or two variables	Equivalent expressions	Nonlinear equations in one variable / Systems of equations in two variables	Nonlinear functions	Ratios, rates, proportional relationships, and units	Percentages	One variable data: Distributions and measures of center and spread	Two-variable data: Models and scatterplots	Probability and conditional probability	Inference from sample statistics	Area and volume	Lines, angles, and triangles	Right triangles
		a. Make formal geometric constructions with a variety of tools and methods. b. Apply basic construction procedures to construct more complex figures.																	
Similarity, Right Triangles, and Trigonometry	KY.HS.G.9	Understand properties of dilations. a. Verify the properties that result from that dilations given by a center and a scale factor. b. Verify that a dilation produces an image that is similar to the pre-image.															✓	✓	
Similarity, Right Triangles, and Trigonometry	KY.HS.G.10	Apply the properties of similarity transformations to establish the AA criterion for two triangles to be similar.																	
Similarity, Right Triangles, and Trigonometry	KY.HS.G.11	Understand theorems about triangles. a. Apply theorems about triangles. c. Use similarity criteria for triangles to solve problems and to prove relationships in geometric figures.																✓	✓
Similarity, Right Triangles, and Trigonometry	KY.HS.G.12	Understand properties of right triangles. a. Understand that by similarity, side ratios in right triangles are properties of the angles in the triangle, leading to definitions of trigonometric ratios for acute angles (sine, cosine and tangent). b. Explain and use the relationship between the sine and cosine of complementary angles. c. Use trigonometric ratios and the																	✓

Kentucky Academic Standards			Algebra					Advanced Math			Problem Solving and Data Analysis						Geometry and Trigonometry		
			Linear equations in one variable	Linear functions	Linear equations in two variables	Systems of two linear equations in two variables	Linear equations in one or two variables	Equivalent expressions	Nonlinear equations in one variable / Systems of equations in two variables	Nonlinear functions	Ratios, rates, proportional relationships, and units	Percentages	One variable data: Distributions and measures of center and spread	Two-variable data: Models and scatterplots	Probability and conditional probability	Inference from sample statistics	Area and volume	Lines, angles, and triangles	Right triangles
		Pythagorean Theorem to solve right triangles in applied problems.																	
Circles	KY.HS.G.15	Verify using dilations that all circles are similar.																	
Circles	KY.HS.G.16	Identify and describe relationships among angles and segments within the context of circles involving: a. Recognize differences between and properties of inscribed, central and circumscribed angles. b. Understand relationships between inscribed angles and the diameter of a circle. c. Understand the relationship between the radius of a circle and the line drawn through the point of tangency on that radius.																	
Expressing Geometric Properties with Equations	KY.HS.G.19	Understand the relationship between the algebraic form and the geometric representation of a circle. a. Write the equation of a circle of given center and radius using the Pythagorean Theorem.																	
Expressing Geometric Properties with Equations	KY.HS.G.21	Use coordinates to justify and prove simple geometric theorems algebraically.															✓		

Kentucky Academic Standards			Algebra					Advanced Math			Problem Solving and Data Analysis						Geometry and Trigonometry		
			Linear equations in one variable	Linear functions	Linear equations in two variables	Systems of two linear equations in two variables	Linear equations in one or two variables	Equivalent expressions	Nonlinear equations in one variable / Systems of equations in two variables	Nonlinear functions	Ratios, rates, proportional relationships, and units	Percentages	One variable data: Distributions and measures of center and spread	Two-variable data: Models and scatterplots	Probability and conditional probability	Inference from sample statistics	Area and volume	Lines, angles, and triangles	Right triangles
Expressing Geometric Properties with Equations	KY.HS.G.22	Justify and apply the slope criteria for parallel and perpendicular lines and use them to solve geometric problems.			✓												✓		
Expressing Geometric Properties with Equations	KY.HS.G.23	Find measurements among points within the coordinate plane. a. Use points from the coordinate plane to find the coordinates of a midpoint of a line segment and the distance between the endpoints of a line segment. b. Find the point on a directed line segment between two given points that partitions the segment in a given ratio.															✓		✓
Expressing Geometric Properties with Equations	KY.HS.G.24	Use coordinates within the coordinate plane to calculate measurements of two-dimensional figures. a. Compute the perimeters of various polygons. b. Compute the areas of triangles, rectangles and other quadrilaterals.															✓		
Geometric Measurement and Dimensions	KY.HS.G.25	Analyze and determine the validity of arguments for the formulas for the various figures and shapes. a. Finding the circumference and area of a circle. b. Finding the volume of a sphere, prism, cylinder, pyramid and cone.																	

Kentucky Academic Standards			Algebra					Advanced Math			Problem Solving and Data Analysis						Geometry and Trigonometry		
			Linear equations in one variable	Linear functions	Linear equations in two variables	Systems of two linear equations in two variables	Linear equations in one or two variables	Equivalent expressions	Nonlinear equations in one variable / Systems of equations in two variables	Nonlinear functions	Ratios, rates, proportional relationships, and units	Percentages	One variable data: Distributions and measures of center and spread	Two-variable data: Models and scatterplots	Probability and conditional probability	Inference from sample statistics	Area and volume	Lines, angles, and triangles	Right triangles
Geometric Measurement and Dimensions	KY.HS.G.27	Use volume formulas to solve problems for cylinders, pyramids, cones, spheres, prisms.															✓		
Geometric Measurement and Dimensions	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.																	
Modeling with Geometry	KY.HS.G.29	Use geometric shapes, their measures and their properties to describe objects in real world settings.															✓		
Modeling with Geometry	KY.HS.G.30	Apply concepts of density based on area and volume in modeling situations, using appropriate units of measurement.									✓								
Modeling with Geometry	KY.HS.G.31	Apply geometric methods to solve design problems.																	
Quantities	KY.HS.N.5	Define appropriate units in context for the purpose of descriptive modeling.																	
Quantities	KY.HS.N.6	Choose a level of accuracy appropriate to limitations on measurement when reporting quantities.																	

Table 22: Algebra 2 Aligned to PSAT/NMSQT and PSAT 10

Kentucky Academic Standards			Algebra					Advanced Math			Problem Solving and Data Analysis						Geometry and Trigonometry		
			Linear equations in one variable	Linear functions	Linear equations in two variables	Systems of two linear equations in two variables	Linear equations in one or two variables	Equivalent expressions	Nonlinear equations in one variable / Systems of equations in two variables	Nonlinear functions	Ratios, rates, proportional relationships, and units	Percentages	One variable data: Distributions and measures of center and spread	Two-variable data: Models and scatterplots	Probability and conditional probability	Inference from sample statistics	Area and volume	Lines, angles, and triangles	Right triangles
Seeing Structure in Expressions	KY.HS.A.1	Interpret expressions that represent a quantity in terms of its context. b. Interpret complicated expressions, given a context, by viewing one or more of their parts as a single entity.	✓	✓	✓	✓	✓			✓									
Seeing Structure in Expressions	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.	✓	✓	✓			✓	✓										
Seeing Structure in Expressions	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. a. Write the standard form of a given polynomial and identify the terms, coefficients, degree, leading coefficient and constant term.						✓		✓									
Arithmetic with Polynomials and Rational Expressions	KY.HS.A.7	Identify roots of polynomials when suitable factorizations are available. Know these roots become the zeros (x-intercepts) for the corresponding polynomial function.								✓									
Creating Equations	KY.HS.A.12	Create equations and inequalities in one variable and use them to solve problems.	✓				✓			✓									

Kentucky Academic Standards			Algebra					Advanced Math			Problem Solving and Data Analysis						Geometry and Trigonometry		
			Linear equations in one variable	Linear functions	Linear equations in two variables	Systems of two linear equations in two variables	Linear equations in one or two variables	Equivalent expressions	Nonlinear equations in one variable / Systems of equations in two variables	Nonlinear functions	Ratios, rates, proportional relationships, and units	Percentages	One variable data: Distributions and measures of center and spread	Two-variable data: Models and scatterplots	Probability and conditional probability	Inference from sample statistics	Area and volume	Lines, angles, and triangles	Right triangles
Creating Equations	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.		✓	✓					✓									
Creating Equations	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.				✓	✓												
Creating Equations	KY.HS.A.15	Rearrange formulas to solve a literal equation, highlighting a quantity of interest, using the same reasoning as in solving equations.							✓										
Reasoning with Equations and Inequalities	KY.HS.A.17	Solve and justify equations in one variable. Justify the solutions and give examples showing how extraneous solutions may arise. a. Solve rational equations written as proportions in one variable. b. Solve radical equations in one variable.							✓										
Reasoning with Equations and Inequalities	KY.HS.A.19	Solve quadratic equations in one variable. a. Solve quadratic equations by taking square roots, the quadratic formula and factoring, as appropriate to the initial form of the equation. Recognize when							✓										

