Program of Studies
and
College Readiness Standards Alignment

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General Introduction

Overview

In July 2006, Senate Bill 130 was passed by the Kentucky legislature. The bill amended KRS 158.6453 to include the provision that "no later than the 2007-2008 school year, and each year thereafter" the Commonwealth's assessment program shall include a high school readiness examination in grade 8, a college readiness examination in grade 10 and the ACT college admissions and placement examination in grade 11. These three examinations — EXPLORE, PLAN and ACT — comprise the **Educational Planning and Assessment System (EPAS)**. Because of this requirement, many teachers and administrators have requested an EPAS College Readiness Standards (CRS) alignment with Kentucky's curriculum standards to help teachers link instruction and assessment standards. This document includes an alignment of standards between Kentucky's *Program of Studies* (POS) and the EPAS CRS. For each test area, supplemental information also is included that may help teachers better understand the expectations of EPAS.

Common Core for Every Student: Kentucky's *Program of Studies* and the College Readiness Standards

On February 1, 2006, the Kentucky Board of Education defined a detailed and more rigorous minimum high school graduation requirement, beginning with the graduating class of 2012 (704 KAR 3:305). The board and the Kentucky Department of Education know that in order to be prepared for postsecondary education and the workforce, all students need access to rigorous course work.

The *Program of Studies* is Kentucky's comprehensive mandated curriculum for all Kentucky schools. In 2006, the POS was revised to include instructional standards that address the more rigorous graduation requirements. Therefore, the CRS is embedded within the *Program of Studies*. While there has been an effort to align the standards as closely as possible in this document, readers will see that in some cases, there is not an exact standard match for the CRS within the POS. In these cases, KDE has found that the skill or skills identified within the CRS are often a component of a more complex POS standard and that the POS standard to which we have aligned the CRS may include the expectation that students demonstrate a variety of other, related skills.

In each tested area, educators should note the importance of reading and critical thinking skills necessary for students to perform well on the tests. It also is important to note that, from grade to grade, some standards may be the same or very similar. In these cases, teachers are expected to continually refine instruction so that students use increasingly complex skills to achieve the standards for each consecutive grade level.

EPAS and CPE Benchmarks

Benchmark Provider	Exam	Benchmarks for Each Content Area			
		English	**Math**	**Reading**	**Science**
ACT, Inc.	EXPLORE	13	17	15	20
	PLAN	15	19	17	21
	ACT	18	22	21	24
KY CPE (Current)	ACT	18	18	18	none
KY CPE (effective fall 2009)	ACT	18	19	21	none

The benchmark scores determined by ACT, Inc. are predictive scores. That is, the EXPLORE score can be used to predict a PLAN score; a PLAN score can predict an ACT score. The EXPLORE score, however, does not predict an ACT score. The benchmarks are provided to allow a student to determine if he/she is on track to be prepared for college-level work or success after high school. The EXPLORE and PLAN benchmarks are associated with a 50 percent chance of meeting or exceeding the relevant ACT benchmark score.

The ACT benchmark scores are also predictive. If a student meets or exceeds the benchmark, it indicates that he/she has a 50 percent chance of obtaining a B or a 75 percent chance of obtaining a C in a corresponding credit-bearing college course.

The Council on Postsecondary Education (CPE) benchmarks are used to determine whether a student should be placed in a remedial, non-credit bearing English or Mathematics college course. As there are no remedial courses in science, no CPE benchmark is mandated.

Students who do not meet the EXPLORE or PLAN benchmarks, as determined by ACT, Inc., in English, reading or mathematics “shall have intervention strategies for accelerated learning incorporated into his or her learning plan.” Students who do not meet the ACT benchmarks, as identified by CPE, “shall be provided the opportunity to participate in accelerated learning designed to address his or her identified academic deficiencies” (KRS 158.6459).

More information about EPAS can be found here.

How to Use the Document

This document is divided into tables with two columns (The science alignment is divided into four columns to incorporate embedded math and language arts standards). The left-hand column lists the College Readiness Standards (CRS) and provides descriptions of the skills and knowledge associated with what students are likely to know and be able to do based on their EXPLORE, PLAN and ACT test scores. The right-hand column provides the content standards from the POS that most closely match each College Readiness Standard.

Teachers may use this document to link instruction with assessment. By identifying the connections between the CRS and the POS, educators may better understand how the ACT College Readiness Standards are embedded within Kentucky's curriculum.

Supplemental Information

Following the alignment of each subject area, educators will find a supplemental section designed to provide further, specific information about each subject area tested in EPAS.

Educational Planning and Assessment System (EPAS) College Readiness Standards and *Program of Studies* Standards Alignment Introduction

Test: English

Kentucky's *Program of Studies* (POS) and the College Readiness Standards (CRS)

The *Program of Studies*, Kentucky's mandated curriculum for all Kentucky schools, is a comprehensive document. Therefore, the CRS is embedded within the *Program of Studies*. While there has been an effort to align the standards as closely as possible in this document, readers will see that in some cases, there is not an exact standard match for the CRS within the POS. In these cases, the Kentucky Department of Education has found that the skill or skills identified within the CRS are often a component of a more complex POS standard and that the POS standard to which we have aligned the CRS may include the expectation that students demonstrate a variety of other, related skills.
In each tested area, educators should note the importance of reading and critical thinking skills necessary for students to perform well on the tests. It also is important to note that, from grade to grade, some standards may be the same or very similar. In these cases, teachers are expected to continually refine instruction so that students use increasingly complex skills to achieve the standards for each consecutive grade level.

How to Use this Document

This document is divided into tables with two columns. The left-hand column provides the College Readiness Standards (CRS) and descriptions of the skills and knowledge associated with what students are likely to know and be able to do based on their EXPLORE, PLAN and ACT test scores. The right-hand column provides the content standards from the *Program of Studies* that most closely match each CRS.

Teachers may use this document to link instruction with assessment. By identifying the connections between the CRS and the POS, educators may better understand how the ACT College Readiness Standards are embedded within Kentucky's curriculum.

Example

CRS English

TOD 301 (Score Range: 16-19): Identify the basic purpose or role of a specified phrase of a sentence.

POS Writing

EL-11-WC-S-4: Students will communicate purpose, focus, and controlling ideas authentic to the writer.

While both standards include expectations for students to understand the purpose of writing within a text, the CRS asks that students *identify* the basic purpose, while the POS asks that students *communicate* purpose in their writing. While these two standards (CRS-English and

POS-Writing) do not provide an exact match, the POS standard identified most closely matches the CRS.

The English Test

The EPAS English test "measures the student's understanding of the conventions of written English (punctuation, grammar and usage, and sentence structure) and of rhetorical skills (strategy, organization, and style)" (35). A note to educators: The CRS English standards most closely match the Conventions and Writing Process standards in the *Program of Studies*. Therefore, the CRS are aligned to the writing standards. Because the ACT Writing test is not included as a component of Kentucky's accountability index, the ACT Writing Standards are not included within this alignment.

Supplemental Information

The specifications for the English test on the EXPLORE, PLAN and ACT can be found in the supplemental information section for English on page 25.

Reference

ACT. "ACT Educator Workshops: College Access and Opportunity For All," 2007 Resource Manual.

English*
P0S/CRS Alignment

Strand 1—Topic Development in Terms of Purpose and Focus (TOD)

College Readiness Standards	Kentucky Program of Studies
Score Range: 16-19	
Identify the basic purpose or role of a specified phrase or sentence	**EL-6-WC-S-3, EL-7-WC-S-3, EL-8-WC-S-3** Students will write for a variety of authentic purposes and audiences: o communicate about the significance of personal experiences and relationships o communicate through authentic literary forms to make meaning about the human condition o communicate through authentic transactive purposes for writing (e.g. informing, describing, explaining, persuading, analyzing) o analyze and communicate reflectively about literacy goals o analyze and address needs of intended audience o adjust the writing style (formal, informal) for intended audience **EL-6-WC-U-4, EL-7-WC-U-4, EL-8-WC-U-4** Students will communicate purpose, focus, and controlling ideas authentic to the writer
Score Range: 20-23	
Identify the central idea or main topic of a straightforward piece of writing	**EL-9-WC-S-4, EL-10-WC-S-4** Students will communicate purpose, focus, and controlling ideas authentic to the writer **EL-9-WP-S-1, EL-10-WP-S-1** Students will focus: establish and maintain a controlling idea on a selected topic
Determine relevancy when presented with a variety of sentence-level details	**EL-9-WP-S-4, EL-10-WP-S-4** Students will revise: o identify and develop topic sentences, making sure ideas are supported appropriately with relevant details and that sentences are in sequential order o insert new sentences and delete unnecessary ones o develop effective introductions and conclusions o eliminate redundant words o choose the most precise words available

Score Range: 24-27	
Identify the focus of a simple essay, applying that knowledge to add a sentence that sharpens that focus or to determine if an essay has met a specified goal	**EL-9-WC-S-4, EL-10-WC-S-4** Students will communicate purpose, focus, and controlling ideas authentic to the writer **EL-9-WP-S-4, EL-10-WP-S-4** Students will revise: o confer to determine where to add, delete, rearrange, define/redefine or elaborate content so that writing is coherent and effective for intended audience, then make revisions
Delete material primarily because it disturbs the flow and development of the paragraph	**EL-9-WP-S-4, EL-10-WP-S-4** Students will revise: o confer to determine where to add, delete, rearrange, define/redefine or elaborate content so that writing is coherent and effective for intended audience, then make revisions
Add a sentence to accomplish a fairly straightforward purpose such as illustrating a given statement	**EL-9-WP-S-4, EL-10-WP-S-4** Students will revise: o confer to determine where to add, delete, rearrange, define/redefine or elaborate content so that writing is coherent and effective for intended audience, then make revisions o identify and develop topic sentences, making sure ideas are supported appropriately with relevant details and that sentences are in sequential order o insert new sentences and delete unnecessary ones o develop effective introductions and conclusions o eliminate redundant words o choose the most precise words available
Score Range: 28-32	
Apply an awareness of the focus and purpose of a fairly involved essay to determine the rhetorical effect and suitability of an existing phrase or sentence, or to determine the need to delete plausible but irrelevant material	**EL-11-WC-S-4**, **EL-12-WC-S-4** Students will communicate purpose, focus, and controlling ideas authentic to the writer **EL-11-WP-S-4, EL-12-WP-S-4** Students will revise: o identify and develop topic sentences, making sure ideas are supported appropriately with relevant details and that sentences are in sequential order o insert new sentences and delete unnecessary ones o develop effective introductions and conclusions o eliminate redundant words o choose the most precise words available

*The EPAS English standards most closely align to Kentucky's writing standards for *Conventions* and *Writing Process* which, aside from the grades 5 and 8 multiple choice questions for on-demand, ask students to apply their understanding of revision and editing skills to their own writing.

Add a sentence to accomplish a subtle rhetorical purpose such as to emphasize, to add supporting detail, or to express meaning through connotation	**EL-11-WP-S-4, EL-12-WP-S-4** Students will revise: o identify and develop topic sentences, making sure ideas are supported appropriately with relevant details and that sentences are in sequential order o insert new sentences and delete unnecessary ones o develop effective introductions and conclusions o eliminate redundant words o choose the most precise words available
Score Range: 33-36	
Determine whether a complex essay has accomplished a specific purpose	**EL-11-WC-S-5, EL-12-WC-S-5** Students will develop ideas that are logical, justified and suitable for a variety of purposes, audiences and forms of writing
Add a phrase or sentence to accomplish a specific purpose, often expressed in terms of the main focus of the essay	**EL-11-WP-S-4, EL-12-WP-S-4** Students will revise: o confer to determine where to add, delete, rearrange, define/redefine or elaborate content so that writing is coherent and effective for intended audience, then make revisions o identify and develop topic sentences, making sure ideas are supported appropriately with relevant details and that sentences are in sequential order o insert new sentences and delete unnecessary ones o develop effective introductions and conclusions o eliminate redundant words o choose the most precise words available

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English *
POS/CRS Alignment
Strand 2—Organization, Unity and Clarity (OUC)

College Readiness Standards	Kentucky Program of Studies
Score Range: 13-15	
Use conjunctive adverbs or phrases to show time relationships in simple narrative essays (e.g., *then, this time*)	**EL-6-WS-S-5, EL-7-WS-S-6, EL-8-WS-S-6** Students will use a variety of transitions and/or transitional elements (e.g., ellipses, time transitions, white space) with intent
Score Range: 16-19	
Select the most logical place to add a sentence in a paragraph	**EL-6-WP-S-4, EL-7-WP-S-4, EL-8-WP-S-4** Students will revise: o confer to determine where to add, delete, rearrange, define/redefine or elaborate content so that writing is coherent and effective for intended audience, then make revisions o identify and develop topic sentences, making sure ideas are supported appropriately with relevant details and that sentences are in sequential order o insert new sentences and delete unnecessary ones o develop effective introductions and conclusions o eliminate redundant words o choose the most precise words available
Score Range 20-23	
Use conjunctive adverbs or phrases to express straightforward logical relationships (e.g., *first, afterward, in response*)	**EL-9-WV-S-3, EL-10-WV-S-3** Students will apply correct grammar skills (e.g., complete sentences, various sentence structures, subject/ verb agreement, pronoun antecedent agreement); mechanics (e.g., use of commas and semicolons); and usage (e.g., father/further, fewer/less, amount/number)

*The EPAS English standards most closely align to Kentucky's writing standards for *Conventions* and *Writing Process* which, aside from the grades 5 and 8 multiple choice questions for on-demand, ask students to apply their understanding of revision and editing skills to their own writing.

Decide the most logical place to add a sentence in an essay	**EL-9-WP-S-4, EL-10-WP-S-4** Students will revise: o confer to determine where to add, delete, rearrange, define/redefine or elaborate content so that writing is coherent and effective for intended audience, then make revisions o identify and develop topic sentences, making sure ideas are supported appropriately with relevant details and that sentences are in sequential order o insert new sentences and delete unnecessary ones o develop effective introductions and conclusions o eliminate redundant words o choose the most precise words available
Add a sentence that introduces a simple paragraph	**EL-9-WP-S-4, EL-10-WP-S-4** Students will revise: o confer to determine where to add, delete, rearrange, define/redefine or elaborate content so that writing is coherent and effective for intended audience, then make revisions o identify and develop topic sentences, making sure ideas are supported appropriately with relevant details and that sentences are in sequential order o insert new sentences and delete unnecessary ones o develop effective introductions and conclusions o eliminate redundant words o choose the most precise words available
Score Range: 24-27	
Determine the need for conjunctive adverbs or phrases to create subtle logical connections between sentences (e.g., *therefore, however, in addition*)	**EL-9-WV-S-3, EL-10-WV-S-3** Students will apply correct grammar skills (e.g., complete sentences, various sentence structures, subject/ verb agreement, pronoun antecedent agreement); mechanics (e.g., use of commas and semicolons); and usage (e.g., father/further, fewer/less, amount/number)
Rearrange the sentences in a fairly uncomplicated paragraph for the sake of logic	**EL-9-WP-S-4, EL-10-WP-S-4** Students will revise: o confer to determine where to add, delete, rearrange, define/redefine or elaborate content so that writing is coherent and effective for intended audience, then make revisions
Add a sentence to introduce or conclude the essay or to provide a transition between paragraphs when the essay is pretty straightforward	**EL-9-WP-S-4, EL-10-WP-S-4** Students will revise: o confer to determine where to add, delete, rearrange, define/redefine or elaborate content so that writing is coherent and effective for intended audience, then make revisions

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	o identify and develop topic sentences, making sure ideas are supported appropriately with relevant details and that sentences are in sequential order; o insert new sentences and delete unnecessary ones o develop effective introductions and conclusions o eliminate redundant words o choose the most precise words available
Score Range: 28-32	
Make sophisticated distinctions concerning the logical use of conjunctive adverbs or phrases, particularly when signaling a shift between paragraphs	**EL-11-WV-S-3, EL-12-WV-S-3** Students will apply correct grammar skills (e.g., complete sentences, various sentence structures, subject/ verb agreement, pronoun antecedent agreement, phrases, clauses); mechanics (e.g., use of commas and semicolons); and usage (e.g., avoiding misplaced modifiers and shifts in tense, number and person)
Rearrange sentences to improve the logic and coherence of a complex paragraph	**EL-11-WP-S-4, EL-12=WP-S-4** Students will revise: o confer to determine where to add, delete, rearrange, define/redefine or elaborate content so that writing is coherent and effective for intended audience, then make revisions o identify and develop topic sentences, making sure ideas are supported appropriately with relevant details and that sentences are in sequential order; o insert new sentences and delete unnecessary ones o develop effective introductions and conclusions o eliminate redundant words o choose the most precise words available
Add a sentence to introduce or conclude a fairly complex paragraph	**EL-11-WP-S-4, EL-12=WP-S-4** Students will revise: o confer to determine where to add, delete, rearrange, define/redefine or elaborate content so that writing is coherent and effective for intended audience, then make revisions o identify and develop topic sentences, making sure ideas are supported appropriately with relevant details and that sentences are in sequential order; o insert new sentences and delete unnecessary ones o develop effective introductions and conclusions o eliminate redundant words o choose the most precise words available
Score Range: 33-36	

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Consider the need for introductory sentences or transitions, basing decisions on a thorough understanding of both the logic and rhetorical effect of the paragraph and the essay	**EL-11-WS-S-6, EL-12-WS-S-6** Students will use a variety of transitions and/or transitional elements (e.g., ellipses, time transitions, white space) with intent

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English*
POS/CRS Alignment

Strand 3—Word Choice in Terms of Style, Tone, Clarity and Economy (WCH)

College Readiness Standards	Kentucky Program of Studies
Score Range: 13-15	
Revise sentences to correct awkward and confusing arrangements of sentence elements	**EL-6-WP-S-5, EL-7-WP-S-5, EL-8-WP-S-5** Students will edit for appropriate language usage, sentence structure, spelling, capitalization, punctuation and proper documentation of sources
Revise vague nouns and pronouns that create obvious logic problems	**EL-6-WP-S-5, EL-7-WP-S-5, EL-8-WP-S-5** Students will edit for appropriate language usage, sentence structure, spelling, capitalization, punctuation and proper documentation of sources
Score Range: 16-19	
Delete obviously synonymous and wordy material in a sentence	**EL-6-WP-S-4, EL-7-WP-S-4, EL-8-WP-S-4** Students will revise: o confer to determine where to add, delete, rearrange, define/redefine or elaborate content so that writing is coherent and effective for intended audience, then make revisions o identify and develop topic sentences, making sure ideas are supported appropriately with relevant details and that sentences are in sequential order; o insert new sentences and delete unnecessary ones o develop effective introductions and conclusions o eliminate redundant words o choose the most precise words available

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Revise expressions that deviate from the style of an essay	**EL-6-WP-S-4, EL-7-WP-S-4, EL-8-WP-S-4** Students will revise: o confer to determine where to add, delete, rearrange, define/redefine or elaborate content so that writing is coherent and effective for intended audience, then make revisions o identify and develop topic sentences, making sure ideas are supported appropriately with relevant details and that sentences are in sequential order; o insert new sentences and delete unnecessary ones o develop effective introductions and conclusions o eliminate redundant words o choose the most precise words available
Score Range: 20-23	
Delete redundant material when information is repeated in different parts of speech (e.g., “alarmingly startled”)	**EL-9-WP-S-4, EL-10-WP-S-4** Students will revise: o confer to determine where to add, delete, rearrange, define/redefine or elaborate content so that writing is coherent and effective for intended audience, then make revisions o identify and develop topic sentences, making sure ideas are supported appropriately with relevant details and that sentences are in sequential order; o insert new sentences and delete unnecessary ones o develop effective introductions and conclusions o eliminate redundant words o choose the most precise words available
Use the word or phrase most consistent with the style and tone of a fairly straightforward essay	**EL-9-WV-S-2, EL-10-WV-S-2** Students will use specialized content vocabulary and words used for specific contexts, as needed
Determine the clearest and most logical conjunction to link clauses	**EL-9-WV-S-3, EL-10-WV-S-3** Students will apply correct grammar skills (e.g., complete sentences, various sentence structures, subject/ verb agreement, pronoun antecedent agreement); mechanics (e.g., use of commas and semicolons); and usage (e.g., father/further, fewer/less, amount/number)

*The EPAS English standards most closely align to Kentucky’s writing standards for *Conventions* and *Writing Process* which, aside from the grades 5 and 8 multiple choice questions for on-demand, ask students to apply their understanding of revision and editing skills to their own writing.