Kentucky Academic Standards			Algebra					Advanced Math			Problem Solving and Data Analysis						Geometry and Trigonometry		
			Linear equations in one variable	Linear functions	Linear equations in two variables	Systems of two linear equations in two variables	Linear equations in one or two variables	Equivalent expressions	Nonlinear equations in one variable / Systems of equations in two variables	Nonlinear functions	Ratios, rates, proportional relationships, and units	Percentages	One variable data: Distributions and measures of center and spread	Two-variable data: Models and scatterplots	Probability and conditional probability	Inference from sample statistics	Area and volume	Lines, angles, and triangles	Right triangles
		the quadratic formula gives complex solutions and write them as a ± bi for real numbers a and b.																	
Reasoning with Equations and Inequalities	KY.HS.A.21	Solve a simple system consisting of a linear equation and a quadratic equation in two variables algebraically and graphically.							✓										
Reasoning with Equations and Inequalities	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.				✓			✓										
Interpreting Functions	KY.HS.F.1	Understand properties and key features of functions and the different ways functions can be represented. 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. d. Relate the domain of a function to its graph and, where applicable, to the quantitative relationship it describes. e. Compare properties of two functions each represented in a different way		✓						✓									

Kentucky Academic Standards			Algebra					Advanced Math			Problem Solving and Data Analysis						Geometry and Trigonometry		
			Linear equations in one variable	Linear functions	Linear equations in two variables	Systems of two linear equations in two variables	Linear equations in one or two variables	Equivalent expressions	Nonlinear equations in one variable / Systems of equations in two variables	Nonlinear functions	Ratios, rates, proportional relationships, and units	Percentages	One variable data: Distributions and measures of center and spread	Two-variable data: Models and scatterplots	Probability and conditional probability	Inference from sample statistics	Area and volume	Lines, angles, and triangles	Right triangles
		(algebraically, graphically, numerically in tables, or by verbal descriptions).																	
Interpreting Functions	KY.HS.F.3	Understand average rate of change of a function over an interval. a. Calculate and interpret the average rate of change of a function (presented symbolically or as a table) over a specified interval. b. Estimate the rate of change from a graph.			✓									✓					
Interpreting Functions	KY.HS.F.4	Graph functions expressed symbolically and show key features of the graph, with and without using technology (computer, graphing calculator). b. Graph square root, cube root and absolute value functions. c. Graph polynomial functions, identifying zeros when suitable factorizations are available and showing end behavior. d. Graph exponential and logarithmic functions, showing intercepts and end behavior.		✓						✓									
Building Functions	KY.HS.F.6	Write a function that describes a relationship between two quantities. b. Combine standard function types using arithmetic operations.		✓						✓									

Kentucky Academic Standards			Algebra					Advanced Math			Problem Solving and Data Analysis						Geometry and Trigonometry		
			Linear equations in one variable	Linear functions	Linear equations in two variables	Systems of two linear equations in two variables	Linear equations in one or two variables	Equivalent expressions	Nonlinear equations in one variable / Systems of equations in two variables	Nonlinear functions	Ratios, rates, proportional relationships, and units	Percentages	One variable data: Distributions and measures of center and spread	Two-variable data: Models and scatterplots	Probability and conditional probability	Inference from sample statistics	Area and volume	Lines, angles, and triangles	Right triangles
Building Functions	KY.HS.F.8	Understand the effects of transformations on the graph of a function. 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 of k (both positive and negative); find the value of k given the graphs. b. Experiment with cases and illustrate an explanation of the effects on the graph using technology.		✓						✓									
Building Functions	KY.HS.F.9	Find inverse functions. a. Given the equation of an invertible function, find the inverse.																	
Building Functions	KY.HS.F.10	Understand the inverse relationship between exponents and logarithms and use this relationship to solve problems involving logarithms and exponents with the use of technology.																	
Linear, Quadratic, and Exponential Models	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.								✓				✓					
Quantities	KY.HS.N.5	Define appropriate units in context for the purpose of descriptive modeling.																	

Kentucky Academic Standards			Algebra					Advanced Math			Problem Solving and Data Analysis							Geometry and Trigonometry		
			Linear equations in one variable	Linear functions	Linear equations in two variables	Systems of two linear equations in two variables	Linear equations in one or two variables	Equivalent expressions	Nonlinear equations in one variable / Systems of equations in two variables	Nonlinear functions	Ratios, rates, proportional relationships, and units	Percentages	One variable data: Distributions and measures of center and spread	Two-variable data: Models and scatterplots	Probability and conditional probability	Inference from sample statistics	Area and volume	Lines, angles, and triangles	Right triangles
Quantities	KY.HS.N.6	Choose a level of accuracy appropriate to limitations on measurement when reporting quantities.																	
Complex Number System	KY.HS.N.7	Understanding properties of complex numbers. a. Know there is a complex number i such that $i^2 = –1$ and every complex number has the form a + bi with a and b real. b. Use the relation $i^2 = –1$ and the commutative, associative and distributive properties to add, subtract and multiply complex numbers.																	
Complex Number System	KY.HS.N.9	Solve quadratic equations with real coefficients that have complex solutions.																	
Number and Quantity	KY.HS.N.14	Use matrices to represent and manipulate data.																	
Number and Quantity	KY.HS.N.15	Perform operations with matrices. a. Add, subtract and multiply matrices of appropriate dimensions. b. Multiply matrices by scalars to produce new matrices.																	
Interpreting Categorical and Quantitative Data	KY.HS.SP.1	Represent the distribution of data with plots on the real number line (stem plots, dot plots, histograms and box plots).											✓						

Kentucky Academic Standards			Algebra					Advanced Math			Problem Solving and Data Analysis						Geometry and Trigonometry		
			Linear equations in one variable	Linear functions	Linear equations in two variables	Systems of two linear equations in two variables	Linear equations in one or two variables	Equivalent expressions	Nonlinear equations in one variable / Systems of equations in two variables	Nonlinear functions	Ratios, rates, proportional relationships, and units	Percentages	One variable data: Distributions and measures of center and spread	Two-variable data: Models and scatterplots	Probability and conditional probability	Inference from sample statistics	Area and volume	Lines, angles, and triangles	Right triangles
Interpreting Categorical and Quantitative Data	KY.HS.SP.2	Use statistics appropriate to the shape of the numerical data distribution to compare center (median, mean) and spread (interquartile range when comparing medians and standard deviation when comparing means) of different data distributions.											✓						
Interpreting Categorical and Quantitative Data	KY.HS.SP.3	Interpret differences in shape, center and spread in the context of the distributions of the numerical data, accounting for the presence and possible effects of extreme data points (outliers).											✓						
Interpreting Categorical and Quantitative Data	KY.HS.SP.5	Summarize categorical data for two or more categories in frequency tables. Calculate and interpret joint, marginal and conditional relative frequencies (probabilities) in the context of the data, recognizing possible associations and trends in the data.													✓				
Making Inferences and Justifying Conclusions	KY.HS.SP.9	Understand statistics as a process for making inferences and justifying conclusions about population parameters based on a random sample from that population.														✓			
Making Inferences and	KY.HS.SP.10	Decide if a specified model is consistent with the results from a simulation.																	

Kentucky Academic Standards			Algebra					Advanced Math			Problem Solving and Data Analysis						Geometry and Trigonometry		
			Linear equations in one variable	Linear functions	Linear equations in two variables	Systems of two linear equations in two variables	Linear equations in one or two variables	Equivalent expressions	Nonlinear equations in one variable / Systems of equations in two variables	Nonlinear functions	Ratios, rates, proportional relationships, and units	Percentages	One variable data: Distributions and measures of center and spread	Two-variable data: Models and scatterplots	Probability and conditional probability	Inference from sample statistics	Area and volume	Lines, angles, and triangles	Right triangles
Justifying Conclusions																			
Making Inferences and Justifying Conclusions	KY.HS.SP.11	Recognize the purposes of and differences among sample surveys, experiments and observational studies; explain how randomization relates to each.																	
Making Inferences and Justifying Conclusions	KY.HS.SP.12	Use data from a sample survey to estimate a population mean or proportion and explain how bias may be involved in the process.																	
Making Inferences and Justifying Conclusions	KY.HS.SP.13	Use data from a randomized experiment to compare two treatments; use simulations to decide if differences between estimates or statistics are significant.																	
Conditional Probability and the Rules of Probability	KY.HS.SP.14	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.													✓				
Conditional Probability and	KY.HS.SP.15	Understand the concept of independence.																	

Kentucky Academic Standards			Algebra					Advanced Math			Problem Solving and Data Analysis						Geometry and Trigonometry		
			Linear equations in one variable	Linear functions	Linear equations in two variables	Systems of two linear equations in two variables	Linear equations in one or two variables	Equivalent expressions	Nonlinear equations in one variable / Systems of equations in two variables	Nonlinear functions	Ratios, rates, proportional relationships, and units	Percentages	One variable data: Distributions and measures of center and spread	Two-variable data: Models and scatterplots	Probability and conditional probability	Inference from sample statistics	Area and volume	Lines, angles, and triangles	Right triangles
the Rules of Probability		a. 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) x P(B) c. Recognize and explain the concept of independence in everyday language and everyday situations.																	
Conditional Probability and the Rules of Probability	KY.HS.SP.16	Understand the concept of conditional probability. a. Understand the conditional probability of A given B as P(A and B)/P(B). c. Recognize and explain the concept of conditional probability in everyday language and everyday situations. d. Find the conditional probability of A given B as the fraction of B's outcomes that also belong to A and interpret the answer in terms of the model.																	
Number and Quantity	KY.HS.SP.19	Use permutations and combinations to compute probabilities. a. Distinguish between situations that can be modeled using counting techniques, including Fundamental Counting Principle, permutations and combinations.													✓				

Kentucky Academic Standards			Algebra					Advanced Math			Problem Solving and Data Analysis						Geometry and Trigonometry		
			Linear equations in one variable	Linear functions	Linear equations in two variables	Systems of two linear equations in two variables	Linear equations in one or two variables	Equivalent expressions	Nonlinear equations in one variable / Systems of equations in two variables	Nonlinear functions	Ratios, rates, proportional relationships, and units	Percentages	One variable data: Distributions and measures of center and spread	Two-variable data: Models and scatterplots	Probability and conditional probability	Inference from sample statistics	Area and volume	Lines, angles, and triangles	Right triangles
		b. Perform calculations using the appropriate counting technique, including simple probabilities. c. (+) Use permutations and combinations to compute probabilities of compound events and solve problems.																	

Table 23: Algebra 1 Aligned to PSAT 8/9

Kentucky Academic Standards			Algebra					Advanced Math			Problem Solving and Data Analysis					Geometry and Trigonometry		
			Linear equations in one variable	Linear functions	Linear equations in two variables	Systems of two linear equations in two variables	Linear equations in one or two variables	Equivalent expressions	Nonlinear equations in one variable / Systems of equations in two variables	Nonlinear functions	Ratios, rates, proportional relationships, and units	Percentages	One variable data: Distributions and measures of center and spread	Two-variable data: Models and scatterplots	Probability and conditional probability	Area and volume	Lines, angles, and triangles	Right triangles
Seeing Structure in Expressions	KY.HS.A.1	Interpret expressions that represent a quantity in terms of its context. a. Interpret parts of an expression, such as terms, factors and coefficients. b. Interpret complicated expressions, given a context, by viewing one or more of their parts as a single entity.	✓	✓	✓	✓	✓			✓								
Seeing Structure in Expressions	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.	✓	✓	✓			✓	✓									
Seeing Structure in Expressions	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. a. Write the standard form of a given polynomial and identify the terms, coefficients, degree, leading coefficient and constant term. b. Factor a quadratic expression to reveal the zeros of the function it defines. c. Use the properties of exponents to rewrite exponential expressions.						✓		✓								
Arithmetic with Polynomials and Rational Expressions	KY.HS.A.5	Add, subtract and multiply polynomials.						✓										

Kentucky Academic Standards			Algebra					Advanced Math			Problem Solving and Data Analysis					Geometry and Trigonometry		
			Linear equations in one variable	Linear functions	Linear equations in two variables	Systems of two linear equations in two variables	Linear equations in one or two variables	Equivalent expressions	Nonlinear equations in one variable / Systems of equations in two variables	Nonlinear functions	Ratios, rates, proportional relationships, and units	Percentages	One variable data: Distributions and measures of center and spread	Two-variable data: Models and scatterplots	Probability and conditional probability	Area and volume	Lines, angles, and triangles	Right triangles
Arithmetic with Polynomials and Rational Expressions	KY.HS.A.7	Identify roots of polynomials when suitable factorizations are available. Know these roots become the zeros (x-intercepts) for the corresponding polynomial function.								✓								
Creating Equations	KY.HS.A.12	Create equations and inequalities in one variable and use them to solve problems.	✓				✓											
Creating Equations	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.		✓	✓					✓								
Creating Equations	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.				✓	✓											
Creating Equations	KY.HS.A.15	Rearrange formulas to solve a literal equation, highlighting a quantity of interest, using the same reasoning as in solving equations.							✓									
Reasoning with Equations and Inequalities	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.	✓		✓	✓	✓		✓	✓								

Kentucky Academic Standards			Algebra					Advanced Math			Problem Solving and Data Analysis					Geometry and Trigonometry		
			Linear equations in one variable	Linear functions	Linear equations in two variables	Systems of two linear equations in two variables	Linear equations in one or two variables	Equivalent expressions	Nonlinear equations in one variable / Systems of equations in two variables	Nonlinear functions	Ratios, rates, proportional relationships, and units	Percentages	One variable data: Distributions and measures of center and spread	Two-variable data: Models and scatterplots	Probability and conditional probability	Area and volume	Lines, angles, and triangles	Right triangles
Reasoning with Equations and Inequalities	KY.HS.A.18	Solve linear equations and inequalities in one variable, including literal equations with coefficients represented by letters.	✓				✓				✓							
Reasoning with Equations and Inequalities	KY.HS.A.19	Solve quadratic equations in one variable. a. Solve quadratic equations by taking square roots, the quadratic formula and factoring, as appropriate to the initial form of the equation. Recognize when the quadratic formula gives complex solutions and write them as a ± bi for real numbers a and b.							✓									
Reasoning with Equations and Inequalities	KY.HS.A.20	Solve systems of linear equations in two variables. 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. b. Solve systems of linear equations with graphs, substitution and elimination, focusing on pairs of linear equations in two variables.				✓												
Reasoning with Equations and Inequalities	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.		✓	✓					✓								
Reasoning with Equations and Inequalities	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				✓			✓									

Kentucky Academic Standards			Algebra					Advanced Math			Problem Solving and Data Analysis					Geometry and Trigonometry		
			Linear equations in one variable	Linear functions	Linear equations in two variables	Systems of two linear equations in two variables	Linear equations in one or two variables	Equivalent expressions	Nonlinear equations in one variable / Systems of equations in two variables	Nonlinear functions	Ratios, rates, proportional relationships, and units	Percentages	One variable data: Distributions and measures of center and spread	Two-variable data: Models and scatterplots	Probability and conditional probability	Area and volume	Lines, angles, and triangles	Right triangles
		solutions graphically, using technology or tables.																
Reasoning with Equations and Inequalities	KY.HS.A.25	Graph linear inequalities in two variables. a. Graph the solutions to a linear inequality as a half-plane (excluding the boundary in the case of a strict inequality). b. Graph the solution set to a system of linear inequalities as the intersection of the corresponding half-planes.					✓											
Interpreting Functions	KY.HS.F.1	Understand properties and key features of functions and the different ways functions can be represented. 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. b. Using appropriate function notation, evaluate functions for inputs in their domains and interpret statements that use function notation in terms of a context. c. For a function that models a relationship between two quantities, interpret key features of graphs and		✓						✓								