Score Range: 24-27	
Revise a phrase that is redundant in terms of the meaning and logic of the entire sentence	**EL-9-WP-S-4, EL-10-WP-S-4** Students will revise: o confer to determine where to add, delete, rearrange, define/redefine or elaborate content so that writing is coherent and effective for intended audience, then make revisions o identify and develop topic sentences, making sure ideas are supported appropriately with relevant details and that sentences are in sequential order; o insert new sentences and delete unnecessary ones o develop effective introductions and conclusions o eliminate redundant words o choose the most precise words available
Identify and correct ambiguous pronoun references	**EL-9-WV-S-3, EL-10-WV-S-3** Students will apply correct grammar skills (e.g., complete sentences, various sentence structures, subject/ verb agreement, pronoun antecedent agreement); mechanics (e.g., use of commas and semicolons); and usage (e.g., father/further, fewer/less, amount/number)
Use the word or phrase most appropriate in terms of the content of the sentence and tone of the essay	**EL-9-WV-S-2, EL-10-WV-S-2** Students will use specialized content vocabulary and words used for specific contexts, as needed
Score Range: 28-32	
Correct redundant material that involves sophisticated vocabulary and sounds acceptable as conversational English (e.g., “an aesthetic viewpoint” versus “the outlook of an aesthetic viewpoint”)	**EL-11-WP-S-4, EL-12-WP-S-4** Students will revise: o confer to determine where to add, delete, rearrange, define/redefine or elaborate content so that writing is coherent and effective for intended audience, then make revisions o identify and develop topic sentences, making sure ideas are supported appropriately with relevant details and that sentences are in sequential order; o insert new sentences and delete unnecessary ones o develop effective introductions and conclusions o eliminate redundant words o choose the most precise words available

*The EPAS English standards most closely align to Kentucky’s writing standards for *Conventions* and *Writing Process* which, aside from the grades 5 and 8 multiple choice questions for on-demand, ask students to apply their understanding of revision and editing skills to their own writing.

Correct vague and wordy or clumsy and confusing writing containing sophisticated language	**EL-11-WP-S-4, EL-12-WP-S-4** Students will revise: o confer to determine where to add, delete, rearrange, define/redefine or elaborate content so that writing is coherent and effective for intended audience, then make revisions o identify and develop topic sentences, making sure ideas are supported appropriately with relevant details and that sentences are in sequential order; o insert new sentences and delete unnecessary ones o develop effective introductions and conclusions o eliminate redundant words o choose the most precise words available
Score Range: 33-36	
Delete redundant material that involves subtle concepts or that is redundant in terms of the paragraph as a whole	**EL-11-WP-S-4, EL-12-WP-S-4** Students will revise: o confer to determine where to add, delete, rearrange, define/redefine or elaborate content so that writing is coherent and effective for intended audience, then make revisions o identify and develop topic sentences, making sure ideas are supported appropriately with relevant details and that sentences are in sequential order; o insert new sentences and delete unnecessary ones o develop effective introductions and conclusions o eliminate redundant words o choose the most precise words available

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English*
POS/CRS Alignment

Strand 4—Sentence Structure and Formation (SST)

College Readiness Standards	Kentucky Program of Studies
Score Range: 13-15	
Use conjunctions or punctuation to join simple clauses	**EL-6-WV-S-3, EL-7-WV-S-3, EL-8-WV-S-3** Students will apply correct grammar skills (e.g., complete sentences, various sentence structures, subject and verb agreement, pronoun antecedent agreement); mechanics (e.g., capitalization, punctuation); and usage (e.g., affect/effect, a lot).
Revise shifts in verb tense between simple clauses in a sentence or between simple adjoining sentences	**EL-6-WV-S-3, EL-7-WV-S-3, EL-8-WV-S-3** Students will apply correct grammar skills (e.g., complete sentences, various sentence structures, subject and verb agreement, pronoun antecedent agreement); mechanics (e.g., capitalization, punctuation); and usage (e.g., affect/effect, a lot).
Score Range: 16-19	
Determine the need for punctuation and conjunctions to avoid awkward-sounding sentence fragments and fused sentences	**EL-6-WV-S-3, EL-7-WV-S-3, EL-8-WV-S-3** Students will apply correct grammar skills (e.g., complete sentences, various sentence structures, subject and verb agreement, pronoun antecedent agreement); mechanics (e.g., capitalization, punctuation); and usage (e.g., affect/effect, a lot).
Decide the appropriate verb tense and voice by considering the meaning of the entire sentence	**EL-6-WV-S-3, EL-7-WV-S-3, EL-8-WV-S-3** Students will apply correct grammar skills (e.g., complete sentences, various sentence structures, subject and verb agreement, pronoun antecedent agreement); mechanics (e.g., capitalization, punctuation); and usage (e.g., affect/effect, a lot).

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Score Range: 20-23	
Recognize and correct marked disturbances of sentence flow and structure (e.g., participial phrase fragments, missing or incorrect relative pronouns, dangling or misplaced modifiers)	**EL-9-WP-S-5, EL-10-WP-S-5** Students will edit for appropriate language usage, sentence structure, spelling, capitalization, punctuation and proper documentation of sources.
Score Range: 24-27	
Revise to avoid faulty placement of phrases and faulty coordination and subordination of clauses in sentences with subtle structural problems	**EL-9-WP-S-4, EL-10-WP-S-4** Students will revise: o confer to determine where to add, delete, rearrange, define/redefine or elaborate content so that writing is coherent and effective for intended audience, then make revisions o identify and develop topic sentences, making sure ideas are supported appropriately with relevant details and that sentences are in sequential order; o insert new sentences and delete unnecessary ones o develop effective introductions and conclusions o eliminate redundant words choose the most precise words available
Maintain consistent verb tense and pronoun person on the basis of the preceding clause or sentence	**EL-9-WV-S-3, EL-10-WV-S-3** Students will apply correct grammar skills (e.g., complete sentences, various sentence structures, subject/ verb agreement, pronoun antecedent agreement); mechanics (e.g., use of commas and semicolons); and usage (e.g., father/further, fewer/less, amount/number).
Score Range: 28-32	
Use sentence-combining techniques, effectively avoiding problematic comma splices, run-on sentences, and sentence fragments especially in sentences containing compound subjects or verbs	**EL-11-WP-S-4, EL-12-WP-S-4** Students will revise: o confer to determine where to add, delete, rearrange, define/redefine or elaborate content so that writing is coherent and effective for intended audience, then make revisions o identify and develop topic sentences, making sure ideas are supported appropriately with relevant details and that sentences are in sequential order; o insert new sentences and delete unnecessary ones o develop effective introductions and conclusions o eliminate redundant words choose the most precise words available

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Maintain a consistent and logical use of verb tense and pronoun person on the basis of information in the paragraph or essay as a whole	**EL-11-WV-S-3, EL-12-WV-S-3** Students will apply correct grammar skills (e.g., complete sentences, various sentence structures, subject/ verb agreement, pronoun antecedent agreement, phrases, clauses); mechanics (e.g., use of commas and semicolons); and usage (e.g., avoiding misplaced modifiers and shifts in tense, number and person).
Score Range: 33-36	
Work comfortably with long sentences and complex clausal relationships within sentences, avoiding weak conjunctions between independent clauses and maintaining parallel structure between clauses	**EL-11-WS-S-1, EL-12-WS-S-1** Students will use complete and correct sentences of various structures and lengths (e.g., simple, compound, complex, compound/complex, including parallel structure) to enhance meaning throughout a piece of writing; apply unconventional sentence structures to achieve intended effect on audience.

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English*
POS/CRS Alignment

Strand 5—Conventions of Usage (COU)

College Readiness Standards	Kentucky Program of Studies
Score Range: 13-15	
Solve such basic grammatical problems such as how to form the past and past participle of irregular but commonly used verbs and how to form comparative and superlative adjectives	**EL-6-WV-S-3, EL-7-WV-S-3, EL-8-WV-S-3** Students will apply correct grammar skills (e.g., complete sentences, various sentence structures, subject and verb agreement, pronoun antecedent agreement); mechanics (e.g., capitalization, punctuation); and usage (e.g., affect/effect, a lot).
Score Range: 16-19	
Solve such grammatical problems as whether to use an adverb or adjective form, how to ensure straightforward subject-verb and pronoun-antecedent agreement, and which preposition to use in simple contexts	**EL-6-WV-S-3, EL-7-WV-S-3, EL-8-WV-S-3** Students will apply correct grammar skills (e.g., complete sentences, various sentence structures, subject and verb agreement, pronoun antecedent agreement); mechanics (e.g., capitalization, punctuation); and usage (e.g., affect/effect, a lot).
Recognize and use the appropriate word in frequently confused pairs such as *there* and *their*, *past* and *passed*, and *led* and *lead*	**EL-6-WV-S-3, EL-7-WV-S-3, EL-8-WV-S-3** Students will apply correct grammar skills (e.g., complete sentences, various sentence structures, subject and verb agreement, pronoun antecedent agreement); mechanics (e.g., capitalization, punctuation); and usage (e.g., affect/effect, a lot).

*The EPAS English standards most closely align to Kentucky's writing standards for *Conventions* and *Writing Process* which, aside from the grades 5 and 8 multiple choice questions for on-demand, ask students to apply their understanding of revision and editing skills to their own writing.

Score Range: 20-23	
Use idiomatically appropriate prepositions, especially in combination with verbs (e.g., *long for*, *appeal to*)	**EL-9-WV-S-3, EL-10-WV-S-3** Students will apply correct grammar skills (e.g., complete sentences, various sentence structures, subject/ verb agreement, pronoun antecedent agreement); mechanics (e.g., use of commas and semicolons); and usage (e.g., father/further, fewer/less, amount/number).
Ensure that a verb agrees with its subject when there is some text between the two	**EL-9-WV-S-3, EL-10-WV-S-3** Students will apply correct grammar skills (e.g., complete sentences, various sentence structures, subject/ verb agreement, pronoun antecedent agreement); mechanics (e.g., use of commas and semicolons); and usage (e.g., father/further, fewer/less, amount/number).
Score Range: 24-27	
Ensure that a pronoun agrees with its antecedent when the two occur in separate clauses or sentences	**EL-9-WV-S-3, EL-10-WV-S-3** Students will apply correct grammar skills (e.g., complete sentences, various sentence structures, subject/ verb agreement, pronoun antecedent agreement); mechanics (e.g., use of commas and semicolons); and usage (e.g., father/further, fewer/less, amount/number).
Identify the correct past and past participle forms of irregular and infrequently used verbs and form present-perfect verbs by using *have* rather than *of*	**EL-9-WV-S-3, EL-10-WV-S-3** Students will apply correct grammar skills (e.g., complete sentences, various sentence structures, subject/ verb agreement, pronoun antecedent agreement); mechanics (e.g., use of commas and semicolons); and usage (e.g., father/further, fewer/less, amount/number).
Score Range: 28-32	
Correctly use reflexive pronouns, the possessive pronouns *its* and *your*, and the relative pronouns *who* and *whom*	**EL-11-WV-S-3, EL-12-WV-S-3** Students will apply correct grammar skills (e.g., complete sentences, various sentence structures, subject/ verb agreement, pronoun antecedent agreement, phrases, clauses); mechanics (e.g., use of commas and semicolons); and usage (e.g., avoiding misplaced modifiers and shifts in tense, number and person).
Ensure that a verb agrees with its subject in unusual situations (e.g., when the subject-verb order is inverted or when the subject is the indefinite pronoun)	**EL-11-WV-S-3, EL-12-WV-S-3** Students will apply correct grammar skills (e.g., complete sentences, various sentence structures, subject/ verb agreement, pronoun antecedent agreement, phrases, clauses); mechanics (e.g., use of commas and semicolons); and usage (e.g., avoiding misplaced modifiers and shifts in tense, number and person).

*The EPAS English standards most closely align to Kentucky's writing standards for *Conventions* and *Writing Process* which, aside from the grades 5 and 8 multiple choice questions for on-demand, ask students to apply their understanding of revision and editing skills to their own writing.

Score Range: 33-36	
Provide idiomatically and contextually appropriate prepositions following verbs in situations involving sophisticated language or ides	**EL-11-WV-S-3, EL-12-WV-S-3** Students will apply correct grammar skills (e.g., complete sentences, various sentence structures, subject/ verb agreement, pronoun antecedent agreement, phrases, clauses); mechanics (e.g., use of commas and semicolons); and usage (e.g., avoiding misplaced modifiers and shifts in tense, number and person).
Ensure that a verb agrees with its subject when a phrase or clause between the two suggests a different number for the verb	**EL-11-WV-S-3, EL-12-WV-S-3** Students will apply correct grammar skills (e.g., complete sentences, various sentence structures, subject/ verb agreement, pronoun antecedent agreement, phrases, clauses); mechanics (e.g., use of commas and semicolons); and usage (e.g., avoiding misplaced modifiers and shifts in tense, number and person).

*The EPAS English standards most closely align to Kentucky's writing standards for *Conventions* and *Writing Process* which, aside from the grades 5 and 8 multiple choice questions for on-demand, ask students to apply their understanding of revision and editing skills to their own writing.

English*
POS/CRS Alignment

Strand 6—Conventions of Punctuation (COP)

College Readiness Standards	Kentucky Program of Studies
Score Range: 13-15	
Delete commas that create basic sense problems (e.g., between verb and direct object)	**EL-6-WP-S-5, EL-7-WP-S-5, EL-8-WP-S-5** Students will edit for appropriate language usage, sentence structure, spelling, capitalization, punctuation and proper documentation of sources.
Score Range: 16-19	
Provide appropriate punctuation in straightforward situations (e.g., items in a series)	**EL-6-WV-S-3, EL-7-WV-S-3, EL-8-WV-S-3** Students will apply correct grammar skills (e.g., complete sentences, various sentence structures, subject and verb agreement, pronoun antecedent agreement); mechanics (e.g., capitalization, punctuation); and usage (e.g., affect/effect, a lot).
Delete commas that disturb the sentence flow (e.g., between modifier and modified element)	**EL-6-WP-S-5, EL-7-WP-S-5, EL-8-WP-S-5** Students will edit for appropriate language usage, sentence structure, spelling, capitalization, punctuation and proper documentation of sources.
Score Range: 20-23	
Use commas to set off simple parenthetical phrases	**EL-9-WV-S-3, EL-10-WV-S-3** Students will apply correct grammar skills (e.g., complete sentences, various sentence structures, subject/ verb agreement, pronoun antecedent agreement); mechanics (e.g., use of commas and semicolons); and usage (e.g., father/further, fewer/less, amount/number).
Delete unnecessary commas when an incorrect reading of the sentence suggests a pause that should be punctuated (e.g., between verb and direct object clause)	**EL-9-WP-S-5, EL-10-WP-S-5** Students will edit for appropriate language usage, sentence structure, spelling, capitalization, punctuation and proper documentation of sources.

*The EPAS English standards most closely align to Kentucky's writing standards for *Conventions* and *Writing Process* which, aside from the grades 5 and 8 multiple choice questions for on-demand, ask students to apply their understanding of revision and editing skills to their own writing.

Score Range: 24-27	
Use punctuation to set off complex parenthetical phrases	**EL-9-WV-S-3, EL-10-WV-S-3** Students will apply correct grammar skills (e.g., complete sentences, various sentence structures, subject/ verb agreement, pronoun antecedent agreement); mechanics (e.g., use of commas and semicolons); and usage (e.g., father/further, fewer/less, amount/number).
Recognize and delete unnecessary commas based on a careful reading of a complicated sentence (e.g., between the elements of a compound subject or a compound verb joined by *and*)	**EL-9-WP-S-5, EL-10-WP-S-5** Students will edit for appropriate language usage, sentence structure, spelling, capitalization, punctuation and proper documentation of sources.
Use apostrophes to indicate simple possessive nouns	**EL-9-WV-S-3, EL-10-WV-S-3** Students will apply correct grammar skills (e.g., complete sentences, various sentence structures, subject/ verb agreement, pronoun antecedent agreement); mechanics (e.g., use of commas and semicolons); and usage (e.g., father/further, fewer/less, amount/number).
Recognize inappropriate uses of colons and semicolons	**EL-9-WP-S-5, EL-10-WP-S-5** Students will edit for appropriate language usage, sentence structure, spelling, capitalization, punctuation and proper documentation of sources. **EL-9-WV-S-3, EL-10-WV-S-3** Students will apply correct grammar skills (e.g., complete sentences, various sentence structures, subject/ verb agreement, pronoun antecedent agreement); mechanics (e.g., use of commas and semicolons); and usage (e.g., father/further, fewer/less, amount/number).
Score Range: 28-32	
Use commas to set off nonessential/nonrestrictive appositive or clause	**EL-11-WV-S-3, EL-12-WV-S-3** Students will apply correct grammar skills (e.g., complete sentences, various sentence structures, subject/ verb agreement, pronoun antecedent agreement, phrases, clauses); mechanics (e.g., use of commas and semicolons); and usage (e.g., avoiding misplaced modifiers and shifts in tense, number and person).
Deal with multiple punctuation problems (e.g., compound sentences containing unnecessary commas and phrases that may or may not be parenthetical)	**EL-11-WP-S-5, EL-12-WP-S-5** Students will edit for appropriate language usage, sentence structure, spelling, capitalization, punctuation and proper documentation of sources.
Use an apostrophe to show possession, especially with irregular plural nouns	**EL-11-WV-S-3, EL-12-WV-S-3** Students will apply correct grammar skills (e.g., complete sentences, various sentence structures, subject/ verb agreement, pronoun antecedent agreement, phrases, clauses); mechanics (e.g., use of commas and semicolons); and usage (e.g., avoiding misplaced modifiers and shifts in tense, number and person).

*The EPAS English standards most closely align to Kentucky's writing standards for *Conventions* and *Writing Process* which, aside from the grades 5 and 8 multiple choice questions for on-demand, ask students to apply their understanding of revision and editing skills to their own writing.

Use a semicolon to indicate a relationship between closely related independent clauses	**EL-11-WV-S-3, EL-12-WV-S-3** Students will apply correct grammar skills (e.g., complete sentences, various sentence structures, subject/ verb agreement, pronoun antecedent agreement, phrases, clauses); mechanics (e.g., use of commas and semicolons); and usage (e.g., avoiding misplaced modifiers and shifts in tense, number and person).
Score Range: 33-36	
Use a colon to introduce an example or an elaboration	**EL-11-WV-S-3, EL-12-WV-S-3** Students will apply correct grammar skills (e.g., complete sentences, various sentence structures, subject/ verb agreement, pronoun antecedent agreement, phrases, clauses); mechanics (e.g., use of commas and semicolons); and usage (e.g., avoiding misplaced modifiers and shifts in tense, number and person).

*The EPAS English standards most closely align to Kentucky's writing standards for *Conventions* and *Writing Process* which, aside from the grades 5 and 8 multiple choice questions for on-demand, ask students to apply their understanding of revision and editing skills to their own writing.

English Test*
EPAS Test Breakdown
Supplemental Information

What does the English Test Measure? The English Test measures students' understanding of the conventions of standard written English in punctuation, grammar, sentence structure, strategy, organization and style. Students are asked to simulate the decision-making process that takes place while writing—to think about audience, purpose and the conventions of language and to make decisions about the case at hand, weighing and then adopting or rejecting various options.

English Test		
EXPLORE	**EXPLORE English Test Design—**30 minutes to read 4 passages (passage length 300 words) and answer 40 multiple choice questions	
	Content Areas Assessed	**Percent of Questions**
	Usage/Mechanics includes punctuation (15%), grammar and usage (20%) and sentence structure (29%)	64%
	Rhetorical Skills includes strategy (12%), organization (12%) and style (12%)	36%
PLAN	**PLAN English Test Makeup—**30 minutes to read 4 passages (passage length 300 words) and answer 50 multiple choice questions	
	Content Areas Assessed	**Percent of Questions**
	Usage/Mechanics includes punctuation (14%), grammar and usage (18%) and sentence structure (28%)	60%
	Rhetorical Skills includes strategy (12%), organization (14%) and style (14%)	40%
ACT	**ACT English Test Makeup**—45 minutes to read 5 passages (passage length 325 words) and answer 75 multiple choice questions	
	Content Areas Assessed	**Percent of Questions**
	Usage/Mechanics includes punctuation (13%), grammar and usage (16%) and sentence structure (24%)	53%
	Rhetorical Skills includes strategy (16%), organization 15%) and style (16%)	47%

*The EPAS English standards most closely align to Kentucky's writing standards for *Conventions* and *Writing Process* which, aside from the grades 5 and 8 multiple choice questions for on-demand, ask students to apply their understanding of revision and editing skills to their own writing.

The following strand descriptors list comes from ACT's publication *Connecting College Readiness Standards to the Classroom for Language Arts Teachers/English* (2005).

English Strands

Topic Development in Terms of Purpose and Focus (TOD)
Organization, Unity, and Coherence (OUC)
Word Choice in Terms of Style, Tone, Clarity, and Economy (WCH)
Sentence Structure and Formation (SST)
Conventions of Usage (COU)
Conventions of Punctuation (COP)

Content-areas Assessed

Usage/Mechanics

Punctuation—punctuating breaks in thought; punctuating relationships and sequences; avoiding unnecessary punctuation

Grammar and Usage—assuring grammatical agreement; forming verbs; using pronouns; forming modifiers; observing usage conventions

Sentence Structure—relating clauses; using modifiers; avoiding unnecessary shifts in construction

Rhetorical Skills

Strategy—making decisions about adding, revising, or deleting supporting material; making decisions about the appropriateness of expression for audience and purpose; judging relevancy

Style—managing sentence elements effectively, editing and revising effectively; choosing words to maintain style and tone

Educational Planning and Assessment System (EPAS) College Readiness Standards and *Program of Studies* Standards Alignment
Introduction
Test: Mathematics

Kentucky's *Program of Studies* (POS) and the College Readiness Standards (CRS)
The *Program of Studies*, Kentucky's mandated curriculum for all Kentucky schools, is a comprehensive document. Therefore, the CRS is embedded within the *Program of Studies*. While there has been an effort to align the standards as closely as possible in this document, readers will see that in some cases, there is not an exact match for the CRS within the POS. In these cases, the Kentucky Department of Education has found that the skill or skills identified within the CRS are often a component of a more complex POS standard and that the POS standard to which we have aligned the CRS may include the expectation that students demonstrate a variety of other, related skills.
In each tested area, educators should note the importance of reading and critical thinking skills necessary for students to perform well on the tests. It also is important to note that, from grade to grade, some standards may be the same or very similar. In these cases, teachers are expected to continually refine instruction so that students use increasingly complex skills to achieve the standards for each consecutive grade level.

How to Use the Document
This document is divided into tables with two columns. The left-hand column contains the College Readiness Standards (CRS) and descriptions of the skills and knowledge associated with what students are likely to know and be able to do based on their EXPLORE, PLAN and ACT test scores. The second column contains the mathematics content standards from the *Program of Studies* that most closely match each CRS.
Teachers may use this document to link instruction with assessment. By identifying the connections between the CRS and the POS, educators may better understand how the ACT College Readiness Standards are embedded within Kentucky's curriculum.
Example

CRS Mathematics GRE (33-36) Solve problems integrating multiple algebraic and/or geometric concepts.

POS Mathematics
MA-HS-AT-U3 Algebra Thinking
Students will representation mathematical situations and structures for analysis and problem-solving.

The CRS statement is much more general than what the POS standards state. While these two standards do not provide an exact match, the POS standard identified most closely matches the CRS.

The Mathematics Test

The EPAS Mathematics test "requires students to analyze problems in real-world and purely mathematical settings, plan and carry out solutions strategies, and verify the appropriateness of solutions." Students must demonstrate understanding of mathematical terminology. Students will be required to apply definitions, algorithms, theorems, and properties to solve problems. Students also will be expected to analyze and interpret data.

Supplemental Information

The specifications for the Mathematics test on the EXPLORE, PLAN and ACT are located in the supplemental information section for Mathematics on page 52.

Mathematics
POS/CRS Alignment

Strand 1 – Basic Operations & Applications (BOA)

College Readiness Benchmarks	Kentucky Program of Studies
Score Range 13-15	
Perform one-operation computation with whole numbers and decimals	**MA-6-NPO-S-NO2** Students will add, subtract, multiply, divide and apply order of operations with whole numbers, fractions and decimals to solve real-world problems.
Solve problems in one or two steps using whole numbers	**MA-7-AT-S-EI3** Students will model and solve real-world problems with one- or two-step equations or inequalities (e.g., 2x+1=9, 3x+3<9).
Perform common conversions (e.g., inches to feet or hours to minutes)	**MA-4-M-S-SM1** Students will convert units (e.g., linear, weight, money, time) within a measurement system (e.g., 2 feet = 24 inches). **MA-5-M-S-SM1** Students will relate and convert units (e.g., linear, volume, weight) within a measurement system (e.g., 125 cm = 1m 25 cm). **MA-6-M-S-SM2** Students will estimate, compare and convert (meaning to make ballpark comparisons/not memorize conversion factors between U.S. and metric) units of measurement for length, weight/mass and volume/capacity within the U.S. customary system and within the metric system: • length (e.g., parts of an inch, inches, feet, yards, miles, millimeters, centimeters, meters, kilometers); • weight/mass (e.g., pounds, tons, grams, kilograms); • volume/capacity (e.g., cups, pints, quarts, gallons, milliliters, liters).
Score Range 16-19	
Solve routine one-step arithmetic problems (using whole numbers, fractions, and decimals) such as single-step percent	**MA-7-NPO-S-NO2** Students will extend concepts and application of operations with fractions and decimals to include percents.

* PLAN and ACT only

† ACT only

Solve some routine two-step arithmetic problems	**MA-6-NPO-S-NO2** Students will add, subtract, multiply, divide and apply order of operations with whole numbers, fractions and decimals to solve real-world problems.
Score Range 20-23	
Solve routine two-step or three-step arithmetic problems involving concepts such as rate and proportion, tax added, percentage off, and computing with a given average	**MA-7-NPO-S-RP3** Students will develop proportional reasoning and apply to real-world and mathematical problems (e.g., rates, scaling, similarity).
Score Range 24-27	
Solve multistep arithmetic problems that involve planning or converting units of measure (e.g., feet per second to miles per hour)	**MA-8-NPO-S-RP2** Students will derive and use formulas for various rates (e.g., distance/time, miles per hour).
Score Range 28-32*	
Solve word problems containing several rates, proportions, or percentages	**MA-HS-NPO-S-RP1** Students will calculate and apply ratios, proportions, rates and percentages to solve problems.

* PLAN and ACT only

† ACT only

Score Range 33-36†	
Solve complex arithmetic problems involving percent of increase or decrease and problems requiring integration of several concepts from pre-algebra and/or pre-geometry (e.g., comparing percentages or averages, using several ratios, and finding ratios in geometry settings)	**MA-HS-NPO-S-RP1** Students will calculate and apply ratios, proportions, rates and percentages to solve problems.

* PLAN and ACT only

† ACT only

Mathematics
POS/CRS Alignment

Strand 2 – Probability, Statistics, & Data Analysis (PSD)

College Readiness Benchmarks	Kentucky Program of Studies
Score Range 13-15	
Calculate the average of a list of positive whole numbers	**MA-6-DAP-S-CD2** Students will determine and apply measures of distribution (mean, median, mode, range). **MA-7-DAP-S-CD2** Students will determine, apply and compare measures of mean, median, mode and/or range, as appropriate to the problem situation. **MA-8-DAP-S-CD3** Students will determine and interpret the mean, median, mode and range of a set of data.
Perform a single computation using information from a table or chart	**MA-6-DAP-S-DR2** Students will collect, organize, construct, analyze and interpret data in a variety of graphical methods, including line plots, line graphs, circle graphs, bar graphs and stem-and-leaf plots.
Score Range 16-19	
Calculate the average of a list of numbers	**MA-7-DAP-S-CD2** Students will determine, apply and compare measures of mean, median, mode and/or range, as appropriate to the problem situation. **MA-8-DAP-S-CD3** Students will determine and interpret the mean, median, mode and range of a set of data.
Calculate the average, given the number of data values and the sum of the data values	**MA-8-DAP-S-CD3** Students will determine and interpret the mean, median, mode and range of a set of data.

* PLAN and ACT only

† ACT only

Read tables and graphs	**MA-6-DAP-S-DR2** Students will collect, organize, construct, analyze and interpret data in a variety of graphical methods, including line plots, line graphs, circle graphs, bar graphs and stem-and-leaf plots. **MA-7-DAP-S-DR1** Students will collect, organize, construct, analyze and interpret data and data displays in a variety of graphical methods, including circle graphs, multiple line graphs, double bar graphs and double stem-and-leaf plots. **MA-8-DAP-S-DR1** Students will collect, organize, construct, analyze and make inferences from data in a variety of graphical methods (e.g., drawings, tables/charts, pictographs, bar graphs, circle graphs, line plots, Venn diagrams, line graphs, stem-and-leaf plots, scatter plots, histograms, box-and-whiskers plots).
Perform computations on data from tables and graphs	**MA-6-DAP-S-DR2** Students will collect, organize, construct, analyze and interpret data in a variety of graphical methods, including line plots, line graphs, circle graphs, bar graphs and stem-and-leaf plots.
Use the relationship between the probability of an event and the probability of its complement	**MA-HS-DAP-S-P11** Students will determine the probability of an event and the probability of its complement.
Score Range 20-23	
Calculate the missing data value, given the average and all data values but one	**MA-8-DAP-S-CD3** Students will determine and interpret the mean, median, mode and range of a set of data.
Translate from one representation of data to another (e.g., a bar graph to a circle graph)	**MA-8-DAP-S-DR4** Students will relate different representations of data (e.g., tables, graphs, diagrams, plots) and explain how misleading representations affect interpretations and conclusions about data.
Determine the probability of a simple event	**MA-6-DAP-S-P4** Students will determine simple probabilities based on the results of an experiment and make inferences based on the data.

* PLAN and ACT only

† ACT only

Exhibit knowledge of simple counting techniques*	**MA-6-DAP-S-P2** Students will investigate solutions to probability problems using counting techniques, tree diagrams, charts and tables. **MA-7-DAP-S-P7** Students will apply counting techniques to determine the size of a sample space. **MA-8-DAP-S-P4** Students will compute and interpret the expected value of random variables in simple cases.

* PLAN and ACT only

† ACT only

Score Range 24-27	
Calculate the average, given the frequency counts of all the data values	**MA-8-DAP-S-CD3** Students will determine and interpret the mean, median, mode and range of a set of data.
Manipulate data from tables and graphs	**MA-6-DAP-S-DR2** Students will collect, organize, construct, analyze and interpret data in a variety of graphical methods, including line plots, line graphs, circle graphs, bar graphs and stem-and-leaf plots. **MA-7-DAP-S-DR1** Students will collect, organize, construct, analyze and interpret data and data displays in a variety of graphical methods, including circle graphs, multiple line graphs, double bar graphs and double stem-and-leaf plots. **MA-8-DAP-S-DR1** Students will collect, organize, construct, analyze and make inferences from data in a variety of graphical methods (e.g., drawings, tables/charts, pictographs, bar graphs, circle graphs, line plots, Venn diagrams, line graphs, stem-and-leaf plots, scatter plots, histograms, box-and-whiskers plots).
Compute straightforward probabilities for common situations	**MA-6-DAP-S-P4** Students will determine simple probabilities based on the results of an experiment and make inferences based on the data.
Use Venn diagrams in counting*	**MA-8-DAP-S-DR1** Students will collect, organize, construct, analyze and make inferences from data in a variety of graphical methods (e.g., drawings, tables/charts, pictographs, bar graphs, circle graphs, line plots, Venn diagrams, line graphs, stem-and-leaf plots, scatter plots, histograms, box-and-whiskers plots).
Score Range 28-32*	
Calculate or use a weighted average	**MA-8-DAP-S-CD3** Students will determine and interpret the mean, median, mode and range of a set of data.
Interpret and use information from figures, tables and graphs	**MA-8-DAP-S-DR1** Students will collect, organize, construct, analyze and make inferences from data in a variety of graphical methods (e.g., drawings, tables/charts, pictographs, bar graphs, circle graphs, line plots, Venn diagrams, line graphs, stem-and-leaf plots, scatter plots, histograms, box-and-whiskers plots).

* PLAN and ACT only

† ACT only

Apply counting techniques	**MA-8-DAP-S-P4** Students will investigate counting techniques (e.g., networks).
Compute a probability when the event and/or sample space are not given or obvious	**MA-HS-DAP-S-P2** Students will apply the concepts of sample space and probability distribution to construct sample spaces and distributions in simple cases.
Score Range 33-36†	
Distinguish between mean, median, and mode for a list of numbers	**MA-7-DAP-S-CD2** Students will determine, apply and compare measures of mean, median, mode and/or range, as appropriate to the problem situation.
Analyze and draw conclusions based on information from figures, tables, and graphs	**MA-8-DAP-S-DR1** Students will collect, organize, construct, analyze and make inferences from data in a variety of graphical methods (e.g., drawings, tables/charts, pictographs, bar graphs, circle graphs, line plots, Venn diagrams, line graphs, stem-and-leaf plots, scatter plots, histograms, box-and-whiskers plots).
Exhibit knowledge of conditional and joint probability	**MA-HS-DAP-S-P5** Students will apply the concepts of conditional probability and independent events and be able to compute those probabilities. **MA-HS-DAP-S-P6** Students will compute the probability of a compound event.

* PLAN and ACT only

† ACT only

Mathematics
POS/CRS Alignment
Strand 3 – Number: Concepts & Properties (NCP)

College Readiness Benchmarks	Kentucky Program of Studies
Score Range 13-15	
Recognize equivalent fractions and fractions in lowest terms	**MA-7-NPO-S-NS5** Students will compare, order and determine equivalent relationships among fractions, decimals and percents.
Score Range 16-19	
Recognize one-digit factors of a number	**MA-4- NPO-S-PNO1** Students will determine factors/multiples of a whole number.
Identify a digit's place value	**MA-6-NPO-S-NS3** Students will develop place value of large and small numbers, including decimals.

* PLAN and ACT only

† ACT only

Score Range 20-23	
Exhibit knowledge of elementary number concepts including rounding, the ordering of decimals, pattern identification, absolute value, primes, and greatest common factor	**MA-6-NPO-S-NS5** Students will compare, order and convert between whole numbers, fractions, decimals and percents using concrete materials, drawings or pictures and mathematical symbols. **MA-6-NPO-S-E1** Students will estimate and mentally compute to solve real-world and/or mathematical problems with whole numbers, fractions, decimals and percents, checking for reasonable and appropriate computational results. **MA-6-NPO-S-PNO1** Students will determine prime numbers, composite numbers, prime factorization, factors, multiples, greatest common factor and least common multiple. **MA-6-NPO-S-PRF1** Students will recognize, create and extend patterns (give an informal description of the continuation of a pattern and/or generalize a pattern through a verbal rule). **MA-8-NPO-S-NS2** Students will provide examples of, describe and compare irrational and rational numbers (e.g., magnitude, order on a number line, scientific notation, very large and very small integers, numbers close to zero).
Score Range 24-27	
Find and use the least common multiple	**MA-6-NPO-S-PNO1** Students will determine prime numbers, composite numbers, prime factorization, factors, multiples, greatest common factor and least common multiple.
Order fractions	**MA-6-NPO-S-NS5** Students will explore, investigate, compare, relate and apply relationships among whole numbers, fractions, decimals and percents.

* PLAN and ACT only

† ACT only

Work with numerical factors	**MA-6-NPO-S-PNO3** Students will use prime numbers, composite numbers, factors, multiples and divisibility to solve problems.
Work with scientific notation	**MA-8-NPO-S-NS2** Students will provide examples of, describe and compare irrational and rational numbers (e.g., magnitude, order on a number line, scientific notation, very large and very small integers, numbers close to zero).
Work with squares and square roots of numbers	**MA-8-NPO-S-NS1** Students will continue to develop number sense to include irrational numbers (e.g., square roots, cube roots, π).
Work problems involving positive integer exponents*	**MA-8-NPO-S-NO1** Students will add, subtract, multiply, divide and apply order of operations (including positive whole number exponents) using rational numbers to solve real-world problems.
Work with cubes and cube roots of numbers*	**MA-8-NPO-S-NS3** Students will describe and provide multiple representations of numbers (rational, square roots, cube roots and π) in a variety of equivalent forms using models, diagrams and symbols based on real-world and/or mathematical situations.
Determine when an expression is undefined*.	**MA-HS-AT-S-VEO10** Students will determine when an expression is undefined.
Exhibit some knowledge of the complex numbers†	**MA-HS-NPO-S-NO2** Students will add, subtract and multiply complex numbers.
Score Range 28-32*	
Apply number properties involving prime factorization	**MA-6-NPO-S-PNO1** Students will determine prime numbers, composite numbers, prime factorization, factors, multiples, greatest common factor and least common multiple.
Apply number properties involving even/odd numbers and factors/multiples	**MA-6-NPO-S-PNO1** Students will determine prime numbers, composite numbers, prime factorization, factors, multiples, greatest common factor and least common multiple.
Apply number properties involving positive/negative numbers	**MA-7-NPO-S-PNO1** Students will identify, explain and apply properties (e.g., commutative, associative, inverse and identity for addition and multiplication; distributive).

* PLAN and ACT only

† ACT only

Apply rules of exponents	**MA-HS-AT-S-VEO5** Students will understand the properties of integer exponents and roots and apply these properties to simplify algebraic expressions.
Multiply two complex numbers†	**MA-HS-NPO-S-NO2** Students will add, subtract and multiply complex numbers.

* PLAN and ACT only

† ACT only

Score Range 33-36†	
Draw conclusions based on number concepts, algebraic properties, and/or relationships between expressions and numbers	**MA-HS-AT-S-VEO3** Students will use symbolic expressions, including iterative and recursive forms, to represent relationships among various contexts.
Exhibit knowledge of logarithms and geometric sequences	**MA-HS-AT-S-PRF19** Students will relate the patterns in geometric sequences to exponential functions.
Apply properties of complex numbers	**MA-HS-NPO-S-NO2** Students will add, subtract and multiply complex numbers.