Kentucky Academic Standards			Algebra					Advanced Math			Problem Solving and Data Analysis					Geometry and Trigonometry		
			Linear equations in one variable	Linear functions	Linear equations in two variables	Systems of two linear equations in two variables	Linear equations in one or two variables	Equivalent expressions	Nonlinear equations in one variable / Systems of equations in two variables	Nonlinear functions	Ratios, rates, proportional relationships, and units	Percentages	One variable data: Distributions and measures of center and spread	Two-variable data: Models and scatterplots	Probability and conditional probability	Area and volume	Lines, angles, and triangles	Right triangles
		tables in terms of the quantities and sketch graphs showing key features given a verbal description of the relationship. d. Relate the domain of a function to its graph and, where applicable, to the quantitative relationship it describes. e. Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions).																
Interpreting Functions	KY.HS.F.2	Recognize that arithmetic and geometric sequences are functions, sometimes defined recursively, whose domain is a subset of the integers.																
Interpreting Functions	KY.HS.F.3	Understand average rate of change of a function over an interval. a. Calculate and interpret the average rate of change of a function (presented symbolically or as a table) over a specified interval. b. Estimate the rate of change from a graph.			✓									✓				
Interpreting Functions	KY.HS.F.4	Graph functions expressed symbolically and show key features of the graph, with and without using technology (computer, graphing calculator). a. Graph linear and quadratic functions and show intercepts, maxima and minima.		✓						✓								

Kentucky Academic Standards			Algebra					Advanced Math			Problem Solving and Data Analysis					Geometry and Trigonometry		
			Linear equations in one variable	Linear functions	Linear equations in two variables	Systems of two linear equations in two variables	Linear equations in one or two variables	Equivalent expressions	Nonlinear equations in one variable / Systems of equations in two variables	Nonlinear functions	Ratios, rates, proportional relationships, and units	Percentages	One variable data: Distributions and measures of center and spread	Two-variable data: Models and scatterplots	Probability and conditional probability	Area and volume	Lines, angles, and triangles	Right triangles
Interpreting Functions	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. a. Identify zeros, extreme values and symmetry of the graph within the context of a quadratic function. b. Use the properties of exponents to interpret expressions for exponential functions and classify the exponential function as representing growth or decay.								✓								
Building Functions	KY.HS.F.6	Write a function that describes a relationship between two quantities. a. Determine an explicit expression, a recursive process, or steps for calculation from a context. b. Combine standard function types using arithmetic operations.		✓						✓								
Building Functions	KY.HS.F.7	Use arithmetic and geometric sequences to model situations and scenarios. a. Use formulas (explicit and recursive) to generate terms for arithmetic and geometric sequences. b. Write formulas to model arithmetic and geometric sequences and apply those formulas in realistic situations.																
Linear, Quadratic, and	KY.HS.F.11	Distinguish between situations that can be modeled with linear functions and with exponential functions.		✓						✓				✓				

Kentucky Academic Standards			Algebra					Advanced Math			Problem Solving and Data Analysis					Geometry and Trigonometry		
			Linear equations in one variable	Linear functions	Linear equations in two variables	Systems of two linear equations in two variables	Linear equations in one or two variables	Equivalent expressions	Nonlinear equations in one variable / Systems of equations in two variables	Nonlinear functions	Ratios, rates, proportional relationships, and units	Percentages	One variable data: Distributions and measures of center and spread	Two-variable data: Models and scatterplots	Probability and conditional probability	Area and volume	Lines, angles, and triangles	Right triangles
Exponential Models		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. b. Recognize situations in which one quantity changes at a constant rate per unit interval relative to another. c. Recognize situations in which a quantity grows or decays by a constant percent rate per unit interval relative to another.																
Linear, Quadratic, and Exponential Models	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).		✓						✓								
Linear, Quadratic, and Exponential Models	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.								✓								
Linear, Quadratic, and Exponential Models	KY.HS.F.14	Interpret the parameters in a linear or exponential function in terms of a context.		✓						✓								
The Real Number System	KY.HS.N.1	Extend the properties of integer exponents to rational exponents, allowing																

Kentucky Academic Standards			Algebra					Advanced Math			Problem Solving and Data Analysis					Geometry and Trigonometry		
			Linear equations in one variable	Linear functions	Linear equations in two variables	Systems of two linear equations in two variables	Linear equations in one or two variables	Equivalent expressions	Nonlinear equations in one variable / Systems of equations in two variables	Nonlinear functions	Ratios, rates, proportional relationships, and units	Percentages	One variable data: Distributions and measures of center and spread	Two-variable data: Models and scatterplots	Probability and conditional probability	Area and volume	Lines, angles, and triangles	Right triangles
		for the expression of radicals in terms of rational exponents.																
The Real Number System	KY.HS.N.2	Rewrite expressions involving radicals and rational exponents using the properties of exponents.						✓										
Quantities	KY.HS.N.4	Use units in context as a way to understand problems and to guide the solution of multi-step problems; a. Choose and interpret units consistently in formulas; b. Choose and interpret the scale and the origin in graphs and data displays.									✓							
Quantities	KY.HS.N.5	Define appropriate units in context for the purpose of descriptive modeling.																
Quantities	KY.HS.N.6	Choose a level of accuracy appropriate to limitations on measurement when reporting quantities.																
Interpreting Categorical and Quantitative Data	KY.HS.SP.6	Represent data on two quantitative variables on a scatter plot and describe how the explanatory and response variables are related. a. Calculate an appropriate mathematical model, or use a given mathematical model, for data to solve problems in context. b. Informally assess the fit of a model (through calculating correlation for linear data, plotting, calculating and/or analyzing residuals).												✓				

Kentucky Academic Standards			Algebra					Advanced Math			Problem Solving and Data Analysis					Geometry and Trigonometry		
			Linear equations in one variable	Linear functions	Linear equations in two variables	Systems of two linear equations in two variables	Linear equations in one or two variables	Equivalent expressions	Nonlinear equations in one variable / Systems of equations in two variables	Nonlinear functions	Ratios, rates, proportional relationships, and units	Percentages	One variable data: Distributions and measures of center and spread	Two-variable data: Models and scatterplots	Probability and conditional probability	Area and volume	Lines, angles, and triangles	Right triangles
Interpreting Categorical and Quantitative Data	KY.HS.SP.7	Interpret the slope (rate of change) and the intercept (constant term) of a linear model in the context of the data.												✓				
Interpreting Categorical and Quantitative Data	KY.HS.SP.8	Understand the role and purpose of correlation in linear regression. a. Use technology to compute correlation coefficient of a linear fit. b. Interpret the meaning of the correlation within the context of the data. c. Describe the limitations of correlation when establishing causation.																

Table 24: Geometry Aligned to PSAT 8/9

Kentucky Academic Standards			Algebra					Advanced Math			Problem Solving and Data Analysis					Geometry and Trigonometry		
			Linear equations in one variable	Linear functions	Linear equations in two variables	Systems of two linear equations in two variables	Linear equations in one or two variables	Equivalent expressions	Nonlinear equations in one variable / Systems of equations in two variables	Nonlinear functions	Ratios, rates, proportional relationships, and units	Percentages	One variable data: Distributions and measures of center and spread	Two-variable data: Models and scatterplots	Probability and conditional probability	Area and volume	Lines, angles, and triangles	Right triangles
Congruence	KY.HS.G.1	Know and apply precise definitions of the language of Geometry: a. Understand properties of line segments, angles and circle. b. Understand properties of and differences between perpendicular and parallel lines.			✓												✓	
Congruence	KY.HS.G.2	Representing transformations in the plane. a. Describe transformations as functions that take points in the plane as inputs and give other points as outputs b. Compare transformations that preserve distance and angle measures to those that do not. c. Given a rectangle, parallelogram, trapezoid, or regular polygon, formally describe the rotations and reflections that carry it onto itself, using properties of these figures.																