* PLAN and ACT only

† ACT only

Mathematics
POS/CRS Alignment

Strand 4 – Expressions, Equations, & Inequalities (XEI)

College Readiness Benchmarks	Kentucky Program of Studies
Score Range 13-15	
Exhibit knowledge of basic expressions (e.g., identify an expression for a total as b + g)	**MA-6-AT-S-VEO1** Students will explore the use of variables in expressions and equations.
Solve equations in the form x + a = b, where *a* and *b* are whole numbers or decimals	**MA-6-AT-S-EI3** Students will model and solve real-world problems with one variable equations and inequalities (e.g., 8x=4, x+2>5).
Score Range 16-19	
Substitute whole numbers for unknown quantities to evaluate expressions	**MA-6-AT-S-VEO2** Students will substitute numerical values for variables and evaluate algebraic expressions.
Solve one-step equations having integer or decimal answers	**MA-7-AT-S-EI3** Students will model and solve real-world problems with one- or two-step equations or inequalities (e.g., 2x+1=9, 3x+3<9).
Combine like terms (e.g., 2x + 5x)	**MA-7-AT-S-VEO1** Students will simplify numeric and algebraic expressions.
Score Range 20-23	
Evaluate algebraic expressions by substituting integers for unknown quantities	**MA-6-AT-S-VEO2** Students will substitute numerical values for variables and evaluate algebraic expressions.
Add and subtract simple algebraic expressions	**MA-7-AT-S-VEO1** Students will simplify numeric and algebraic expressions.

* PLAN and ACT only

† ACT only

Solve routine first-degree equations	**MA-6-AT-S-EI3** Students will model and solve real-world problems with one variable equations and inequalities (e.g., 8x=4, x+2>5).
Perform straightforward word-to-symbol translations	**MA-8-AT-S-VEO3** Students will describe, define and provide examples of variables and expressions with a missing value based on real-world and/or mathematical situations.
Multiply two binomials*	**MA-HS-AT-S-VEO6** Students will add, subtract and multiply polynomials.
Score Range 24-27	
Solve real-world problems using first-degree equations	**MA-6-AT-S-EI3** Students will model and solve real-world problems with one variable equations and inequalities (e.g., 8x=4, x+2>5).
Write expressions, equations, or inequalities with a single variable for common pre-algebra settings (e.g., rate and distance problems and problems that can be solved by using proportions)	**MA-8-AT-S-VEO3** Students will describe, define and provide examples of variables and expressions with a missing value based on real-world and/or mathematical situations. **MA-8-AT-S-EI4** Students will model and solve real-world problems with one- or two-step equations or inequalities (e.g., 4x+2=22, x-4<-60).
Identify solutions to simple quadratic equations	**MA-8-AT-S-PRF2** Students will represent, interpret and describe linear and simple quadratic functional relationships (input/output) through tables, graphs and symbolic rules.
Add, subtract, and multiply polynomials*	**MA-HS-AT-S-VEO6** Students will add, subtract and multiply polynomials.
Factor simple quadratics (e.g., the difference of squares and perfect square trinomials)*	**MA-HS-AT-S-VEO9** Students will factor quadratic polynomials.
Solve first-degree inequalities that do not require reversing the inequality sign*	**MA-8-AT-S-EI4** Students will model and solve real-world problems with one- or two-step equations or inequalities (e.g., 4x+2=22, x-4<-60).
Score Range 28-32*	

* PLAN and ACT only

† ACT only

Manipulate expressions and equations	**MA-HS-AT-S-VEO 4** Students will judge the meaning, utility and reasonableness of the results of symbol manipulations, including those carried out using technology.
Write expressions, equations, and inequalities for common algebra settings	**MA-HS-AT-S-VEO2** Students will use symbolic algebra to represent and explain mathematical relationships.
Solve linear inequalities that require reversing the inequality sign	**MA-HS-AT-S-EI4** Students will solve linear equations and inequalities in one variable including those involving the absolute value of a linear function.
Solve absolute value equations	**MA-HS-AT-S-EI19** Students will use the skills learned to solve linear equations and inequalities to solve numerically, graphically or symbolically non-linear equations (e.g., absolute value, quadratic, exponential equations).
Solve quadratic equations	**MA-HS-AT-S-EI19** Students will use the skills learned to solve linear equations and inequalities to solve numerically, graphically or symbolically non-linear equations (e.g., absolute value, quadratic, exponential equations).
Find solutions to systems of linear equations	**MA-HS-AT-S-EI16** Students will solve systems of two linear equations in two variables.
Score Range 33-36†	
Write expressions that require planning and/or manipulating to accurately model a situation	**MA-HS-AT-S-VEO4** Students will judge the meaning, utility and reasonableness of the results of symbol manipulations, including those carried out using technology.
Write equations and inequalities that require planning, manipulating, and/or solving	**MA-HS-AT-S-VEO4** Students will judge the meaning, utility and reasonableness of the results of symbol manipulations, including those carried out using technology.
Solve simple absolute value inequalities	**MA-HS-AT-S-EI4** Students will solve linear equations and inequalities in one variable including those involving the absolute value of a linear function.

* PLAN and ACT only

† ACT only

Mathematics
POS/CRS Alignment

Strand 5 – Graphical Representation (GRE)

College Readiness Benchmarks	Kentucky Program of Studies
Score Range 13-15	
Identify the location of a point with a positive coordinate on the number line	**MA-P-NPO-S-NS2** Students will apply multiple representations (e.g., drawings, manipulatives, base-10 blocks, number lines, expanded form, symbols) to describe and compare whole numbers and fractions (e.g., halves, thirds, fourths) in mathematical and real-world problems.
Score Range 16-19	
Locate points on the number line and in the first quadrant	**MA-6-G-S-CG1** Students will identify and graph ordered pairs on a positive coordinate system, identifying the origin, axes and ordered pairs.
Score Range 20-23	
Locate points in the coordinate plane	**MA-7-G-S-GC1** Students will identify and graph ordered pairs on a coordinate system, identifying the origin, axes and ordered pairs.
Comprehend the concept of length on the number line*	**MA-HS-NPO-S-NS2** Students will locate the position of a real number on the number line, find its distance from the origin (absolute value/magnitude) and find the distance between two numbers on the number line (the absolute value of their difference).
Exhibit knowledge of slope*	**MA-8-G-S-CG2** Students will analyze the graph of a line to determine the slope , y-intercept and equation of the line.
Score Range 24-27	
Identify the graph of a linear inequality on the number line*	**MA-HS-AT-S-EI3** Students will solve one-variable equations and inequalities using manipulatives, symbols, procedures and graphing, including graphing the solution set on a number line.

* PLAN and ACT only

† ACT only

Determine the slope of a line from points or equations*	**MA-8-G-S-CG2** Students will analyze the graph of a line to determine the slope , y-intercept and equation of the line. **MA-HS-G-S-CG1** Students will express the intuitive concept of the “slant” of a line as slope, use the coordinates of two points on a line to determine its slope and use slope to express the parallelism and perpendicularity of lines.
Match linear graphs with their equations*	**MA-HS-G-S-CG2** Students will describe a line by a linear equation.
Find the midpoint of a line segment*	**MA-HS-G-S-CG5** Students will find the midpoint of a segment when the coordinates of the endpoints are identified.
Score Range 28-32*	
Interpret and use information from graphs in the coordinate plane	**MA-8-G-S-CG1** Students will identify and graph ordered pairs on a coordinate system, identifying the origin, axes and ordered pairs; apply graphing in the coordinate system to solve real-world problems.
Match number line graphs with solution sets of linear inequalities	**MA-HS-AT-S-EI3** Students will solve one-variable equations and inequalities using manipulatives, symbols, procedures and graphing, including graphing the solution set on a number line.
Use the distance formula	**MA-HS-G-S-CG3** Students will find the distance between two points using their coordinates and the Pythagorean theorem or the distance formula.
Use properties of parallel and perpendicular lines to determine an equation of a line or coordinates of a point	**MA-HS-G-S-CG1** Students will express the intuitive concept of the “slant” of a line as slope, use the coordinates of two points on a line to determine its slope and use slope to express the parallelism and perpendicularity of lines.
Recognize special characteristics of parabolas and circles (e.g., the vertex of a parabola and the center or radius of a circle)†	**MA-HS-G-S-CG4** Students will find the equation of a circle given its center and radius; given the equation of a circle, find its center and radius. **MA-HS-AT-S-EI16** Students will graph a quadratic function and understand the relationship between its real zeros and the x-intercepts of the graph.

* PLAN and ACT only

† ACT only

Score Range 33-36†	
Match number line graphs with solution sets of simple quadratic inequalities	**MA-HS-AT-S-EI19** Students will use the skills learned to solve linear equations and inequalities to solve numerically, graphically or symbolically non-linear equations (e.g., absolute value, quadratic, exponential equations).
Identify characteristics of graphs based on a set of conditions or on a general equation such as $y = ax^2 + c$	**MA-HS-AT-S-PRF3** Students will analyze functions by investigating rates of change, intercepts, zeros, asymptotes and local and global behavior.
Solve problems integrating multiple algebraic and/or geometric concepts	**MA-HS-AT-U3 Algebra** Students will representation mathematical situations and structures for analysis and problem solving.
Analyze and draw conclusions based on information from graphs in the coordinate plane	**MA-HS-AT-PRF13** Students will graph linear, absolute value, quadratic and exponential functions and identify their key characteristics.

* PLAN and ACT only

† ACT only

Mathematics
POS/CRS Alignment
Strand 6 – Properties of Plane Figures (PPF)

College Readiness Benchmarks	Kentucky Program of Studies
Score Range 16-19	
Exhibit some knowledge of the angles associated with parallel lines	**MA-7-G-S-SR2** Students will identify characteristics of angles (e.g., adjacent, vertical, corresponding, interior, exterior).
Score Range 20-23	
Find the measure of an angle using properties of parallel lines	**MA-7-G-S-SR2** Students will identify characteristics of angles (e.g., adjacent, vertical, corresponding, interior, exterior).
Exhibit knowledge of basic angle properties and special sums of angle measures (e.g., 90°, 180°, and 360°)	**MA-7-G-S-SR3** Students will identify properties for classifying, describe, provide examples of and identify elements (e.g., sides, vertices, angles, congruent parts) of two-dimensional figures (circles, triangles [acute, right, obtuse, scalene, isosceles, equilateral], quadrilaterals [square, rectangle, rhombus, parallelogram, trapezoid], regular and irregular polygons); apply properties of these figures to solve real-world problems.
Score Range 24-27	
Use several angle properties to find an unknown angle measure	**MA-7-M-S-MPA2** Students will estimate and find angle measures and segment measures.
Recognize Pythagorean triples*	**MA-8-M-S-MPA6** Students will develop and apply the Pythagorean theorem.
Use properties of isosceles*	**MA-6-G-S-SR4** Students will identify, describe and provide examples and properties of two-dimensional figures (circles, triangles [acute, right, obtuse, scalene, isosceles, equilateral], quadrilaterals, regular polygons); apply these properties and figures to solve real-world problems.
Score Range 28-32*	

* PLAN and ACT only

† ACT only

Apply properties of 30°-60°-90°, 45°-45°-90°, similar and congruent triangles	**MA-HS-M-S-MPA7** Students will apply special right triangles and the converse of the Pythagorean theorem to solve realistic problems.
Use the Pythagorean theorem	**MA-8-M-S-MPA6** Students will develop and apply the Pythagorean theorem.
Score Range 33-36†	
Draw conclusions based on a set of conditions	**MA-HS-G-S-SR1** Students will identify and apply the definitions, properties and theorems about line segments, rays and angles and use them to prove theorems in Euclidean geometry, solve problems and perform basic geometric constructions using a straight edge and a compass.
Solve multistep geometry problems that involve integrating concepts, planning, visualization and/or making connections with other content areas	**MA-HS-G-S-SR12** Students will use geometric models and ideas to gain insights into and answer questions in other areas of mathematics and into other disciplines and areas of interest, such as art and architecture.
Use relationships among angles, arcs and distances in a circle	**MA-HS-G-S-SR5** Students will use the definitions and basic properties of a circle (e.g., arcs, chords, central angles, inscribed angles) to prove basic theorems and solve problems.

* PLAN and ACT only

† ACT only

Mathematics
POS/CRS Alignment

Strand 7—Measurement (MEA)

College Readiness Benchmarks	Kentucky Program of Studies
Score Range 13-15	
Estimate or calculate the length of a line segment based on other lengths given on a geometric figure	**MA-6-G-S-SR4** Students will identify, describe and provide examples and properties of two-dimensional figures (circles, triangles [acute, right, obtuse, scalene, isosceles, equilateral], quadrilaterals, regular polygons); apply these properties and figures to solve real-world problems.
Score Range 16-19	
Compute the perimeter of polygons when all side lengths are given	**MA-6-M-S-MPA1** Students will find perimeter of regular and irregular polygons in metric and U.S. customary units.
Compute the area of rectangles when whole number dimensions are given	**MA-6-M-S-MPA3** Students will find area of plane figures composed of triangles, squares and rectangles by subdividing and measuring; use square units appropriately.
Score Range 20-23	
Compute the area and perimeter of triangles and rectangles in simple problems	**MA-7-M-S-MPA5** Students will determine the length of sides (to the nearest eighth of an inch or nearest centimeter), area and perimeter of triangles, quadrilaterals (rectangles, squares, trapezoids) and other polygons. (Using the Pythagorean theorem will not be required as a strategy).
Use geometric formulas when all necessary information is given	**MA-8-AT-S-VEO2** Students will given a formula, substitute appropriate elements from a real-world or mathematical situation.
Score Range 24-27	
Compute the area of triangles and rectangles when one or more additional simple steps are required	**MA-8-M-S-MPA4** Students will determine the area of triangles and quadrilaterals.

* PLAN and ACT only

† ACT only

Compute the area and circumference of circles after identifying necessary information	**MA-7-M-S-MPA3** Students will estimate and find circle measurements in standard units (radius, diameter, circumference, area) and relationships among them.
Compute the perimeter of simple composite geometric figures with unknown side lengths*	**MA-8-M-S-MPA3** Students will determine measures of the lengths of sides and the perimeter both regular and irregular shapes, including lengths to the nearest sixteenth of an inch or the nearest millimeter.
Score Range 28-32*	
Use relationships involving area, perimeter, and volume of geometric figures to compute another measure	**MA-7-M-S-MPA6** Students will explain how measurements and measurement formulas are related or different (e.g., perimeter and area of rectangles).
Score Range 33-36†	
Use scale factors to determine the magnitude of a size change	**MA-8-G-S-SR5** Students will apply proportional reasoning to solve problems involving scale models and real objects and scale drawings and similar two-dimensional figures.
Compute the area of composite geometric figures when planning or visualization is required	**MA-6-M-S-MPA3** Students will find area of plane figures composed of triangles, squares and rectangles by subdividing and measuring; use square units appropriately.

* PLAN and ACT only

† ACT only

Mathematics

POS/CRS Alignment
Strand 9—Functions (FUN)

College Readiness Benchmarks	Kentucky Program of Studies
Score Range 20-23	
Evaluate quadratic functions, expressed in function notation, at integer values†	**MA-HS-AT-S-VEO12** Students will evaluate polynomial and rational expressions and expressions containing radicals and absolute values at specified values of their variables.
Score Range 24-27	
Evaluate polynomial functions, expressed in function notation, at integer values†	**MA-HS-AT-S-VEO12** Students will evaluate polynomial and rational expressions and expressions containing radicals and absolute values at specified values of their variables.
Express the sine, cosine, and tangent of an angle in a right triangle as a ratio of given side lengths†	**MA-HS-M-S-MPA6** Students will apply definitions and properties of right triangle relationships (basic right triangle trigonometry and the Pythagorean theorem) to determine length and angle measures to solve realistic problems.
Score Range 28-32	
Evaluate composite functions at integer values†	**MA-HS-AT-S-VEO12** Students will evaluate polynomial and rational expressions and expressions containing radicals and absolute values at specified values of their variables.
Apply basic trigonometric ratios to solve right-triangle problems†	**MA-HS-M-S-MPA7** Students will apply special right triangles and the converse of the Pythagorean theorem to solve realistic problems.

* PLAN and ACT only

† ACT only

Score Range 33-36	
Write an expression for the composite of two simple functions†	**MA-HS-AT-S-PRF12** Students will combine functions by addition, subtraction, multiplication and compositions.
Use trigonometric concepts and basic identities to solve problems†	**MA-HS-M-S-MPA6** Students will apply definitions and properties of right triangle relationships (basic right triangle trigonometry and the Pythagorean theorem) to determine length and angle measures to solve realistic problems.
Exhibit knowledge of unit circle trigonometry†	**MA-HS-M-S-MPA5** Students will explore the relationships between the right triangle trigonometric functions, using technology (e.g., graphing calculator) as appropriate.
Match graphs of basic trigonometric functions with their equations†	**MA-HS-M-S-MPA5** Students will explore the relationships between the right triangle trigonometric functions, using technology (e.g., graphing calculator) as appropriate.

* PLAN and ACT only

† ACT only

Mathematics Test
EPAS Test Breakdown
Supplemental Information

What does the Mathematics Test Measure? The mathematics test "requires students to analyze problems in real-world and purely mathematical settings, plan and carry out solutions strategies, and verify the appropriateness of solutions." Students must demonstrate understanding of mathematical terminology. Students will be required to apply definitions, algorithms, theorems and properties to solve problems. Students will also be expected to analyze and interpret data.

Mathematics Test		
EXPLORE	**EXPLORE Mathematics Test Design—** 30 minutes to answer 30 multiple choice questions	
	Content Area (Strands)	**Percent of Questions**
	Probability, Statistics, & Data Analysis includes Probability, Statistics and Data Analysis	13%
	Pre-Algebra includes Basic Operations and Applications; Probability, Statistics and Data Analysis; Number Concepts and Properties; and Expressions, Equations, and Inequalities	33%
	Elementary Algebra includes Probability, Statistics and Data Analysis; Number Concepts and Properties; and Expressions, Equations and Inequalities	30%
	Pre-Geometry includes Graphical Representations, Properties of Plane Figures and Measurement	23%
PLAN	**PLAN Mathematics Test Design—** 40 minutes to answer 40 multiple choice questions	
	Content Area (Strands)	**Percent of Questions**
	Pre-Algebra includes Basic Operations and Applications; Probability, Statistics and Data Analysis; Number Concepts and Properties; and Expressions, Equations and Inequalities	35%
	Elementary Algebra includes Probability, Statistics and Data Analysis; Number Concepts and Properties; and Expressions, Equations and Inequalities	20%
	Coordinate Geometry includes Graphical Representations, Measurement and Functions	18%
	Plane Geometry includes Properties of Plane Figures and Measurement	27%

ACT	**ACT Mathematics Test Design**— 60 minutes to answer 60 multiple choice questions	
	Content Area (Strands)	**Percent of Questions**
	Pre-Algebra includes Basic Operations and Applications; Probability, Statistics and Data Analysis; Number Concepts and Properties; and Expressions, Equations and Inequalities	23%
	Elementary Algebra includes Probability, Statistics and Data Analysis; Number Concepts and Properties; and Expressions, Equations and Inequalities	17%
	Intermediate Algebra includes Number Concepts and Properties, Functions	15%
	Coordinate Geometry includes Graphical Representations, Measurement and Functions	15%
	Plane Geometry Includes Properties of Plane Figures and Measurement	23%
	Trigonometry includes Functions	7%

Mathematics Strands
Basic Operations and Applications (BOA)
Probability, Statistics and Data Analysis (PSD)
Numbers: Concepts and Properties (NCP)
Expressions, Equations and Inequalities (XEI)
Graphical Representations (GRE)
Properties of Plane Figures (PPF)
Measurement (MEA)
Functions (FUN)—This strand if tested ONLY on the ACT exam.

The Mathematics Test contains items that fall under four cognitive levels:

- Knowledge and Skills—these questions require the use of mathematical facts, definitions, formulas or procedures to solve problems that are strictly mathematical.
- Direct Application—these questions involve applying mathematical facts, definitions, formulas or procedures to solve problems with real-world context.
- Understanding Concepts—these questions assess students' understanding of concepts required to make an inference or draw a conclusion.
- Integrating Conceptual Knowledge—these questions appraise students' ability to integrate understanding of major concepts to solve non-routine problems.

References
The ACT: Connecting College Readiness Standards to the Classroom for Mathematics Teachers. ACT, Inc., Iowa City, IA. 2005: 17-18.

Your Guide to ACT. ACT. 27 May 2008.
http://www.act.org/aap/pdf/YourGuidetoACT.pdf

Educational Planning and Assessment System (EPAS) College Readiness Standards and *Program of Studies* Standards Alignment
Introduction
Test: Reading

Kentucky's *Program of Studies* (POS) and the College Readiness Standards (CRS)

The *Program of Studies*, Kentucky's mandated curriculum for all Kentucky schools, is a comprehensive document. Therefore, the CRS is embedded within the *Program of Studies*. While there has been an effort to align the standards as closely as possible in this document, readers will see that in some cases, there is not an exact standard match for the CRS within the POS. In these cases, the Kentucky Department of Education has found that the skill or skills identified within the CRS are often a component of a more complex POS standard and that the POS standard to which we have aligned the CRS may include the expectation that students demonstrate a variety of other, related skills.
In each tested area, educators should note the importance of reading and critical thinking skills necessary for students to perform well on the tests. It also is important to note that, from grade to grade, some standards may be the same or very similar. In these cases, teachers are expected to continually refine instruction so that students use increasingly complex skills to achieve the standards for each consecutive grade level.
How to Use this Document

This document is divided into tables with two columns. The left-hand column provides the College Readiness Standards (CRS) and descriptions of the skills and knowledge associated with what students are likely to know and be able to do based on their EXPLORE, PLAN and ACT test scores. The right-hand column provides the content standards from the *Program of Studies* that most closely match each College Readiness Standard.

Teachers may use this document to link instruction with assessment. By identifying the connections between the CRS and the POS, educators may better understand how the ACT College Readiness Standards are embedded within Kentucky's curriculum.

Example
CRS Reading
MID 201 (Score Range: 13 – 15) Recognize a clear intent of an author or narrator in uncomplicated literary narratives
POS Reading
EL-8-DIU-S-6
Students will demonstrate understanding of literary elements and literary passages/texts: explain the main idea of a passage

The Reading Test

The reading test “measures students’ literal-level reading skills as well as their ability to make inferences, draw conclusions, generalize from specific data, and reason logically” (16).

Supplemental Information

The specifications for the reading test for the EXPLORE, PLAN and ACT may be found in the supplemental information section for Reading on page 79. Clarifying information about text complexity and reading skills assessed within EPAS also is included.

Reference

ACT. (2005). *Connecting College Readiness Standards to the Classroom: For Language Arts Teachers/Reading.*

Reading
POS/CRS Alignment

Strand 1—Main Idea and Author's Approach (MID)

College Readiness Standards	Kentucky Program of Studies
Score Range: 13-15	
Recognize a clear intent of an author or narrator in uncomplicated literary narratives	**EL-6-DIU-S-6** Students will demonstrate understanding of literary elements and literary passages/texts: identify characteristics of different types of literary texts (e.g., stories, poems, plays, folktales, historical fiction, realistic fiction, mysteries, science fiction, myths, legends). **EL-6-IT-S-3** Students will use text references to explain author's purpose, author's message or theme and supporting evidence. **EL-7-DIU-S-6** Students will demonstrate understanding of literary elements and literary passages/texts: identify and explain the main idea of a passage. **EL-7-IT-S-3** Students will use text references to explain author's purpose, author's message or theme, and supporting evidence. **EL-8-DIU-S-6** Students will demonstrate understanding of literary elements and literary passages/texts: explain the main idea of a passage. **EL-8-IT-S-3** Students will use text references to explain author's purpose, author's message or theme, and supporting evidence.

Score Range: 16-19	
Identify a clear main idea or purpose of straightforward paragraphs in uncomplicated literary narratives	**EL-9-DIU-S-5** Students will make text-based inferences; state generalizations; draw conclusions based on what is read. **EL-9-IT-S-3** Students will use text references to explain author's purpose, author's message or theme, or supporting evidence. **EL-9-DCS-3** Students will evaluate what is read, based on the author's purpose, message, word choice, sentence variety, content, tone, style or use of literary elements. **EL-10-DIU-S-5** Students will make text-based inferences; state generalizations; draw conclusions based on what is read. **EL-10-DIU-S-6** Students will demonstrate understanding of literary elements and literary passages/texts: explain the main ideas of a passage and identify the key ideas or information that support them. **EL-10-IT-S-3** Students will use text references to explain author's purpose, author's message or theme, or supporting evidence.
Score Range: 20-23	
Infer the main idea or purpose of straightforward paragraphs in uncomplicated literary narratives	**EL-11-DIU-S-1** Students will use comprehension strategies (e.g., using prior knowledge, generating clarifying, literal and inferential questions, constructing sensory images, locating and using text features) while reading, listening to, or viewing literary and informational texts. **EL-11-DIU-S-5** Students will make text-based inferences; state generalizations; draw conclusions based on what is read. **El-11-DIU-S-6** Students will demonstrate understanding of literary elements and literary passages/texts: explain the main ideas of a passage and identify the key ideas or information that support them. **EL-11-DCS-S-7**

	Students will make comparisons and synthesize information within and across texts (e.g., comparing themes, ideas, concept development, literary elements, events, genres).
Understand the overall approach taken by an author or narrator (e.g., point of view, kinds of evidence used) in uncomplicated passages	**EI-11-DIU-S-6** Students will demonstrate understanding of literary elements and literary passages/texts: explain the main ideas of a passage and identify the key ideas or information that support them. **EL-11-IT-S-3** Students will use text references to explain author's purpose, author's message or theme (including universal themes), arguments and supporting evidence. **EL-11-IT-S-5** Students will demonstrate understanding of literary elements and literary passages/texts: analyze the use of supporting details as they relate to the author's message. **EL-11-IT-S-5** Students will demonstrate understanding of literary elements and literary passages/texts explain author's craft as appropriate to genre (e.g., metrics, rhyme scheme, analogy, symbolism, allusion, soliloquy). **EL-11-IT-S-6** Students will demonstrate understanding of informational passages/texts: analyze the effectiveness of use of persuasive techniques (e.g., logical/emotional/ethical appeal, repetition, allusion) or propaganda techniques (e.g., testimonial, bandwagon, transfer, personal attack). **EL-11-IT-S-6** Students will demonstrate understanding of informational passages/texts: explain the purpose of text features in different types of informational texts (e.g., periodicals, newspapers, online texts, public documents/public discourse, essays, editorials, textbooks, technical manuals/reports, Internet websites, electronic media). **EL-11-DCS-S-3** Students will evaluate what is read, based on the author's purpose, message, word choice, sentence variety, content, tone, style or use of literary elements.

Score Range: 24-27	
Identify a clear main idea or purpose of any paragraph or paragraphs in uncomplicated passages	**El-11-DIU-S-6** Students will demonstrate understanding of literary elements and literary passages/texts explain the main ideas of a passage and identify the key ideas or information that support them. **EL-11-DIU-S-7** Students will demonstrate understanding of informational passages/texts: use information from text to state and support central/main idea. **EL-11-IT-S-3** Students will use text references to explain author's purpose, author's message or theme (including universal themes), arguments and supporting evidence.
Infer the main idea or purpose of straightforward paragraphs in more challenging passages	**EL-11-DIU-S-1** Students will use comprehension strategies (e.g., using prior knowledge, generating clarifying, literal and inferential questions, constructing sensory images, locating and using text features) while reading, listening to, or viewing literary and informational texts **EL-11-DIU-S-5** Students will make text-based inferences; state generalizations; draw conclusions based on what is read
Summarize basic events and ideas in more challenging passages	**EL-11-DIU-S-4** Students will paraphrase and summarize information from texts of various lengths; distinguish between a summary and a critique
Understand the overall approach taken by an author or narrator (e.g., point of view, kinds of evidence used) in more challenging passages	**EL-11-IT-S-6** Students will demonstrate understanding of informational passages/texts: use text references to support conclusions about what is read; for example, author's opinion about a subject **EL-11-DCS-S-3** Students will evaluate what is read, based on the author's purpose, message, word choice, sentence variety, content, tone, style or use of literary elements

Score Range: 28-32	
Infer the main idea or purpose of more challenging passages or their paragraphs	**EL-11-DIU-S-1** Students will use comprehension strategies (e.g., using prior knowledge, generating clarifying, literal and inferential questions, constructing sensory images, locating and using text features) while reading, listening to, or viewing literary and informational texts. **EL-11-DIU-S-5** Students will make text-based inferences; state generalizations; draw conclusions based on what is read.
Summarize events and ideas in virtually any passage	**EL-11-DIU-S-4** Students will paraphrase and summarize information from texts of various lengths; distinguish between a summary and a critique
Understand the overall approach taken by an author or narrator (e.g., point of view, kinds of evidence used) in virtually any passage	**EL-11-IT-S-6** Students will demonstrate understanding of informational passages/texts: use text references to support conclusions about what is read; for example, author's opinion about a subject **EL-11-DCS-S-3** Students will evaluate what is read, based on the author's purpose, message, word choice, sentence variety, content, tone, style or use of literary elements

Score Range: 33-36	
Identify clear main ideas or purposes of complex passages or their paragraphs	**EL-11-DIU-S-5** Students will make text-based inferences; state generalizations; draw conclusions based on what is read. **El-11-DIU-S-6** Students will demonstrate understanding of literary elements and literary passages/texts: explain the main ideas of a passage and identify the key ideas or information that support them. **EL-11-DIU-S-7** Students will demonstrate understanding of informational passages/texts use information from text to state and support central/main idea. **EL-11-IT-S-3** Students will use text references to explain author's purpose, author's message or theme (including universal themes), arguments and supporting evidence. **EL-11-IT-S-6** Students will demonstrate understanding of informational passages/texts: use references from the text to state central ideas and details that support them; analyze the importance and relevance of details used in a text. **EL-11-IT-S-6** Students will demonstrate understanding of informational passages/texts: use text references to support conclusions about what is read; for example, author's opinion about a subject. **EL-11-DCS-S-3** Students will evaluate what is read, based on the author's purpose, message, word choice, sentence variety, content, tone, style or use of literary elements. **EL-11-DCS-S-2** Students will analyze the organizational pattern used (e.g., description, sequence, cause/effect, compare/contrast, logical/sequential, problem/solution, proposition/support, deductive/inductive) and explain how effective it is in understanding the passage and meeting the author's purpose.

Reading
POS/CRS Alignment

Strand 2—Supporting Details (SUP)

College Readiness Standards	Kentucky Program of Studies
Score Range: 13-15	
Locate basic facts (e.g., names, dates, events) clearly stated in a passage	**EL-6-DIU-S-7** Students will demonstrate understanding of informational passages/texts: locate key ideas, information, facts or details. **EL-7-FF-S-4** Students will use a variety of reading strategies to understand vocabulary and texts: scan to find specific key information; skim to get the general meaning of a passage. **EL-7-DIU-S-7** Students will demonstrate understanding of informational passages/texts: locate key ideas, information, facts or details. **EL-7-IT-S-3** Students will use text references to explain author's purpose, author's message or theme, and supporting evidence. **EL-8-DIU-S-7** Students will demonstrate understanding of informational passages/texts: locate key ideas, information, facts or details. **EL-8-IT-S-3** Students will use text references to explain author's purpose, author's message or theme, and supporting evidence.
Score Range: 16-19	
Locate simple details at the sentence and paragraph level in uncomplicated passages	**EL-9-FF-S-4** Students will use a variety of reading strategies to understand vocabulary and texts: scan to find specific key information; skim to get the general meaning of a passage. **EL-9-IT-S-5**

	Students will demonstrate understanding of literary elements and literary passages/texts: analyze the use of supporting details as they relate to the author's message. **EL-10-FF-S-4** Students will use a variety of reading strategies to understand vocabulary and texts: scan to find specific key information; skim to get the general meaning of a passage. **EL-10-DIU-S-6** Students will demonstrate understanding of literary elements and literary passages/texts: explain the main ideas of a passage and identify the key ideas or information that support them. **EL-10-IT-S-3** Students will use text references to explain author's purpose, author's message or theme, or supporting evidence. **EL-10-IT-S-5** Students will demonstrate understanding of literary elements and literary passages/texts: analyze the use of supporting details as they relate to the author's message. **EL-10-IT-S-6** Students will demonstrate understanding of informational passages/texts: use evidence from the text to state the central ideas and details that support them; analyze the importance and relevance of details used in a text.
Recognize a clear function of a part of an uncomplicated passage	**EL-9-DIU-S-5** Students will make text-based inferences; state generalizations; draw conclusions based on what is read. **EL-9-IT-S-3** Students will use text references to explain author's purpose, author's message or theme, or supporting evidence. **EL-10-DIU-S-5** Students will make text-based inferences; state generalizations; draw conclusions based on what is read. **EL-10-DIU-S-6** Students will demonstrate understanding of literary elements and literary passages/texts: explain the main ideas of a passage and identify the key ideas or information that support them. **EL-10-IT-S-3** Students will use text references to explain author's purpose, author's message or theme, or supporting evidence.

	EL-10-IT-S-5 Students will demonstrate understanding of literary elements and literary passages/texts: analyze the use of supporting details as they relate to the author's message. **EL-10-IT-S-6** Students will demonstrate understanding of informational passages/texts: use evidence from the text to state the central ideas and details that support them; analyze the importance and relevance of details used in a text.
Score Range: 20-23	
Locate important details in uncomplicated passages	**EI-11-DIU-S-6** Students will demonstrate understanding of literary elements and literary passages/texts: explain the main ideas of a passage and identify the key ideas or information that support them. **EL-11-DIU-S-7** Students will demonstrate understanding of informational passages/texts: locate key ideas, information, facts or details. **EL-11-IT-S-3** Students will use text references to explain author's purpose, author's message or theme (including universal themes), arguments and supporting evidence. **EL-11-IT-S-5** Students will demonstrate understanding of literary elements and literary passages/texts: analyze the use of supporting details as they relate to the author's message. **EL-11-IT-S-6** Students will demonstrate understanding of informational passages/texts: use references from the text to state central ideas and details that support them; analyze the importance and relevance of details used in a text.

Make simple inferences about how details are used in passages	**EL-11-DIU-S-5** Students will make text-based inferences; state generalizations; draw conclusions based on what is read.
Score Range: 24-27	
Locate important details in more challenging passages	**EL-11-FF-S-3** Students will use a variety of reading strategies to understand vocabulary and texts: scan to find specific key information; skim to get the general meaning of a passage. **EL-11-DIU-S-6** Students will demonstrate understanding of literary elements and literary passages/texts: explain the main ideas of a passage and identify the key ideas or information that support them. **EL-11-DIU-S-7** Students will demonstrate understanding of informational passages/texts: locate key ideas, information, facts or details.
Locate and interpret minor or subtly stated details in uncomplicated passages	**EL-11-DIU-S-6** Students will demonstrate understanding of literary elements and literary passages/texts: explain the main ideas of a passage and identify the key ideas or information that support them. **EL-11-IT-S-3** Students will use text references to explain author's purpose, author's message or theme (including universal themes), arguments and supporting evidence.
Discern which details, though they may appear in different sections throughout a passage, support important points in more challenging passages	**EL-11-IT-S-5** Students will demonstrate understanding of literary elements and literary passages/texts analyze the use of supporting details as they relate to the author's message. **EL-11-IT-S-6** Students will demonstrate understanding of informational passages/texts: use references from the text to state central ideas and details that support them; analyze the importance and relevance of details used in a text.

Score Range: 28-32	
Locate and interpret minor or subtly stated details in more challenging passages	**EL-11-DIU-S-6** Students will demonstrate understanding of literary elements and literary passages/texts: explain the main ideas of a passage and identify the key ideas or information that support them. **EL-11-IT-S-3** Students will use text references to explain author's purpose, author's message or theme (including universal themes), arguments and supporting evidence.
Use details from different sections of some complex informational passages to support a specific point or argument	**EL-11-DCS-S-4** Students will form and support warranted judgments/opinions/conclusions about central ideas. **EL-11-DCS-S-8** Students will evaluate arguments, interpret and analyze information from multiple sources; for example, synthesize arguments or claims to discover the relationship between the parts, understand induction and deduction, determine unstated assumptions. **EL-11-DCS-10** Students will evaluate the range and quality of evidence used to support or oppose an argument.
Score Range: 33-36	
Locate and interpret details in complex passages	**EL-11-DIU-S-5** Students will make text-based inferences; state generalizations; draw conclusions based on what is read. **EL-11-DIU-S-6** Students will demonstrate understanding of literary elements and literary passages/texts: explain the main ideas of a passage and identify the key ideas or information that support them. **EL-11-DIU-S-7** Students will demonstrate understanding of informational passages/texts: use information from text to state and support central/main idea. **EL-11-IT-S-3** Students will use text references to explain author's purpose, author's message or theme (including universal themes), arguments and supporting evidence. **EL-11-IT-S-6**

	Students will demonstrate understanding of informational passages/texts: use references from the text to state central ideas and details that support them; analyze the importance and relevance of details used in a text.

Understand the function of a part of a passage when the function is subtle or complex	**EL-11-IT-S-3** Students will use text references to explain author's purpose, author's message or theme (including universal themes), arguments and supporting evidence. **EL-11-DCS-10** Students will evaluate the range and quality of evidence used to support or oppose an argument.

Reading
POS/CRS Alignment

Strand 3—Sequential, Comparative and Cause-Effect Relationships (REL)

College Readiness Standards	Kentucky Program of Studies
Score Range: 13-15	
Determine when (e.g., first, last, before, after) or if an event occurred in uncomplicated passages	**EL-6-DCS-S-2** Students will identify the organizational pattern used (e.g., description, sequence, cause/effect, compare/contrast, logical/sequential) and explain how it helps in understanding the passage (e.g., organizing key ideas) and meeting the author's purpose. **EL-7-DCS-S-2** Students will apply knowledge of the organizational pattern used (e.g., description, sequence, cause/effect, compare/contrast, logical/sequential, problem/solution) and explain how it helps in understanding the passage and meeting the author's purpose. **EL-8-DCS-S-2** Students will identify the organizational pattern used (e.g., description, sequence, cause/effect, compare/contrast, logical/sequential, problem/solution, proposition/support) and explain how it helps in understanding the passage and meeting the author's purpose.
Recognize clear cause-effect relationships described within a single sentence in a passage	**EL-6-DIU-S-2** Students will use text structure cues (e.g., chronology, cause/effect, compare/contrast, description, classification, logical/sequential), to aid in comprehension. **EL-7-DIU-S-2** Students will use text structure cues (e.g., chronology, cause/effect, compare/contrast, proposition and support, description, classification, logical/sequential) to aid in comprehension. **EL-8-DIU-S-2** Students will use text structure cues (e.g., chronology, cause/effect, compare/contrast, proposition/support, description, classification, logical/sequential) to aid in comprehension.