Kentucky Academic Standards			Algebra					Advanced Math			Problem Solving and Data Analysis					Geometry and Trigonometry		
			Linear equations in one variable	Linear functions	Linear equations in two variables	Systems of two linear equations in two variables	Linear equations in one or two variables	Equivalent expressions	Nonlinear equations in one variable / Systems of equations in two variables	Nonlinear functions	Ratios, rates, proportional relationships, and units	Percentages	One variable data: Distributions and measures of center and spread	Two-variable data: Models and scatterplots	Probability and conditional probability	Area and volume	Lines, angles, and triangles	Right triangles
Congruence	KY.HS.G.4	Understand the effects of transformations of geometric figures. a. Given a geometric figure and a rotation, reflection, or translation, draw the transformed figure. b. Specify a sequence of transformations that will carry a given figure onto another. 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.																
Congruence	KY.HS.G.5	Know and apply the concepts of triangle congruence: a. Use the definition of congruence in terms of rigid motions to show that two triangles are congruent if and only if corresponding pairs of sides and corresponding pairs of angles are congruent. b. Explain how the criteria for triangle congruence (ASA, SAS and SSS) follow from the definition of congruence in terms of rigid motions.																
Congruence	KY.HS.G.6	Apply theorems for lines, angles, triangles, parallelograms.															✓	

Kentucky Academic Standards			Algebra					Advanced Math			Problem Solving and Data Analysis					Geometry and Trigonometry		
			Linear equations in one variable	Linear functions	Linear equations in two variables	Systems of two linear equations in two variables	Linear equations in one or two variables	Equivalent expressions	Nonlinear equations in one variable / Systems of equations in two variables	Nonlinear functions	Ratios, rates, proportional relationships, and units	Percentages	One variable data: Distributions and measures of center and spread	Two-variable data: Models and scatterplots	Probability and conditional probability	Area and volume	Lines, angles, and triangles	Right triangles
Congruence	KY.HS.G.7	Prove theorems about geometric figures. a. Construct formal proofs to justify theorems for lines, angles and triangles.																
Congruence	KY.HS.G.8	Create and apply geometric constructions. a. Make formal geometric constructions with a variety of tools and methods. b. Apply basic construction procedures to construct more complex figures.																
Similarity, Right Triangles, and Trigonometry	KY.HS.G.9	Understand properties of dilations. a. Verify the properties that result from that dilations given by a center and a scale factor. b. Verify that a dilation produces an image that is similar to the pre-image.														✓		
Similarity, Right Triangles, and Trigonometry	KY.HS.G.10	Apply the properties of similarity transformations to establish the AA criterion for two triangles to be similar.																
Similarity, Right Triangles, and Trigonometry	KY.HS.G.11	Understand theorems about triangles. a. Apply theorems about triangles. c. Use similarity criteria for triangles to solve problems and to prove relationships in geometric figures.															✓	✓

Kentucky Academic Standards			Algebra					Advanced Math			Problem Solving and Data Analysis					Geometry and Trigonometry		
			Linear equations in one variable	Linear functions	Linear equations in two variables	Systems of two linear equations in two variables	Linear equations in one or two variables	Equivalent expressions	Nonlinear equations in one variable / Systems of equations in two variables	Nonlinear functions	Ratios, rates, proportional relationships, and units	Percentages	One variable data: Distributions and measures of center and spread	Two-variable data: Models and scatterplots	Probability and conditional probability	Area and volume	Lines, angles, and triangles	Right triangles
Similarity, Right Triangles, and Trigonometry	KY.HS.G.12	Understand properties of right triangles. a. Understand that by similarity, side ratios in right triangles are properties of the angles in the triangle, leading to definitions of trigonometric ratios for acute angles (sine, cosine and tangent). b. Explain and use the relationship between the sine and cosine of complementary angles. c. Use trigonometric ratios and the Pythagorean Theorem to solve right triangles in applied problems.																
Circles	KY.HS.G.15	Verify using dilations that all circles are similar.																
Circles	KY.HS.G.16	Identify and describe relationships among angles and segments within the context of circles involving: a. Recognize differences between and properties of inscribed, central and circumscribed angles. b. Understand relationships between inscribed angles and the diameter of a circle. c. Understand the relationship between the radius of a circle and the line drawn through the point of tangency on that radius.																

Kentucky Academic Standards			Algebra					Advanced Math			Problem Solving and Data Analysis					Geometry and Trigonometry		
			Linear equations in one variable	Linear functions	Linear equations in two variables	Systems of two linear equations in two variables	Linear equations in one or two variables	Equivalent expressions	Nonlinear equations in one variable / Systems of equations in two variables	Nonlinear functions	Ratios, rates, proportional relationships, and units	Percentages	One variable data: Distributions and measures of center and spread	Two-variable data: Models and scatterplots	Probability and conditional probability	Area and volume	Lines, angles, and triangles	Right triangles
Expressing Geometric Properties with Equations	KY.HS.G.19	Understand the relationship between the algebraic form and the geometric representation of a circle. a. Write the equation of a circle of given center and radius using the Pythagorean Theorem.																
Expressing Geometric Properties with Equations	KY.HS.G.21	Use coordinates to justify and prove simple geometric theorems algebraically.														✓		
Expressing Geometric Properties with Equations	KY.HS.G.22	Justify and apply the slope criteria for parallel and perpendicular lines and use them to solve geometric problems.			✓											✓		
Expressing Geometric Properties with Equations	KY.HS.G.23	Find measurements among points within the coordinate plane. a. Use points from the coordinate plane to find the coordinates of a midpoint of a line segment and the distance between the endpoints of a line segment. b. Find the point on a directed line segment between two given points that partitions the segment in a given ratio.														✓		✓

Kentucky Academic Standards			Algebra					Advanced Math			Problem Solving and Data Analysis					Geometry and Trigonometry		
			Linear equations in one variable	Linear functions	Linear equations in two variables	Systems of two linear equations in two variables	Linear equations in one or two variables	Equivalent expressions	Nonlinear equations in one variable / Systems of equations in two variables	Nonlinear functions	Ratios, rates, proportional relationships, and units	Percentages	One variable data: Distributions and measures of center and spread	Two-variable data: Models and scatterplots	Probability and conditional probability	Area and volume	Lines, angles, and triangles	Right triangles
Expressing Geometric Properties with Equations	KY.HS.G.24	Use coordinates within the coordinate plane to calculate measurements of two-dimensional figures. a. Compute the perimeters of various polygons. b. Compute the areas of triangles, rectangles and other quadrilaterals.														✓		
Geometric Measurement and Dimensions	KY.HS.G.25	Analyze and determine the validity of arguments for the formulas for the various figures and shapes. a. Finding the circumference and area of a circle. b. Finding the volume of a sphere, prism, cylinder, pyramid and cone.																
Geometric Measurement and Dimensions	KY.HS.G.27	Use volume formulas to solve problems for cylinders, pyramids, cones, spheres, prisms.														✓		
Geometric Measurement and Dimensions	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.																
Modeling with Geometry	KY.HS.G.29	Use geometric shapes, their measures and their properties to describe objects in real world settings.														✓		

Kentucky Academic Standards			Algebra					Advanced Math			Problem Solving and Data Analysis					Geometry and Trigonometry		
			Linear equations in one variable	Linear functions	Linear equations in two variables	Systems of two linear equations in two variables	Linear equations in one or two variables	Equivalent expressions	Nonlinear equations in one variable / Systems of equations in two variables	Nonlinear functions	Ratios, rates, proportional relationships, and units	Percentages	One variable data: Distributions and measures of center and spread	Two-variable data: Models and scatterplots	Probability and conditional probability	Area and volume	Lines, angles, and triangles	Right triangles
Modeling with Geometry	KY.HS.G.30	Apply concepts of density based on area and volume in modeling situations, using appropriate units of measurement.									✓							
Modeling with Geometry	KY.HS.G.31	Apply geometric methods to solve design problems.																
Quantities	KY.HS.N.5	Define appropriate units in context for the purpose of descriptive modeling.																
Quantities	KY.HS.N.6	Choose a level of accuracy appropriate to limitations on measurement when reporting quantities.																