Score Range: 16-19	
Identify relationships between main characters in uncomplicated literary narratives	**EL-9-DCS-5** Students will interpret the interactions between and among literary elements within and across a variety of texts. **EL-9-DCS-7** Students will make comparisons and synthesize information within and across texts (e.g., comparing themes, ideas, concept development, literary elements, events, genres). **EL-10-DCS-S-3** Students will evaluate what is read, based on the author's purpose, message, word choice, sentence variety, content, tone, style or use of literary elements. **El-10-DCS-S-5** Students will interpret the interactions between and among literary elements within and across a variety of texts. **EL-10-DCS-S-7** Students will make comparisons and synthesize information within and across texts (e.g., comparing themes, ideas, concept development, literary elements, events, genres).
Recognize clear cause-effect relationships within a single paragraph in uncomplicated literary narratives	**EL-9-DIU-S-2** Students will use text structure cues (e.g., chronology, cause/effect, compare/contrast, proposition/support, description, classification, logical/sequential) to aid in comprehension. **EL-9-IT-S-2** Students will use text structure cues (e.g., chronology, cause/effect, compare/contrast, proposition and support, description, classification, logical/sequential) to aid comprehension. **EL-9-DCS-S-2** Students will identify organizational patterns and describe how understanding the structure helps to understand the text; analyze the organizational pattern used (e.g., description, sequence, cause/effect, compare/contrast, logical/sequential, problem/solution, proposition/support, deductive/inductive) and explain how effective it is in understanding the passage and meeting the author's purpose. **EL-10-DIU-S-2**

	Students will use text structure cues (e.g., chronology, cause/effect, compare/contrast, proposition/support, description, classification, logical/sequential) to aid in comprehension. **EI-10-IT-S-2** Students will use text structure cues (e.g., chronology, cause/effect, compare/contrast, proposition and support, description, classification, logical/sequential) to aid comprehension. **EL-10-DCS-S-2** Students will identify organizational patterns and describe how understanding the structure helps to understand the text; analyze the organizational pattern used (e.g., description, sequence, cause/effect, compare/contrast, logical/sequential, problem/solution, proposition/support, deductive/inductive) and explain how effective it is in understanding the passage and meeting the author's purpose.
Score Range: 20-23	
Order simple sequences of events in uncomplicated literary narratives	**EL-11-DIU-S-2** Students will use text structure cues (e.g., chronology, cause/effect, compare/contrast, proposition/support, description, classification, logical/sequential, deductive/inductive) to aid in comprehension. **EL-11-IT-S-2** Students will use text structure cues (e.g., chronology, cause/effect, compare/contrast, proposition and support, description, classification, logical/sequential, deductive/inductive) to aid comprehension. **EL-11-DCS-S-2** Students will analyze the organizational pattern used (e.g., description, sequence, cause/effect, compare/contrast, logical/sequential, problem/solution, proposition/support, deductive/inductive) and explain how effective it is in understanding the passage and meeting the author's purpose.
Identify clear relationships between people, ideas, and so on in uncomplicated passages	**EL-11-IT-S-5** Students will demonstrate understanding of literary elements and literary passages/texts: analyze the relationship between a character's motivation and behavior, as revealed by the dilemmas.
Identify clear cause-effect relationships in uncomplicated passages	**EL-11-IT-S-2** Students will use text structure cues (e.g., chronology, cause/effect, compare/contrast, proposition and support, description, classification, logical/sequential, deductive/inductive) to aid comprehension. **EL-11-DCS-S-2** Students will analyze the organizational pattern used (e.g., description, sequence, cause/effect, compare/contrast, logical/sequential, problem/solution, proposition/support, deductive/inductive) and explain how effective it is in understanding the passage and meeting the author's purpose.

Score Range: 24-27	
Order sequences of events in uncomplicated passages	**EL-11-DIU-S-2** Students will use text structure cues (e.g., chronology, cause/effect, compare/contrast, proposition/support, description, classification, logical/sequential, deductive/inductive) to aid in comprehension. **EL-11-DCS-S-2** Students will analyze the organizational pattern used (e.g., description, sequence, cause/effect, compare/contrast, logical/sequential, problem/solution, proposition/support, deductive/inductive) and explain how effective it is in understanding the passage and meeting the author's purpose.
Understand relationships between people, ideas, and so on in uncomplicated passages	**EL-11-DCS-S-3** Students will evaluate what is read, based on the author's purpose, message, word choice, sentence variety, content, tone, style or use of literary elements.
Identify clear relationships between characters, ideas, and so on in more challenging literary narratives	**EL-11-DCS-S-7** Students will make comparisons and synthesize information within and across texts (e.g., comparing themes, ideas, concept development, literary elements, events, genres).
Understand implied or subtly stated cause-effect relationships in uncomplicated passages	**EL-11-IT-S-2** Students will use text structure cues (e.g., chronology, cause/effect, compare/contrast, proposition and support, description, classification, logical/sequential, deductive/inductive) to aid comprehension. **EL-11-IT-S-5** Students will demonstrate understanding of literary elements and literary passages/texts: analyze the relationship between a character's motivation and behavior, as revealed by the dilemmas. **EL-11-DCS-S-5** Students will analyze the interactions between and among literary elements within and across a variety of texts.
Identify clear cause-effect relationships in more challenging passages	**EL-11-DCS-S-2** Students will analyze the organizational pattern used (e.g., description, sequence, cause/effect, compare/contrast, logical/sequential, problem/solution, proposition/support, deductive/inductive) and explain how effective it is in understanding the passage and meeting the author's purpose.

Score Range: 28-32	
Order sequences of events in more challenging passages	**EL-11-DIU-S-2** Students will use text structure cues (e.g., chronology, cause/effect, compare/contrast, proposition/support, description, classification, logical/sequential, deductive/inductive) to aid in comprehension. **EL-11-DCS-S-2** Students will analyze the organizational pattern used (e.g., description, sequence, cause/effect, compare/contrast, logical/sequential, problem/solution, proposition/support, deductive/inductive) and explain how effective it is in understanding the passage and meeting the author's purpose.
Understand the dynamics between people, ideas, and so on in more challenging passages	**EL-11-DCS-S-3** Students will evaluate what is read, based on the author's purpose, message, word choice, sentence variety, content, tone, style or use of literary elements.
Understand implied or subtly stated cause-effect relationships in more challenging passages	**EL-11-IT-S-2** Students will use text structure cues (e.g., chronology, cause/effect, compare/contrast, proposition and support, description, classification, logical/sequential, deductive/inductive) to aid comprehension. **EL-11-IT-S-5** Students will demonstrate understanding of literary elements and literary passages/texts: analyze the relationship between a character's motivation and behavior, as revealed by the dilemmas. **EL-11-DCS-S-5** Students will analyze the interactions between and among literary elements within and across a variety of texts.

Score Range: 33-36	
Order sequences of events in complex passages	**EL-11-IT-S-4** Students will organize ideas within and across texts to show understanding of central ideas and interrelationships (e.g., charting, semantic mapping, graphic organizers, outlining). **EL-11-DCS-S-2** Students will analyze the organizational pattern used (e.g., description, sequence, cause/effect, compare/contrast, logical/sequential, problem/solution, proposition/support, deductive/inductive) and explain how effective it is in understanding the passage and meeting the author's purpose.
Understand the subtleties in relationships between people, ideas, and so on in virtually any passage	**EL-11-IT-S-5** Students will demonstrate understanding of literary elements and literary passages/texts: analyze the relationship between a character's motivation and behavior, as revealed by the dilemmas. **EL-11-DCS-S-3** Students will evaluate what is read, based on the author's purpose, message, word choice, sentence variety, content, tone, style or use of literary elements. **EL-11-DCS-S-5** Students will analyze the interactions between and among literary elements within and across a variety of texts.
Understand implied, subtle or complex cause-effect relationships in virtually any passage	**EL-11-DIU-S-2** Students will use text structure cues (e.g., chronology, cause/effect, compare/contrast, proposition/support, description, classification, logical/sequential, deductive/inductive) to aid in comprehension. **EL-11-IT-S-2** Students will use text structure cues (e.g., chronology, cause/effect, compare/contrast, proposition and support, description, classification, logical/sequential, deductive/inductive) to aid comprehension. **EL-11-DCS-S-2** Students will analyze the organizational pattern used (e.g., description, sequence, cause/effect, compare/contrast, logical/sequential, problem/solution, proposition/support, deductive/inductive) and explain how effective it is in understanding the passage and meeting the author's purpose.

Reading
POS/CRS Alignment

Strand 4—Meanings of Words (MOW)

College Readiness Standards	Kentucky Program of Studies
Score Range: 13-15	
Understand the implication of a familiar word or phrase and of simple descriptive language	**EL-6-FF-S-3** Students will use a variety of reading strategies to understand vocabulary and texts: apply word recognition strategies to determine pronunciations or meanings of words in passages.
Score Range: 16-19	
Use context to understand basic figurative language	**EL-9-FF-S-4** Students will use a variety of reading strategies to understand vocabulary and texts: interpret and explain literal and non-literal meanings of words or phrases, analogies, idioms and literary allusions based on context. **EL-9-DIU-S-3** Students will explain the meaning of concrete or abstract terms, based on the context (e.g., “loaded” words, connotation, denotation). **EL-9-DCS-6** Students will analyze the effectiveness of literary devices or figurative language in evoking what the author intended (e.g., picturing a setting, predicting a consequence, establishing a mood or feeling). **EL-10-FF-S-4** Students will use a variety of reading strategies to understand vocabulary and texts: interpret and explain literal and non-literal meanings of words or phrases, analogies, idioms and literary allusions based on context. **EL-10-DIU-S-3** Students will explain the meaning of concrete or abstract terms, based on the context (e.g., “loaded” words, connotation, denotation. **EL-10-DCS-S-6** Students will analyze the effectiveness of literary devices or figurative language in evoking what the author intended (e.g., picturing a setting, predicting a consequence, establishing a mood or feeling).

Score Range: 20-23	
Use context to determine the appropriate meaning of some figurative and nonfigurative words, phrases and statements in uncomplicated passages	**EL-11-FF-S-3** Students will use a variety of reading strategies to understand vocabulary and texts: interpret and explain literal and non-literal meanings of words or phrases, analogies, idioms, and literary and classical allusions based on context. **EL-11-DIU-S-3** Students will explain the meaning of concrete or abstract terms, based on the context (e.g., “loaded” words, connotation, denotation). **EL-11-DCS-S-6** Students will analyze the effectiveness of literary devices or figurative language in evoking what the author intended (e.g., picturing a setting, predicting a consequence, establishing a mood or feeling).
Score Range: 24-27	
Use context to determine the appropriate meaning of virtually any word, phrase or statement in uncomplicated passages	**EL-11-DIU-S-3** Students will explain the meaning of concrete or abstract terms, based on the context (e.g., “loaded” words, connotation, denotation).
Use context to determine the appropriate meaning of some figurative and nonfigurative words, phrases and statements in more challenging passages	**EL-11-FF-S-3** Students will use a variety of reading strategies to understand vocabulary and texts: interpret and explain literal and non-literal meanings of words or phrases, analogies, idioms, and literary and classical allusions based on context. **EL-11-DIU-S-3** Students will explain the meaning of concrete or abstract terms, based on the context (e.g., “loaded” words, connotation, denotation).
Score Range: 28-32	
Determine the appropriate meaning of words, phrases or statements from figurative or somewhat technical contexts	**EL-11-DIU-S-3** Students will explain the meaning of concrete or abstract terms, based on the context (e.g., “loaded” words, connotation, denotation).

Score Range: 33-36	
Determine, even when the language is richly figurative and the vocabulary is difficult, the appropriate meaning of context-dependent words, phrases or statements in virtually any passage	**EL-11-DIU-S-3** Students will explain the meaning of concrete or abstract terms, based on the context (e.g., “loaded” words, connotation, denotation). **EL-11-FF-S-3** Students will use a variety of reading strategies to understand vocabulary and texts: interpret and explain literal and non-literal meanings of words or phrases, analogies, idioms and literary and classical allusions based on context.

Reading
POS/CRS Alignment

Strand 5—Generalizations and Conclusions (GEN)

College Readiness Standards	Kentucky Program of Studies
Score Range: 13-15	
Draw simple generalizations and conclusions about the main characters in uncomplicated literary narratives	**EL-6-DIU-S-1** Students will use comprehension strategies (e.g., using prior knowledge, predicting, generating, clarifying, literal and inferential questions, constructing sensory images, locating and using text features) while reading, listening to or viewing literary and informational . **EL-7-DIU-S-1** Students will use comprehension strategies (e.g., using prior knowledge, predicting, generating, clarifying, literal and inferential questions, constructing sensory images, locating and using text features) while reading, listening to or viewing literary and informational. **EL-8-DIU-S-1** Students will use comprehension strategies (e.g., using prior knowledge, predicting, generating, clarifying, literal and inferential questions, constructing sensory images, locating and using text features) while reading, listening to or viewing literary and informational.
Score Range: 16-19	
Draw simple generalizations and conclusions about people, ideas and more in uncomplicated passages	**EL-9-DIU-S-5** Students will make text-based inferences, state generalizations and draw conclusions based on what is read. **EL-10-DIU-S-5** Students will make text-based inferences, state generalizations and draw conclusions based on what is read.
Score Range: 20-23	
Draw generalizations and conclusions about people, ideas and more in uncomplicated passages	**EL-11-DIU-S-5** Students will make text-based inferences, state generalizations and draw conclusions based on what is read.
Draw simple generalizations and conclusions using details that support the main points of	**EL-11-IT-S-1** Students will use comprehension strategies while reading, listening to, or viewing increasingly complex literary and informational texts

more challenging passages	**EL-11-DIU-S-1** Students will use comprehension strategies (e.g., using prior knowledge, generating clarifying, literal and inferential questions, constructing sensory images, locating and using text features) while reading, listening to, or viewing literary and informational texts **EL-11-DIU-S-5** Students will make text-based inferences; state generalizations; draw conclusions based on what is read
Score Range: 24-27	
Draw subtle generalizations and conclusions about characters, ideas and more in uncomplicated literary narratives	**EL-11-DIU-S-5** Students will make text-based inferences; state generalizations; draw conclusions based on what is read.
Draw generalizations and conclusions about people, ideas and more in more challenging passages	**EL-11-IT-S-1** Students will use comprehension strategies while reading, listening to or viewing increasingly complex literary and informational texts.
Score Range: 28-32	
Use information from one or more sections of a more challenging passage to draw generalizations and conclusions about people, ideas and more	**EL-11-DCS-S-7** Students will make comparisons and synthesize information within and across texts (e.g., comparing themes, ideas, concept development, literary elements, events, genres).
Score Range: 33-36	
Draw complex or subtle generalizations and conclusions about people, ideas and more, often by synthesizing information from different portions of the passage	**EL-11-DCS-S-7** Students will make comparisons and synthesize information within and across texts (e.g., comparing themes, ideas, concept development, literary elements, events, genres). **EL-11-DCS-S-8** Students will evaluate arguments, interpret and analyze information from multiple sources; for example, synthesize arguments or claims to discover the relationship between the parts, understand induction and deduction, determine unstated assumptions.
Understand and generalize about portions of a complex literary narrative	**EL-11-DIU-S-5** Students will make text-based inferences, state generalizations and draw conclusions based on what is read. **EL-11-IT-S-1** Students will use comprehension strategies while reading, listening to or viewing increasingly complex literary and informational texts.

Reading Test
EPAS Test Breakdown
Supplemental Information

What does the Reading Test Measure? The Reading Test measures the reading comprehension skills students have acquired in their courses prior to the test. "ACT determines the content of the Reading Tests by identifying the concepts and skills that are taught in classrooms nationwide and considered necessary for future academic success. Designed to simulate the types of reading tasks students encounter in their academic work and in life outside of school, the Reading Test measures students' literal-level reading skills as well as their ability to make inferences, draw conclusions, generalize from specific data, and reason logically" (2005).

Reading Test		
EXPLORE	**EXPLORE Reading Test Design—**30 minutes to read 3 passages and answer 30 questions	
	Passage Types (Informational and Literacy)	**Percent of Questions**
	Prose Fiction	33%
	Humanities	33%
	Social Science	33%
PLAN	**PLAN Reading Test Design—**20 minutes to read 3 passages and answer 25 questions	
	Passage Types (Informational and Literacy)	**Percent of Questions**
	Prose Fiction	32%
	Humanities	36%
	Social Science	32%
ACT	**ACT Reading Test Design**— 35 minutes to read 4 passage and answer 40 questions	
	Passage Types (Informational and Literacy)	**Percent of Questions**
	Prose Fiction	25%
	Humanities	25%
	Social Science	25%
	Natural Science	25%

Reading Strands

Main Idea and Author's Approach (MID)
Supporting Details (SUP)
Sequential, Comparative and Cause-Effect Relationships (REL)
Meanings of Words (MOW)
Generalizations and Conclusions (GEN)

Reading Passage Types

Passages on the ACT come from four areas: prose fiction, humanities, social science and natural science. The reading passage descriptors below come from the ACT publication *Connecting College Readiness Standards to the Classroom for Language Arts Teachers/English* (2005).

Prose Fiction—questions are based on passages from short stories or novels

Humanities—questions are based on passages from memoirs and personal essays in the content areas of architecture, art, dance, ethics, film, language, literary criticism, music, philosophy, radio, television or theatre.

Social Science—questions are based on passages in anthropology, archaeology, biography, business, economics, education, geography, history, political science, psychology or sociology.

Natural Science—question are based on passages in anatomy, astronomy, biology, botany, chemistry, ecology, geology, medicine, meteorology, microbiology, natural history, physiology, physics, technology or zoology

Text Complexity

ACT suggests that the ability to read complex texts is the best differentiation between group of students who are more likely to be ready for college-level reading and those who are less likely to be ready. Students' reading skills must develop over time, progressing to higher levels as they move from grade to grade. Table 1 reflects the different levels of text complexity.

Students need to read high-interest and challenging material to experience a range of text complexity within their school work. Students should read academically challenging text to gain proficiency, and teachers should explicitly scaffold rigorous text to make the material accessible for all students. Students who can master the skills necessary to read and understand complex tests are more likely to be college/workplace ready over than those who cannot.

Table 1: Characteristics of Text Complexity

Characteristic of Text	Uncomplicated	More Challenging	Complex
Relationships	Basic, straightforward	Sometimes implicit	Subtle, involved, deeply embedded
Richness	Minimal/limited	Moderate/more detailed	Sizable/highly sophisticated
Structure	Simple, conventional	More involved	Elaborate, sometimes unconventional
Style	Plain, accessible	Richer, less plain	Often intricate
Vocabulary	Familiar	Some difficult, context-dependent words	Demanding, highly context dependent
Purpose	Clear	Conveyed with some subtlety	Implicit, sometimes ambiguous

Table 2: Text Complexity Descriptors

Text Complexity Descriptor	Characteristics of Text
Uncomplicated	May be familiar, related to students' experiences, address concrete topics
More challenging	May be familiar to students, yet include some abstract ideas
Somewhat complex	May include abstract ideas, and address topics that are somewhat unfamiliar to students
Complex	May be unfamiliar to students and removed from their day to day experiences and address abstract, scientific or social issues

Complex Text

Characteristics of Complex Text as Defined by ACT

Relationships: Interactions among ideas or character in the text are subtle, involved or deeply embedded.

Richness: The text possesses a sizeable amount of highly sophisticated information conveyed through data or literary devices.

Structure: The text is organized in ways that are elaborate and sometimes unconventional.

Style: The author's tone and use of language are often intricate.

Vocabulary: The author's choice of words is demanding and highly context dependent.

Purpose: The author's intent in writing the text is implicit and sometimes ambiguous.

References

ACT. (2005). *Connecting College Readiness Standards to the Classroom for Language Arts Teachers/English*.

Additional Information about Text Complexity

Educators may be interested in exploring the topic of text complexity in more depth. Other researchers and national organizations also have described "Text Complexity" for instructional and assessment purposes. The information that appears below provides additional insight on the subject.

Table 3: Factors that Interact to Influence Text Complexity (Hess)

Factor	Examples
word difficulty and language structure	vocabulary and sentence type and complexity of words or structure
text structure	e.g., description, chronology, sequence/procedure, cause-effect, proposition-support, problem-solution, critique
discourse style	e.g., satire, humor
genre and characteristic features	e.g., prose, short story, poetry, historical fiction, memoir
background knowledge and/or degree of familiarity with content	e.g., historical, geographical, or literary references
level of reasoning required	sophistication of themes and ideas presented, abstract metaphors, etc
format and layout of text	how text is organized/layout, size and location of print, graphics and other book/print features
length of text	short, medium, long

American Diploma Project

The American Diploma Project (ADP) indicates that students should engage with increasingly complex texts that represent important cultural, historical and societal themes and ideas. The degrees of text complexity are uncomplicated, more challenging, somewhat complex and complex. ADP categorizes texts as informational, persuasive and literary. Examples of texts are included in the descriptions of different degrees of complexity. For more detailed information, visit http://www.achieve.org/node/956.

National Assessment of Educational Progress (NAEP) Reading Passages

NAEP assesses students in two broad categories of reading—literary and informational. Literary text includes fiction, literary non-fiction (e.g., essays, speeches, biographies, autobiographies and poetry). Informational text includes exposition, argumentation and persuasive text and procedural text and documents.

According to the NAEP *Reading Framework* Pre-Publication Edition, 2007, "Research on the nature of text and on reading processes has suggested that the characteristics of literary and informational text differ dramatically. For the most part, the research literature suggests that readers attend to different aspects of text as they seek to comprehend different types of text" (6).

To reach the goal of approximating actual reading experiences, NAEP reading passages are typical of those read by students every day. The passages are taken from authentic texts found in the environments of students in grades 4, 8 and 12. NAEP defines the criteria as:

- developmentally appropriate
- topic appropriateness
- language appropriateness
- fairness
- interest level
- reproducibility
- diversity among authors

NAEP 2008 determines text complexity as the complication of its arguments, the abstractness of its concepts and the inclusion of unusual points of view and shifting time frames. Passages range in difficulty from those that could be read by the least proficient readers (e.g., about 2nd-grade level in a 4th-grade class) to those that could be read by only the most proficient readers (e.g., possible 8th-grade level in a 4th-grade class), as determined by teachers in specific grades. Presently, NAEP does not use a conventional readability estimate; however, in 2009 two readability formulas will be used.

References

American Diploma Project. http://www.achieve.org.

Hess, Karin, and Sue Biggam (2004). "A Discussion of Increasing Text Complexity.

National Assessment of Educational Progress. <http://nationsreportcard.gov>.

Educational Planning and Assessment System (EPAS) College Readiness Standards Alignment to Program of Studies

Introduction
Test: Science

Kentucky's *Program of Studies* (POS) and the College Readiness Standards (CRS)

The *Program of Studies*, Kentucky's mandated curriculum for all Kentucky schools, is a comprehensive document. Therefore, the CRS is embedded within the *Program of Studies*. While there has been an effort to align the standards as closely as possible in this document, readers will see that in some cases, there is not an exact match for the CRS within the POS. In these cases, the Kentucky Department of Education has found that the skill or skills identified within the CRS are often a component of a more complex POS standard and that the POS standard to which we have aligned the CRS may include the expectation that students demonstrate a variety of other, related skills.

In each tested area, educators should note the importance of reading and critical thinking skills necessary for students to be successful on the tests. Likewise, it is important to note that, from grade to grade, some standards may be the same or very similar. In these cases, teachers are expected to continually refine instruction so that students use increasingly complex skills to achieve the standards for each consecutive grade level.

How to Use the Document

This document is divided into tables with four columns. The left-hand column contains the College Readiness Standards (CRS) and descriptions of the skills and knowledge associated with what students are likely to know and be able to do based on their EXPLORE, PLAN and ACT test scores. The second column contains the science content standards from the *Program of Studies* that most closely match each College Readiness Standard. The third column contains the mathematics content standards from the *Program of Studies*, and the last column contains the language arts content standards. Mathematics and language arts standards are included due to the nature of the ACT science exam.

Standards in the POS science column may contain sections that are underlined. This is to demonstrate where the POS standard is most closely aligns with the CRS.

Teachers may use this document to link instruction with assessment. By identifying the connections between the CRS and the POS, educators may better understand how the ACT College Readiness Standards are embedded within Kentucky's curriculum.

Example

CRS Science

SIN 301 (16-19) Understand the methods and tools used in a simple experiment.

POS Science

SC-7-MF-S-1 Students will use appropriate tools and technology (e.g., timer, meter stick, balance, spring scale) to investigate the position, speed and motion of objects

Based upon this example, one can see that the main component of the POS standard (students will use appropriate tools and technology) most closely aligns with the CRS standard (understand methods and tools), but is specific to the topic of motion.

CRS Science

IOD 403 (20-23) Translate information into a table, graph, or diagram.

POS Science

SC-5-EU-S-6 Students will use a variety of models and graphic representations to obtain and organize data in order to compare the major components of our solar system.

In this example, both standards ask students to demonstrate the translation of information; the CRS statement is much more general than what the POS skill standard states. While these two standards do not provide an exact match, the POS standard identified most closely matches the CRS.

The Science Test

The EPAS Science test is "designed to assess the knowledge and thinking skills, processes, and strategies students acquire in…science courses. These skills include analyzing and interpreting data, comparing experimental designs and methods, comparing assumptions underlying experiments, making generalizations, and identifying and evaluating conflicting points of view….The intent is to present students with a situation to engage their reasoning skills…" The ACT science test is not a test of content knowledge; however, the questions presented are in the context of science.

Supplemental Information

The specifications for the science test on the EXPLORE, PLAN and ACT can be found in the supplemental information section for science on page 111.

Note: For printing purposes, the alignment document will be on legal-sized paper.

Reference

ACT. (2005) *Connecting College Readiness Standards to the Classroom: For Science Teachers*

SCIENCE TEST
POS/CRS Alignment
Strand 1--Interpretation of Data (IOD)

College Readiness Standards	Science Program of Studies	Math Program of Studies	Language Arts Program of Studies
Score Range 13-15			
Select a single piece of data (numerical or nonnumerical) from a simple data presentation (e.g. a table or graph with two or three variables; a food web diagram)	SC-5-MF-S-2 Students will create and interpret graphical representations in order to make inferences and draw conclusions. SC-5-EU-S-2 Students will create/analyze/explain representations that illustrate the circulation of water (evaporation and condensation) from the surface of the Earth, through the crust, oceans, and atmosphere (water cycle). SC-6-UD-S-3 Students will describe and represent (e.g. construct a chart, diagram, or graphic organizer) relationships between and among levels of organization for structure and function, including cells, tissues, organs, organ systems, organisms (e.g., bacteria, protists, fungi, plants, animals) and ecosystems. SC-H-STM-S-3 Students will construct and/or interpret diagrams that illustrate ionic and covalent bonding.	MA-4-G-S-CG2 Students will locate points on a grid. MA-4-DAP-S-DR4 Students will analyze and make inferences from data displays (e.g., drawings, tables/charts, tally tables, pictographs, bar graphs, circle graphs, line plots, Venn diagrams). MA-5-G-S-CG2 Students will locate points on a grid. MA-5-DAP-S-DR4 Students will analyze and make inferences from data displays (e.g., drawings, tables/charts, tally tables, pictographs, bar graphs, circle graphs, line plots, Venn diagrams, line graphs). MA-6-G-S-CG1 Students will identify and graph ordered pairs on a positive coordinate system, identifying the origin, axes and ordered pairs. MA-7-G-S-CG1 Students will identify and graph ordered pairs on a coordinate system, identifying the origin, axes and ordered pairs. MA-8-G-S-CG1 Students will identify and graph ordered pairs on a coordinate system, identifying the origin, axes and ordered pairs; apply graphing in the coordinate system to solve real-world problems. MA-HS-AT-S-EI5 Students will solve an equation involving several variables for one variable in terms of	EL-11-DIU-S-5 Students will make text-based inferences; state generalizations; draw conclusions based on what is read. EL-11-DIU-S-7 Students will demonstrate understanding of informational passages/texts: a) locate key ideas, information, facts or details b) use information from text to state and support central/main idea c) use information from texts to accomplish a specific task or to answer questions d) use text features and visual information (e.g., maps, charts, graphs) to understand texts

		the others.	
Identify basic features of a table, graph, or diagram (e.g. headings, units of measurement, axis labels)	SC-H-STM-S-13 Students will create and/or interpret graphs and equations to depict and analyze patterns of change. SC-H-MF-S-4 Students will create and analyze graphs, ensuring that they do not misrepresent results by using inappropriate scales or by failing to specify the axes clearly.		EL-11-DIU-S-7 Students will demonstrate understanding of informational passages/texts: d) use text features and visual information (e.g., maps, charts, graphs) to understand texts
Score Range 16-19			
Select two or more pieces of data from a simple data presentation		MA-HS-DAP-S-DR3 Students will display the distribution, analyze patterns and describe relationships in paired data for univariate measurement data. MA-HS-AT-S-EI5 Students will solve an equation involving several variables for one variable in terms of the others.	
Understand basic scientific terminology			EL-11-FF-S-3 Students will use a variety of reading strategies to understand vocabulary and texts: d) interpret the meaning of jargon, dialect, or specialized vocabulary in context
Find basic information in a brief body of text			EL-6-DIU-S-7 Students will demonstrate understanding of informational passages/texts. EL-7-DIU-S-7 Students will demonstrate understanding of informational passages/texts. EL-8-DIU-S-7 Students will demonstrate understanding of informational passages/texts. EL-9-DIU-S-7 Students will demonstrate understanding of informational passages/texts. EL-10-DIU-S-7

			Students will demonstrate understanding of informational passages/texts. EL-11-DIU-S-7 Students will demonstrate understanding of informational passages/texts.
Determine how the value of one variable changes as the value of another variable changes in a simple data presentation	SC-4-MF-S-3 Students will investigate how the rate of vibration of an object changes the pitch (high-low) of the sound it produces. SC-5-ET-S-3 Students will design and conduct investigations/experiments to determine the effects of altering variables within electrical circuits and to draw conclusions about the transfer of energy (e.g., heat, light, sound, and magnetic effects) within a system. SC-8-I-S-1 Students will predict the effects of change on one or more components within an ecosystem by analyzing a variety of data. SC-H-STM-S-13 Students will create and/or interpret graphs and equations to depict and analyze patterns of change.	MA-4-DAP-S-DR1 Students will explore line graphs to show change over time. MA-5-DAP-S-DR2 Students will explore line graphs to show change over time. MA-5-AT-S-PRF3 Students will describe input-output functions through pictures, tables and/or words MA-6-AT-S-PRF4 Students will explain how the change in one quantity affects change in another quantity (e.g., in tables or graphs, input/output tables).	EL-11-DIU-S-5 Students will make text-based inferences; state generalizations; draw conclusions based on what is read
Score Range 20-23			
Select data from a complex data presentation (e.g., a table or graph with more than three variables; a phase diagram)		MA-HS-AT-S-EI5 Students will solve an equation involving several variables for one variable in terms of the others.	EL-11-DIU-S-7 Students will demonstrate understanding of informational passages/texts: c) use information from texts to accomplish a specific task or to answer questions
Compare or combine data from a simple data presentation (e.g., order or sum data from a table)		MA-4-DAP-S-DR5 Students will construct data displays (e.g., pictographs, bar graphs, line plots, Venn diagrams, tables). MA-7-DAP-S-DR3 Students will compare data from various types of graphs. MA-8-DAP-S-DR3 Students will compare similar data from various types of graphs.	EL-11-DIU-S-7 Students will demonstrate understanding of informational passages/texts: c) use information from texts to accomplish a specific task or to answer questions EL-11-IT-S-4 Students will organize ideas within and across texts to show

		MA-8-DAP-S-CD4 Students will compare sets of data.	understanding of central ideas and interrelationships (e.g., charting, semantic mapping, graphic organizers, outlining).
Translate information into a table, graph, or diagram	SC-4-STM-S-8 Students will write clear descriptions of their designs and experiments, present their findings (when appropriate) in tables and graphs (designed by the students). SC-5-EU-S-2 Students will create/analyze/explain representations that illustrate the circulation of water (evaporation and condensation) from the surface of the Earth, through the crust, oceans, and atmosphere (water cycle). SC-5-EU-S-6 Students will use a variety of models and graphic representations to obtain and organize data in order to compare the major components of our solar system. SC-5-I-S-4 Students will analyze, create and describe visual representations of ecosystems and the interactions occurring within them. Compare and critique pre-existing and student-constructed representations for accuracy, identifying strengths and limitations, insisting on the use of evidence to support decisions. SC-7-EU-S-5 Students will model the layers of the Earth, explain interactions between them and describe potential results of those interactions. SC-7-UD-S-3 Students will describe the differences between learned and inherited behaviors and characteristics, and classify examples of each using tables, graphs or diagrams. SC-8-ET-S-8 Students will graphically represent energy flow within an ecosystem to identify the existing relationships.	MA-4-DAP-S-DR5 Students will construct data displays (e.g., pictographs, bar graphs, line plots, Venn diagrams, tables). MA-4-DAP-S-DR3 Students will pose questions and choose an appropriate method to collect, organize and display student-collected data to answer the questions. MA-6-DAP-S-DR2 Students will collect, organize, construct, analyze and interpret data in a variety of graphical methods, including line plots, line graphs, circle graphs, bar graphs and stem-and-leaf plots. MA-6-DAP-S-DR3 Students will compare data from various types of graphs. MA-7-DAP-S-DR1 Students will collect, organize, construct, analyze and interpret data and data displays in a variety of graphical methods, including circle graphs, multiple line graphs, double bar graphs and double stem-and-leaf plots MA-7-DAP-S-DR4 Students will relate different representations of data (e.g., tables, graphs, diagrams, plots). MA-8-DAP-S-DR1 Students will collect, organize, construct, analyze and make inferences from data in a variety of graphical methods (e.g., drawings, tables/charts, pictographs, bar graphs, circle graphs, line plots, Venn diagrams, line graphs, steMA-and-leaf plots, scatter plots, histograms, box-and-whiskers plots).	EL-11-FF-S-3 Students will use a variety of reading strategies to understand vocabulary and texts: a) formulate questions to guide reading (before, during and after reading) EL-11-DIU-S-7 Students will demonstrate understanding of informational passages/texts: a) locate key ideas, information, facts or details b) use information from text to state and support central/main idea c) use information from texts to accomplish a specific task or to answer questions d) use text features and visual information (e.g., maps, charts, graphs) to understand texts EL-11-RRT-S-1 Students will use comprehension strategies while reading, listening to, or viewing literary and informational texts to analyze or evaluate content or make connections. EL-11-WC-S-2 Students will write to demonstrate learning and understanding of content knowledge (e.g., on-demand writing, research papers and essays, lab reports).

	SC-8-I-S-3 Students will model the flow of energy and transfer of matter within ecosystems, communities and niches. SC-H-STM-S-3 Students will construct and/or interpret diagrams that illustrate ionic and covalent bonding. SC-H-STM-S-13 Students will create and/or interpret graphs and equations to depict and analyze patterns of change. SC-H-MF-S-1 Students will design and conduct investigations involving the motion of objects and report the results in a variety of ways. SC-H-MF-S-4 Students will create and analyze graphs, ensuring that they do not misrepresent results by using inappropriate scales or by failing to specify the axes clearly. SC-H-UD-S-4 Students will graphically represent (e.g., pedigrees, punnet squares) and predict the outcomes of a variety of genetic combinations.		
Score Range 24-27			
Compare or combine data from two or more simple data presentations (e.g., categorize data from a table using a scale from another table)	SC-H-MF-S-1 Students will design and conduct investigations involving the motion of objects and report the results in a variety of ways.		EL-11-DCS-S-7 Students will make comparisons and synthesize information within and across texts (e.g., comparing themes, ideas, concept development, literary elements, events, genres).
Compare or combine data from a complex data presentation			EL-11-DCS-S-7 Students will make comparisons and synthesize information within and across texts (e.g., comparing themes, ideas, concept development, literary elements, events, genres).

Interpolate between data points in a table or graph	SC-H-STM-S-13 Students will create and/or interpret graphs and equations to depict and analyze patterns of change.	MA-HS-AT-S-EI5 Students will solve an equation involving several variables for one variable in terms of the others. MA-HS-DAP-S-DR5 Students will display and discuss bivariate data where at least one variable is categorical. MA-HS-DAP-S-CDS5 Students will apply line-of-best fit equations for a set of two-variable data to make predictions. MA-HS-DAP-S-CDS6 Students will collect, organize and display bivariate data and use a curve of best fit as a model to make predictions.	EL-11-DCS-S-7 Students will make comparisons and synthesize information within and across texts (e.g., comparing themes, ideas, concept development, literary elements, events, genres). EL-11-DIU-S-7 Students will demonstrate understanding of informational passages/texts: a) locate key ideas, information, facts or details d) use text features and visual information (e.g., maps, charts, graphs) to understand texts
Determine how the value of one variable changes as the value of another variable changes in a complex data presentation	SC-8-I-S-1 Students will predict the effects of change on one or more components within an ecosystem by analyzing a variety of data. SC-H-STM-S-13 Students will create and/or interpret graphs and equations to depict and analyze patterns of change.	MA-HS-DAP-S-CDS3 Students will recognize how linear transformations of univariate data affect shape, center and spread.	EL-11-RRT-S-1 Students will use comprehension strategies while reading, listening to, or viewing literary and informational texts to analyze or evaluate content or make connections. EL-11-DCS-S-8 Students will evaluate arguments, interpret and analyze information from multiple sources; for example, synthesize arguments or claims to discover the relationship between the parts, understand induction and deduction, determine unstated assumptions.
Identify and/or use a simple (e.g., linear) mathematical relationship between data	SC-H-STM-S-13 Students will create and/or interpret graphs and equations to depict and analyze patterns of change.	MA-HS-G-S-CG2 Students will describe a line by a linear equation. MA-HS-DAP-S-CDS7 Students will identify trends in bivariate data and find functions that model the data or transform the data, so that they can be modeled.	EL-11-DIU-S-1 Students will use comprehension strategies (e.g., using prior knowledge, generating clarifying, literal and inferential questions, constructing sensory images, locating and using text features) while reading, listening to, or viewing literary and informational texts. EL-11-DIU-S-7 Students will demonstrate understanding of informational passages/texts: a) locate key ideas, information, facts or details

			b) use information from text to state and support central/main idea c) use information from texts to accomplish a specific task or to answer questions d) use text features and visual information (e.g., maps, charts, graphs) to understand texts
Analyze given information when presented with new, simple information			EL-11-RRT-S-1 Students will use comprehension strategies while reading, listening to, or viewing literary and informational texts to analyze or evaluate content or make connections.