Table 25: Algebra 2 Aligned to PSAT 8/9

Kentucky Academic Standards			Algebra					Advanced Math			Problem Solving and Data Analysis					Geometry and Trigonometry		
			Linear equations in one variable	Linear functions	Linear equations in two variables	Systems of two linear equations in two variables	Linear equations in one or two variables	Equivalent expressions	Nonlinear equations in one variable / Systems of equations in two variables	Nonlinear functions	Ratios, rates, proportional relationships, and units	Percentages	One variable data: Distributions and measures of center and spread	Two-variable data: Models and scatterplots	Probability and conditional probability	Area and volume	Lines, angles, and triangles	Right triangles
Seeing Structure in Expressions	KY.HS.A.1	Interpret expressions that represent a quantity in terms of its context. a. Interpret parts of an expression, such as terms, factors and coefficients. b. Interpret complicated expressions, given a context, by viewing one or more of their parts as a single entity.	✓	✓	✓	✓	✓			✓								
Seeing Structure in Expressions	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.	✓	✓	✓			✓	✓									
Seeing Structure in Expressions	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. a. Write the standard form of a given polynomial and identify the terms, coefficients, degree, leading coefficient and constant term.						✓		✓								
Arithmetic with Polynomials and Rational Expressions	KY.HS.A.7	Identify roots of polynomials when suitable factorizations are available. Know these roots become the zeros (x-intercepts) for the corresponding polynomial function.								✓								
Creating Equations	KY.HS.A.12	Create equations and inequalities in one variable and use them to solve problems.	✓				✓											

Kentucky Academic Standards			Algebra					Advanced Math			Problem Solving and Data Analysis					Geometry and Trigonometry		
			Linear equations in one variable	Linear functions	Linear equations in two variables	Systems of two linear equations in two variables	Linear equations in one or two variables	Equivalent expressions	Nonlinear equations in one variable / Systems of equations in two variables	Nonlinear functions	Ratios, rates, proportional relationships, and units	Percentages	One variable data: Distributions and measures of center and spread	Two-variable data: Models and scatterplots	Probability and conditional probability	Area and volume	Lines, angles, and triangles	Right triangles
Creating Equations	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.		✓	✓					✓								
Creating Equations	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.				✓	✓											
Creating Equations	KY.HS.A.15	Rearrange formulas to solve a literal equation, highlighting a quantity of interest, using the same reasoning as in solving equations.							✓									
Reasoning with Equations and Inequalities	KY.HS.A.17	Solve and justify equations in one variable. Justify the solutions and give examples showing how extraneous solutions may arise. a. Solve rational equations written as proportions in one variable. b. Solve radical equations in one variable.																
Reasoning with Equations and Inequalities	KY.HS.A.19	Solve quadratic equations in one variable. a. Solve quadratic equations by taking square roots, the quadratic formula and factoring, as appropriate to the initial form of the equation. Recognize when the quadratic formula gives complex solutions and write them as a ± bi for real numbers a and b.							✓									

Kentucky Academic Standards			Algebra					Advanced Math			Problem Solving and Data Analysis					Geometry and Trigonometry		
			Linear equations in one variable	Linear functions	Linear equations in two variables	Systems of two linear equations in two variables	Linear equations in one or two variables	Equivalent expressions	Nonlinear equations in one variable / Systems of equations in two variables	Nonlinear functions	Ratios, rates, proportional relationships, and units	Percentages	One variable data: Distributions and measures of center and spread	Two-variable data: Models and scatterplots	Probability and conditional probability	Area and volume	Lines, angles, and triangles	Right triangles
Reasoning with Equations and Inequalities	KY.HS.A.21	Solve a simple system consisting of a linear equation and a quadratic equation in two variables algebraically and graphically.							✓									
Reasoning with Equations and Inequalities	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.				✓			✓									
Interpreting Functions	KY.HS.F.1	Understand properties and key features of functions and the different ways functions can be represented. 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. d. Relate the domain of a function to its graph and, where applicable, to the quantitative relationship it describes. e. Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions).		✓						✓								
Interpreting Functions	KY.HS.F.3	Understand average rate of change of a function over an interval. a. Calculate and interpret the average			✓									✓				

Kentucky Academic Standards			Algebra					Advanced Math			Problem Solving and Data Analysis					Geometry and Trigonometry		
			Linear equations in one variable	Linear functions	Linear equations in two variables	Systems of two linear equations in two variables	Linear equations in one or two variables	Equivalent expressions	Nonlinear equations in one variable / Systems of equations in two variables	Nonlinear functions	Ratios, rates, proportional relationships, and units	Percentages	One variable data: Distributions and measures of center and spread	Two-variable data: Models and scatterplots	Probability and conditional probability	Area and volume	Lines, angles, and triangles	Right triangles
		rate of change of a function (presented symbolically or as a table) over a specified interval. b. Estimate the rate of change from a graph.																
Interpreting Functions	KY.HS.F.4	Graph functions expressed symbolically and show key features of the graph, with and without using technology (computer, graphing calculator). b. Graph square root, cube root and absolute value functions. c. Graph polynomial functions, identifying zeros when suitable factorizations are available and showing end behavior. d. Graph exponential and logarithmic functions, showing intercepts and end behavior.		✓						✓								
Building Functions	KY.HS.F.6	Write a function that describes a relationship between two quantities. b. Combine standard function types using arithmetic operations.		✓						✓								
Building Functions	KY.HS.F.8	Understand the effects of transformations on the graph of a function. 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 of k (both positive and negative); find the value of k given the graphs.		✓						✓								

Kentucky Academic Standards			Algebra					Advanced Math			Problem Solving and Data Analysis					Geometry and Trigonometry		
			Linear equations in one variable	Linear functions	Linear equations in two variables	Systems of two linear equations in two variables	Linear equations in one or two variables	Equivalent expressions	Nonlinear equations in one variable / Systems of equations in two variables	Nonlinear functions	Ratios, rates, proportional relationships, and units	Percentages	One variable data: Distributions and measures of center and spread	Two-variable data: Models and scatterplots	Probability and conditional probability	Area and volume	Lines, angles, and triangles	Right triangles
		b. Experiment with cases and illustrate an explanation of the effects on the graph using technology.																
Building Functions	KY.HS.F.9	Find inverse functions. a. Given the equation of an invertible function, find the inverse.																
Building Functions	KY.HS.F.10	Understand the inverse relationship between exponents and logarithms and use this relationship to solve problems involving logarithms and exponents with the use of technology.																
Linear, Quadratic, and Exponential Models	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.								✓								
Quantities	KY.HS.N.5	Define appropriate units in context for the purpose of descriptive modeling.																
Quantities	KY.HS.N.6	Choose a level of accuracy appropriate to limitations on measurement when reporting quantities.																
Complex Number System	KY.HS.N.7	Understanding properties of complex numbers. a. Know there is a complex number i such that $i^2 = –1$ and every complex number has the form a + bi with a and b real. b. Use the relation $i^2 = –1$ and the commutative, associative and distributive																

Kentucky Academic Standards			Algebra					Advanced Math			Problem Solving and Data Analysis					Geometry and Trigonometry		
			Linear equations in one variable	Linear functions	Linear equations in two variables	Systems of two linear equations in two variables	Linear equations in one or two variables	Equivalent expressions	Nonlinear equations in one variable / Systems of equations in two variables	Nonlinear functions	Ratios, rates, proportional relationships, and units	Percentages	One variable data: Distributions and measures of center and spread	Two-variable data: Models and scatterplots	Probability and conditional probability	Area and volume	Lines, angles, and triangles	Right triangles
		properties to add, subtract and multiply complex numbers.																
Complex Number System	KY.HS.N.9	Solve quadratic equations with real coefficients that have complex solutions.																
Number and Quantity	KY.HS.N.14	Use matrices to represent and manipulate data.																
Number and Quantity	KY.HS.N.15	Perform operations with matrices. a. Add, subtract and multiply matrices of appropriate dimensions. b. Multiply matrices by scalars to produce new matrices.																
Interpreting Categorical and Quantitative Data	KY.HS.SP.1	Represent the distribution of data with plots on the real number line (stem plots, dot plots, histograms and box plots).											✓					
Interpreting Categorical and Quantitative Data	KY.HS.SP.2	Use statistics appropriate to the shape of the numerical data distribution to compare center (median, mean) and spread (interquartile range when comparing medians and standard deviation when comparing means) of different data distributions.											✓					
Interpreting Categorical and Quantitative Data	KY.HS.SP.3	Interpret differences in shape, center and spread in the context of the distributions of the numerical data, accounting for the presence and possible effects of extreme data points (outliers).											✓					
Interpreting Categorical and	KY.HS.SP.5	Summarize categorical data for two or more categories in frequency tables.													✓			

Kentucky Academic Standards			Algebra					Advanced Math			Problem Solving and Data Analysis					Geometry and Trigonometry		
			Linear equations in one variable	Linear functions	Linear equations in two variables	Systems of two linear equations in two variables	Linear equations in one or two variables	Equivalent expressions	Nonlinear equations in one variable / Systems of equations in two variables	Nonlinear functions	Ratios, rates, proportional relationships, and units	Percentages	One variable data: Distributions and measures of center and spread	Two-variable data: Models and scatterplots	Probability and conditional probability	Area and volume	Lines, angles, and triangles	Right triangles
Quantitative Data		Calculate and interpret joint, marginal and conditional relative frequencies (probabilities) in the context of the data, recognizing possible associations and trends in the data.																
Making Inferences and Justifying Conclusions	KY.HS.SP.9	Understand statistics as a process for making inferences and justifying conclusions about population parameters based on a random sample from that population.																
Making Inferences and Justifying Conclusions	KY.HS.SP.10	Decide if a specified model is consistent with the results from a simulation.																
Making Inferences and Justifying Conclusions	KY.HS.SP.11	Recognize the purposes of and differences among sample surveys, experiments and observational studies; explain how randomization relates to each.																
Making Inferences and Justifying Conclusions	KY.HS.SP.12	Use data from a sample survey to estimate a population mean or proportion and explain how bias may be involved in the process.																
Making Inferences and Justifying Conclusions	KY.HS.SP.13	Use data from a randomized experiment to compare two treatments; use simulations to decide if differences between estimates or statistics are significant.																

Kentucky Academic Standards			Algebra					Advanced Math			Problem Solving and Data Analysis					Geometry and Trigonometry		
			Linear equations in one variable	Linear functions	Linear equations in two variables	Systems of two linear equations in two variables	Linear equations in one or two variables	Equivalent expressions	Nonlinear equations in one variable / Systems of equations in two variables	Nonlinear functions	Ratios, rates, proportional relationships, and units	Percentages	One variable data: Distributions and measures of center and spread	Two-variable data: Models and scatterplots	Probability and conditional probability	Area and volume	Lines, angles, and triangles	Right triangles
Conditional Probability and the Rules of Probability	KY.HS.SP.14	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.													✓			
Conditional Probability and the Rules of Probability	KY.HS.SP.15	Understand the concept of independence. a. 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) x P(B) c. Recognize and explain the concept of independence in everyday language and everyday situations.																
Conditional Probability and the Rules of Probability	KY.HS.SP.16	Understand the concept of conditional probability. a. Understand the conditional probability of A given B as P(A and B)/P(B). c. Recognize and explain the concept of conditional probability in everyday language and everyday situations. d. Find the conditional probability of A given B as the fraction of B’s outcomes																

Kentucky Academic Standards			Algebra					Advanced Math			Problem Solving and Data Analysis					Geometry and Trigonometry		
			Linear equations in one variable	Linear functions	Linear equations in two variables	Systems of two linear equations in two variables	Linear equations in one or two variables	Equivalent expressions	Nonlinear equations in one variable / Systems of equations in two variables	Nonlinear functions	Ratios, rates, proportional relationships, and units	Percentages	One variable data: Distributions and measures of center and spread	Two-variable data: Models and scatterplots	Probability and conditional probability	Area and volume	Lines, angles, and triangles	Right triangles
		that also belong to A and interpret the answer in terms of the model.																
Number and Quantity	KY.HS.SP.19	Use permutations and combinations to compute probabilities. a. Distinguish between situations that can be modeled using counting techniques, including Fundamental Counting Principle, permutations and combinations. b. Perform calculations using the appropriate counting technique, including simple probabilities.													✓			

Table 26: Grade 8 Aligned to PSAT 8/9

Kentucky Academic Standards			Algebra					Advanced Math			Problem Solving and Data Analysis					Geometry and Trigonometry		
			Linear equations in one variable	Linear functions	Linear equations in two variables	Systems of two linear equations in two variables	Linear equations in one or two variables	Equivalent expressions	Nonlinear equations in one variable / Systems of equations in two variables	Nonlinear functions	Ratios, rates, proportional relationships, and units	Percentages	One variable data: Distributions and measures of center and spread	Two-variable data: Models and scatterplots	Probability and conditional probability	Area and volume	Lines, angles, and triangles	Right triangles
Expressions and Equations	KY.8.EE.1	Know and apply the properties of integer exponents to generate equivalent numerical expressions.						✓	✓									
Expressions and Equations	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.							✓	✓								
Expressions and Equations	KY.8.EE.3	Use numbers expressed in the form of a single digit times an integer power of 10 (Scientific Notation) to estimate very large or very small quantities and express how many times larger or smaller one is than the other.																
Expressions and Equations	KY.8.EE.4	Perform operations with numbers expressed in scientific notation, including problems where both decimal and scientific notation are used. Use scientific notation and choose units of appropriate size for measurements of very large or very small quantities. Interpret scientific notation that has been generated by technology.																

Kentucky Academic Standards			Algebra					Advanced Math			Problem Solving and Data Analysis					Geometry and Trigonometry		
			Linear equations in one variable	Linear functions	Linear equations in two variables	Systems of two linear equations in two variables	Linear equations in one or two variables	Equivalent expressions	Nonlinear equations in one variable / Systems of equations in two variables	Nonlinear functions	Ratios, rates, proportional relationships, and units	Percentages	One variable data: Distributions and measures of center and spread	Two-variable data: Models and scatterplots	Probability and conditional probability	Area and volume	Lines, angles, and triangles	Right triangles
Expressions and Equations	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.		✓														
Expressions and Equations	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.		✓	✓													
Expressions and Equations	KY.8.EE.7	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 collecting like terms.	✓															
Expressions and Equations	KY.8.EE.8	Analyze and solve a system of two linear equations.				✓												

Kentucky Academic Standards			Algebra					Advanced Math			Problem Solving and Data Analysis					Geometry and Trigonometry		
			Linear equations in one variable	Linear functions	Linear equations in two variables	Systems of two linear equations in two variables	Linear equations in one or two variables	Equivalent expressions	Nonlinear equations in one variable / Systems of equations in two variables	Nonlinear functions	Ratios, rates, proportional relationships, and units	Percentages	One variable data: Distributions and measures of center and spread	Two-variable data: Models and scatterplots	Probability and conditional probability	Area and volume	Lines, angles, and triangles	Right triangles
		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. 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 c. Solve real-world and mathematical problems leading to two linear equations in two variables.																
Functions	KY.8.F.1	Understand that a function is a rule that assigns to each input exactly one output. The graph of a function is the set of ordered pairs consisting of an input and the corresponding output.		✓						✓								
Functions	KY.8.F.2	Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions).		✓						✓								
Functions	KY.8.F.3	Understand properties of linear functions. a. Interpret the equation y = mx + b as		✓										✓				

Kentucky Academic Standards			Algebra					Advanced Math			Problem Solving and Data Analysis					Geometry and Trigonometry		
			Linear equations in one variable	Linear functions	Linear equations in two variables	Systems of two linear equations in two variables	Linear equations in one or two variables	Equivalent expressions	Nonlinear equations in one variable / Systems of equations in two variables	Nonlinear functions	Ratios, rates, proportional relationships, and units	Percentages	One variable data: Distributions and measures of center and spread	Two-variable data: Models and scatterplots	Probability and conditional probability	Area and volume	Lines, angles, and triangles	Right triangles
		defining a linear function, whose graph is a straight line. b. Identify and give examples of functions that are not linear.																
Functions	KY.8.F.4	Construct a function to model a linear relationship between two quantities. a. Determine the rate of change and initial value of the function from a description of a relationship or from two (x, y) values, including reading these from a table or from a graph. b. Interpret the rate of change and initial value of a linear function in terms of the situation it models and in terms of its graph or a table of values.		✓										✓				
Functions	KY.8.F.5	Use graphs to represent functions. a. Describe qualitatively the functional relationship between two quantities by analyzing a graph. b. Sketch a graph that exhibits the qualitative features of a function that has been described verbally.		✓						✓				✓				
Geometry	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.																

Kentucky Academic Standards			Algebra					Advanced Math			Problem Solving and Data Analysis					Geometry and Trigonometry		
			Linear equations in one variable	Linear functions	Linear equations in two variables	Systems of two linear equations in two variables	Linear equations in one or two variables	Equivalent expressions	Nonlinear equations in one variable / Systems of equations in two variables	Nonlinear functions	Ratios, rates, proportional relationships, and units	Percentages	One variable data: Distributions and measures of center and spread	Two-variable data: Models and scatterplots	Probability and conditional probability	Area and volume	Lines, angles, and triangles	Right triangles
		-Parallel lines are congruent to parallel lines.																
Geometry	KY.8.G.2	Understand that a two-dimensional figure is congruent to another if the second can be obtained from the first by a sequence of rotations, reflections and translations. Given two congruent figures, describe a sequence that exhibits the congruence between them.																
Geometry	KY.8.G.3	Describe the effect of dilations, translations, rotations and reflections on two-dimensional figures using coordinates.																
Geometry	KY.8.G.4	Understand that a two-dimensional figure is similar to another if the second can be obtained from the first by a sequence of rotations, reflections, translations and dilations. Given two similar two-dimensional figures, describe a sequence that exhibits the similarity between them.														✓		
Geometry	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.															✓	
Geometry	KY.8.G.6	Explain a proof of the Pythagorean Theorem and its converse.																

Kentucky Academic Standards			Algebra					Advanced Math			Problem Solving and Data Analysis					Geometry and Trigonometry		
			Linear equations in one variable	Linear functions	Linear equations in two variables	Systems of two linear equations in two variables	Linear equations in one or two variables	Equivalent expressions	Nonlinear equations in one variable / Systems of equations in two variables	Nonlinear functions	Ratios, rates, proportional relationships, and units	Percentages	One variable data: Distributions and measures of center and spread	Two-variable data: Models and scatterplots	Probability and conditional probability	Area and volume	Lines, angles, and triangles	Right triangles
Geometry	KY.8.G.7	Apply the Pythagorean Theorem to determine unknown side lengths in right triangles in real-world and mathematical problems in two and three dimensions.																✓
Geometry	KY.8.G.8	Apply the Pythagorean Theorem to find the distance between two points in a coordinate system.																
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.														✓		
The Number System	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.																
The Number System	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.																
Statistics and Probability	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.												✓				

Kentucky Academic Standards			Algebra					Advanced Math			Problem Solving and Data Analysis					Geometry and Trigonometry		
			Linear equations in one variable	Linear functions	Linear equations in two variables	Systems of two linear equations in two variables	Linear equations in one or two variables	Equivalent expressions	Nonlinear equations in one variable / Systems of equations in two variables	Nonlinear functions	Ratios, rates, proportional relationships, and units	Percentages	One variable data: Distributions and measures of center and spread	Two-variable data: Models and scatterplots	Probability and conditional probability	Area and volume	Lines, angles, and triangles	Right triangles
Statistics and Probability	KY.8.SP.2	Know that lines are widely used to model relationships between two quantitative variables. For scatter plots that suggest a linear association, informally fit a line and informally assess the model fit by judging the closeness of the data points to the line.												✓				
Statistics and Probability	KY.8.SP.3	Use the equation of a linear model to solve problems in the context of bivariate numerical data, interpreting the slope and intercept.												✓				

Appendix D: Alignments of Science Standards to SAT

The following tables detail the Kentucky Academic Standards–SAT Suite alignments using the standards as the organizing principle.

Table 27: KAS Science and Engineering Practices Aligned to SAT Reading and Writing

KAS Science and Engineering Practices		Information and Ideas			Craft and Structure			Expression of Ideas		Standard English Conventions	
		Central Ideas and Details	Inferences	Command of Evidence	Words in Context	Text Structure and Purpose	Cross-Text Connections	Rhetorical Synthesis	Transitions	Boundaries	Form, Structure, and Sense
Asking questions or defining problems	Students engage in asking testable questions and defining problems to pursue understanding of phenomena.	✓	✓	✓	✓	✓		✓	✓		
Developing and using models	Students develop physical, conceptual and other models to represent relationships, explain mechanisms, communicate ideas and predict outcomes.	✓	✓	✓							
Planning and carrying out investigations	Students plan and conduct scientific investigations to test, revise or develop explanations.	✓	✓	✓				✓	✓		
Analyzing and interpreting data	Students analyze various types of data to identify features or patterns for interpretation and further use.	✓	✓	✓				✓			
Using mathematics and computational thinking	Students use fundamental tools in science to compute relationships and interpret results.										
Constructing explanations and designing solutions	Students construct explanations about the world and design solutions to problems using observations that are consistent with current evidence and scientific principles.	✓	✓		✓	✓		✓			
Engaging in argument from evidence	Students support their best conclusions and solutions with lines of reasoning using evidence to defend their claims.	✓	✓	✓		✓		✓	✓		

KAS Science and Engineering Practices		Information and Ideas			Craft and Structure			Expression of Ideas		Standard English Conventions	
		Central Ideas and Details	Inferences	Command of Evidence	Words in Context	Text Structure and Purpose	Cross-Text Connections	Rhetorical Synthesis	Transitions	Boundaries	Form, Structure, and Sense
Obtaining, evaluating and communicating information	Students obtain, evaluate and derive meaning from scientific information or presented evidence using appropriate scientific language. They communicate their findings clearly and persuasively in a variety of ways including written text, graphs, diagrams, charts, tables or orally.	✓	✓	✓	✓	✓		✓	✓		

Table 28: KAS Science and Engineering Practices Aligned to SAT Math

KAS Science and Engineering Practices		Algebra					Advanced Math			Problem Solving and Data Analysis							Geometry and Trigonometry			
		Linear equations in one variable	Linear functions	Linear inequalities in two variables	Systems of two linear equations in two variables	Linear equations in one or two variables	Equivalent expressions	Nonlinear equations in one variable and systems of equations in two variables	Nonlinear functions	Ratios, rates, proportional relationships, and units	Percentages	One variable data	Two-variable data	Probability and conditional probability	Inference from sample statistics and margin of error	Evaluating statistical claim	Area and volume	Lines, angles, and triangles	Right triangles and trigonometry	Circles
Asking questions or defining problems	Students engage in asking testable questions and defining problems to pursue understanding of phenomena.	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓				
Developing and using models	Students develop physical, conceptual and other models to represent relationships, explain mechanisms, communicate ideas and predict outcomes.	✓	✓			✓			✓	✓	✓	✓	✓	✓						
Planning and carrying out investigations	Students plan and conduct scientific investigations to test, revise or develop explanations.															✓				
Analyzing and interpreting data	Students analyze various types of data to identify features or patterns for interpretation and further use.	✓	✓			✓			✓	✓	✓	✓	✓	✓	✓	✓				
Using mathematics and computational thinking	Students use fundamental tools in science to compute relationships and interpret results.	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Constructing explanations and designing solutions	Students construct explanations about the world and design solutions to problems using observations that are consistent with current evidence and scientific principles.					✓														

KAS Science and Engineering Practices		Algebra					Advanced Math			Problem Solving and Data Analysis							Geometry and Trigonometry			
		Linear equations in one variable	Linear functions	Linear inequalities in two variables	Systems of two linear equations in two variables	Linear equations in one or two variables	Equivalent expressions	Nonlinear equations in one variable and systems of equations in two variables	Nonlinear functions	Ratios, rates, proportional relationships, and units	Percentages	One variable data	Two-variable data	Probability and conditional probability	Inference from sample statistics and margin of error	Evaluating statistical claim	Area and volume	Lines, angles, and triangles	Right triangles and trigonometry	Circles
Engaging in argument from evidence	Students support their best conclusions and solutions with lines of reasoning using evidence to defend their claims.																			
Obtaining, evaluating and communicating information	Students obtain, evaluate and derive meaning from scientific information or presented evidence using appropriate scientific language. They communicate their findings clearly and persuasively in a variety of ways including written text, graphs, diagrams, charts, tables or orally.	✓	✓			✓			✓			✓	✓		✓	✓				