Score Range 28-32			
Compare or combine data from a simple data presentation with data from a complex data presentation			EL-11-DCS-S-7 Students will make comparisons and synthesize information within and across texts (e.g., comparing themes, ideas, concept development, literary elements, events, genres).
Identify and/or use a complex (e.g., nonlinear) mathematical relationship between data	SC-H-STM-S-13 Students will create and/or interpret graphs and equations to depict and analyze patterns of change.	MA-HS-G-S-CG2 Students will describe a line by a linear equation. MA-HS-DAP-S-CDS7 Students will identify trends in bivariate data and find functions that model the data or transform the data, so that they can be modeled.	EL-11-DCS-S-7 Students will make comparisons and synthesize information within and across texts (e.g., comparing themes, ideas, concept development, literary elements, events, genres). EL-11-DIU-S-7 Students will demonstrate understanding of informational passages/texts: a) locate key ideas, information, facts or details d) use text features and visual information (e.g., maps, charts, graphs) to understand texts
Extrapolate from data points in a table or graph	SC-H-STM-S-13 Students will create and/or interpret graphs and equations to depict and analyze patterns of change Students will use evidence/data from chemical reactions to predict the effects of changes in variables (concentration, temperature, properties of reactants, surface area and catalysts).	MA-HS-NPO-S-NO6 Students will describe and extend arithmetic and geometric sequences. MA-HS-AT-S-EI5 Students will solve an equation involving several variables for one variable in terms of the others. MA-HS-DAP-S-DR5 Students will display and discuss bivariate data where at least one variable is categorical. MA-HS-DAP-S-CDS5 Students will apply line-of-best fit equations for a set of two-variable data to make predictions. MA-HS-DAP-S-CDS6 Students will collect, organize and display bivariate data and use a curve of best fit as	EL-11-DCS-S-7 Students will make comparisons and synthesize information within and across texts (e.g., comparing themes, ideas, concept development, literary elements, events, genres). EL-11-DIU-S-7 Students will demonstrate understanding of informational passages/texts: a) locate key ideas, information, facts or details d) use text features and visual information (e.g., maps, charts, graphs) to understand texts

		a model to make predictions.	

Score Range 33-36			
Compare or combine data from two or more complex data presentations			EL-11-DCS-S-7 Students will make comparisons and synthesize information within and across texts (e.g., comparing themes, ideas, concept development, literary elements, events, genres). EL-11-DIU-S-7 Students will demonstrate understanding of informational passages/texts: a) locate key ideas, information, facts or details d) use text features and visual information (e.g., maps, charts, graphs) to understand texts
Analyze given information when presented with new, complex information			EL-11-DCS-S-7 Students will make comparisons and synthesize information within and across texts (e.g., comparing themes, ideas, concept development, literary elements, events, genres). EL-11-DIU-S-7 Students will demonstrate understanding of informational passages/texts: a) locate key ideas, information, facts or details d) use text features and visual information (e.g., maps, charts, graphs) to understand texts

Science
POS/CRS Alignment
Strand 2--Scientific Investigation (SIN)

College Readiness Standards	Science Program of Studies	Math Program of Studies	Language Arts Program of Studies
Score Range13-15			
Score Range 16-19			
Understand the methods and tools used in a simple experiment	SC-4-ET-S-6 Students will design and conduct investigations/experiments to compare properties of conducting and non-conducting materials (both heat and electrical), documenting and communicating (speak, draw, write, demonstrate) observations, designs, procedures and results of scientific investigations. SC-5-STM-S-1 Students will use appropriate tools (e.g., balance, thermometer, graduated cylinder) and observations to describe physical properties of substances (e.g., boiling point, solubility, density) and to classify materials. SC-6-MF-S-1 Students will use observations and appropriate tools (e.g., timer, meter stick, balance, spring scale) to document the position and motion of objects. SC-7-MF-S-1 Students will use appropriate tools and technology (e.g., timer, meter stick, balance, spring scale) to investigate the position, speed and motion of objects. SC-H-STM-S-12 Students will design and conduct experiments to determine the conductivity of various materials. SC-H-MF-S-1 Students will design and conduct investigations involving the motion of objects and report the results in a variety of ways.	MA-4-M-S-MPA7 Students will choose and use appropriate tools (e.g., thermometer, scale, balance, clock, meter stick) for specific measurement tasks. MA-7-DAP-S-ES2 Students will explore how sample size affects the reliability of the outcome. MA-HS-DAP-S-ES2 Students will know the characteristics of well-designed studies, including the role of randomization in surveys and experiments	EL-11-WC-S-2 Students will write to demonstrate learning and understanding of content knowledge (e.g., on-demand writing, research papers and essays, lab reports). EL-11-WC-S-2 Students will write to demonstrate learning and understanding of content knowledge (e.g., on-demand writing, research papers and essays, lab reports): • analyze and communicate through authentic transactive purposes for writing (e.g., explaining, persuading, analyzing, synthesizing, evaluating) EL-11-WC-S-5 Students will develop ideas that are logical, justified and suitable for a variety of purposes, audiences and forms of writing.

Score Range 20-23			
Understand the methods and tools used in a moderately complex experiment	SC-7-I-S-5 Students will design and conduct investigations of changes to abiotic and biotic factors in ecosystems, document and communicate observations, procedures, results and conclusions. SC-H-STM-S-12 Students will design and conduct experiments to determine the conductivity of various materials. SC-H-MF-S-1 Students will design and conduct investigations involving the motion of objects and report the results in a variety of ways.	MA-HS-DAP-S-ES4 Students will evaluate published reports that are based on interpretations of data by examining the design of the study, the appropriateness of the data analysis and the validity of the conclusions.	EL-11-WC-S-2 Students will write to demonstrate learning and understanding of content knowledge (e.g., on-demand writing, research papers and essays, lab reports).
Understand a simple experimental design	SC-6-UD-S-4 Students will design and conduct scientific investigations to make inferences about factors influencing the behavior of organisms, and compare the results with those of investigations done by others. SC-7-I-S-5 Students will design and conduct investigations of changes to abiotic and biotic factors in ecosystems, document and communicate observations, procedures, results and conclusions. SC-H-STM-S-5 Students will identify and test variables that affect reaction rates. SC-H-STM-S-12 Students will design and conduct experiments to determine the conductivity of various materials. SC-H-MF-S-1 Students will design and conduct investigations involving the motion of objects and report the results in a variety of ways.	MA-4-DAP-S-DR3 Students will pose questions and choose an appropriate method to collect, organize and display student-collected data to answer the questions. MA-5-DAP-S-DR1 Students will choose and use appropriate means to collect and represent data. MA-5-DAP-S-DR3 Students will pose questions and choose an appropriate method to collect, organize and display student-collected data to answer the questions. MA-8-DAP-S-DR2 Students will select an appropriate graph to represent data and justify its use. MA-HS-DAP-S-ES6 Students will design and conduct simple experiments or investigations to collect data to answer student generated questions.	EL-11-WC-S-2 Students will write to demonstrate learning and understanding of content knowledge (e.g., on-demand writing, research papers and essays, lab reports).

Identify a control in an experiment	SC-H-STM-S-12 Students will design and conduct experiments to determine the conductivity of various materials SC-H-MF-S-1 Students will design and conduct investigations involving the motion of objects and report the results in a variety of ways. SC-5-MF-S-3 Students will design and conduct experiments to examine the effects of variables on the straight line motion of objects. Analyze, review, and critique each other's experiments.		
Identify similarities and differences between experiments	SC-8-MF-S-3 Students will investigate motion of objects to generate and experimentally test predictions/conclusions. Compare and critique the results of others for accuracy, identifying strengths and weaknesses in the experiment, insisting on the use of evidence to support decisions.		
Score Range 24-27			
Understand the methods and tools used in a complex experiment	SC-H-STM-S-5 Students will identify and test variables that affect reaction rates. SC-H-STM-S-12 Students will design and conduct experiments to determine the conductivity of various materials.		
Understand a complex experimental design	SC-H-STM-S-12 Students will design and conduct experiments to determine the conductivity of various materials.		
Predict the results of an additional trial or measurement in an experiment	SC-5-MF-S-3 Students will design and conduct experiments to examine the effects of variables on the straight line motion of objects. Analyze, review, and critique each other's experiments. SC-8-MF-S-2		

	Students will explain and experimentally verify how Newton's Laws show that forces between objects affect their motion, allowing future positions to be predicted from their present speeds and positions. SC-H-STM-S-12 Students will design and conduct experiments to determine the conductivity of various materials. SC-H-MF-S-1 Students will design and conduct investigations involving the motion of objects and report the results in a variety of ways.		
Determine the experimental conditions that would produce specified results	SC-5-ET-S-4 Students will design and conduct investigations/experiments to identify predictable patterns of interaction between light and matter (e.g. some materials are more reflective, different liquids refract differently, effects of multiple or differing light sources). SC-8-MF-S-2 Students will explain and experimentally verify how Newton's Laws show that forces between objects affect their motion, allowing future positions to be predicted from their present speeds and positions. SC-8-MF-S-3 Students will investigate motion of objects to generate and experimentally test predictions/conclusions. Compare and critique the results of others for accuracy, identifying strengths and weaknesses in the experiment, insisting on the use of evidence to support decisions. SC-H-STM-S-12 Students will design and conduct experiments to determine the conductivity of various materials. SC-H-MF-S-1 Students will design and conduct investigations involving the motion of objects and report the results in a variety of ways.		

Score Range 28-32			
Determine the hypothesis for an experiment			
Identify an alternate method for testing a hypothesis			
Score Range 33-36			
Understand precision and accuracy issues	SC-8-MF-S-3 Students will investigate motion of objects to generate and experimentally test predictions/conclusions. Compare and critique the results of others for accuracy, identifying strengths and weaknesses in the experiment, insisting on the use of evidence to support decisions.	MA-HS-M-S-MPA2 Students will analyze precision, accuracy and approximate error in measurement situations. MA-HS-DAP-S-ES5 Students will explain the impact of sampling methods, bias and the phrasing of questions asked during data collection and the conclusions that can be justified.	EL-11-DCS-S-7 Students will evaluate the accuracy of information presented in texts. EL-11-DCS-S-8 Students will evaluate arguments, interpret and analyze information from multiple sources; for example, synthesize arguments or claims to discover the relationship between the parts, understand induction and deduction, determine unstated assumptions. EL-11-DCS-S-9 Students will evaluate claims and evidences. EL-11-DCS-10 Students will evaluate the range and quality of evidence used to support or oppose an argument. EL-11-WP-S-4 Students will revise: • confer to determine where to add, delete, rearrange, define/redefine or elaborate content so that writing is coherent and effective for intended audience, then make revisions • identify and develop topic sentences, making sure ideas are supported appropriately with relevant details and that sentences are in sequential order; insert new sentences and delete unnecessary ones; develop effective introductions and conclusions; eliminate redundant words; choose the most precise words available

Predict how modifying the design or methods of an experiment will affect results	SC-H-STM-S-12 Students will design and conduct experiments to determine the conductivity of various materials. SC-H-MF-S-1 Students will design and conduct investigations involving the motion of objects and report the results in a variety of ways.		
Identify an additional trial or experiment that could be performed to enhance or evaluate experimental results	SC-H-STM-S-12 Students will design and conduct experiments to determine the conductivity of various materials. SC-H-MF-S-1 Students will design and conduct investigations involving the motion of objects and report the results in a variety of ways.		

Science
POS/CRS Alignment
Strand 3--Evaluation of Models, Inferences, and Experimental Results (EMI)

College Readiness Standards	Science Program of Studies	Math Program of Studies	Language Arts Program of Studies
Score Range 13-15			
Score Range 16-19			
Score Range 20-23			
Select a simple hypothesis, prediction, or conclusion that is supported by a data presentation or a model	SC-4-EU-S-2 Students will analyze weather data to make predictions about future weather. SC-5-MF-S-4 Students will predict, and support with evidence/justification, changes in the motion of an object related to its mass or the amount of force acting on it. SC-6-MF-S-2 Students will use graphical and observational data to make inferences, predictions and draw conclusions about the motion of an object as related to the mass or force involved. SC-6-BC-S-5 Students will generate questions about the diversity of species, then collect information from a variety of sources to formulate explanations supported by scientific evidence. SC-7-BC-S-3 Students will use information from the fossil record to investigate changes in organisms and their environments to make inferences about past life forms and environmental conditions. SC-7-ET-S-2 Students will model, explain and analyze the flow of energy in ecosystems and draw conclusions about the role of organisms in an	MA-4-DAP-S-CD1 Students will draw conclusions based on data. MA-5-DAP-S-CD1 Students will draw conclusions and make predictions based on data. MA-6-DAP-S-CD1 Students will make predictions, draw conclusions and verify results from statistical data and probability experiments.	EL-6-FF-S-2 Students will make predictions while reading. EL-6-IT-S-6 Students will demonstrate understanding of informational passages/texts: c) use evidence/references from the text to state central/main idea and details that support them; explain the importance of details in a passage EL-7-IT-S-6 Students will demonstrate understanding of informational passages/texts: c) use evidence/references from the text to state central/main idea and details that support them; explain the importance of details in a passage EL-8-IT-S-6 Students will demonstrate understanding of informational passages/texts: c) understand cause-effect inferences d) identify an author's arguments and identify evidence from the passage to support the author's argument EL-11-DCS-S-4 Students will form and support warranted judgments/opinions/conclusions about central ideas. EL-11-DIU-S-5

	ecosystem. SC-7-I-S-3 Students will identify a species which has become extinct and analyze data/evidence to infer the contributing factors which led to extinction.		Students will make text-based inferences; state generalizations; draw conclusions based on what is read.
Identify key issues or assumptions in a model	SC-4-EU-S-6 Students will explore, design and evaluate a number of models (e.g., physical, analogous, conceptual) of Earth-Sun and Earth-Sun-Moon systems for benefits, limitations and accuracy (e.g., scale, proportional relationships). SC-6-EU-S-2 Students will investigate, create and identify the limitations of models which can be used to substantiate and predict the actual results (e.g. moon phases, seasons, eclipses) of the interactions of the sun, moon and Earth. SC-7-EU-S-4 Students will analyze the evidence used to infer the composition of the Earth's interior and evaluate the models based upon that evidence. SC-8-I-S-3 Students will model the flow of energy and transfer of matter within ecosystems, communities and niches. SC-H-EU-S-3 Students will analyze the supporting evidence for the nebular theory of formation of the solar system. SC-H-EU-S-4 Students will analyze the supporting evidence for the Big Bang theory of formation of the universe. SC-H-BC-S-1 Students will identify evidence of change in species using fossils,	MA-HS-DAP-S-CDS12 Students will evaluate reports based on data published in the media by considering the source of the data, the design of the study and the way the data are displayed and analyzed.	EL-6-DCS-S-9 Students will evaluate arguments, interpret, and analyze information from multiple sources by synthesizing arguments or claims to discover the relationship between the parts. EL-8-DCS-S-9 Students will evaluate the quality of evidence used to support or oppose an argument. EI-9-DCS-9 Students will evaluate arguments, interpret and analyze information from multiple sources; for example, synthesize arguments or claims to discover the relationship between the parts, understand induction and deduction, determine unstated assumptions.

	DNA sequences, anatomical similarities, physiological similarities and embryology.		

Score Range 24-27			
Select a simple hypothesis, prediction, or conclusion that is supported by two or more data presentations or models		MA-HS-DAP-S-ES4 Students will evaluate published reports that are based on interpretations of data by examining the design of the study, the appropriateness of the data analysis and the validity of the conclusions.	EL-8-DCS-S-8 Students will evaluate arguments, interpret and analyze information from multiple sources by synthesizing arguments or claims to discover the relationship between the parts. EL-9-DCS-8 Students will evaluate the accuracy of information presented in texts. EI-9-DCS-9 Students will evaluate arguments, interpret and analyze information from multiple sources; for example, synthesize arguments or claims to discover the relationship between the parts, understand induction and deduction, determine unstated assumptions.
Determine whether given information supports or contradicts a simple hypothesis or conclusion, and why	SC-8-I-S-4 Students will evaluate the risks and benefits of human actions affecting the environment and identify which populations will be harmed or helped. Use a variety of data/ sources to support or defend a position related to a proposed action, both orally and in writing. Analyze the validity of other arguments. SC-H-MS-7 Students will create conceptual and mathematical models of motion and test them against real-life phenomena. SC-H-EU-S-3 Students will analyze the supporting evidence for the nebular theory of formation of the solar system. SC-H-EU-S-4 Students will analyze the supporting evidence for the Big Bang theory of formation of the universe. SC-H-I-S-4 Students will examine existing models of global population growth and the factors affecting population change (e.g., geography,	MA-HS-DAP-S-ES4 Students will evaluate published reports that are based on interpretations of data by examining the design of the study, the appropriateness of the data analysis and the validity of the conclusions.	EL-7-DCS-S-11 Students will evaluate the quality of evidence used to support or oppose an argument. EL-7-DCS-S-13 Students will recognize faulty reasoning and false premises in an argument. EL-9-IT-S-5 Students will demonstrate understanding of informational passages/texts: d) use text references to support conclusions about what is read; for example, an author's opinion about a subject g) accept or reject an argument based on evidence EL-10-IT-S-6 Students will demonstrate understanding of informational passages/texts: d) use text references to support conclusions about what is read; for example, an author's opinion about a subject e) understand cause-effect inferences

	diseases, natural events, birth/death rates). Propose and defend solutions to identified problems of population change.		g) accept or reject an argument based on evidence
Identify strengths and weaknesses in one or more models	SC-4-EU-S-6 Students will explore, design and evaluate a number of models (e.g., physical, analogous, conceptual) of Earth-Sun and Earth-Sun-Moon systems for benefits, limitations and accuracy (e.g., scale, proportional relationships). SC-5-EU-S-8 Students will explain why scale models are important tools for understanding a number of phenomena (e.g., solar system, watersheds, earth's atmosphere) but are not always easy to construct or require trade-offs in other aspects of the model (e.g. distance vs. size). SC-7-BC-S-4 Students will compare the results from a variety of investigations (based on similar hypotheses) to identify differences between their outcomes/conclusions and propose reasonable explanations for those discrepancies. SC-8-EU-S-4 Students will discuss and identify the strengths and limitations of a variety of physical and conceptual scientific models. SC-H-MF-S-7 Students will create conceptual and mathematical models of motion and test them against real-life phenomena. SC-H-EU-S-1 Students will compare methods used to measure the ages of geologic features. SC-H-EU-S-3 Students will analyze the supporting evidence for the nebular theory of formation of the solar system.		EL-7-DCS-S-8 Students will evaluate the accuracy of information presented in texts. EL-9-IT-S-5 Students will demonstrate understanding of informational passages/texts: d) use text references to support conclusions about what is read; for example, an author's opinion about a subject g) accept or reject an argument based on evidence EL-10-IT-S-6 Students will demonstrate understanding of informational passages/texts: d) use text references to support conclusions about what is read; for example, an author's opinion about a subject e) understand cause-effect inferences g) accept or reject an argument based on evidence

	SC-H-EU-S-4 Students will analyze the supporting evidence for the Big Bang theory of formation of the universe. SC-H-I-S-4 Students will examine existing models of global population growth and the factors affecting population change (e.g., geography, diseases, natural events, birth/death rates). Propose and defend solutions to identified problems of population change.		
Identify similarities and differences between models	SC-7-BC-S-4 Students will compare the results from a variety of investigations (based on similar hypotheses) to identify differences between their outcomes/conclusions and propose reasonable explanations for those discrepancies. SC-8-EU-S-4 Students will discuss and identify the strengths and limitations of a variety of physical and conceptual scientific models. SC-H-MF-S-7 Students will create conceptual and mathematical models of motion and test them against real-life phenomena. SC-H-I-S-4 Students will examine existing models of global population growth and the factors affecting population change (e.g., geography, diseases, natural events, birth/death rates). Propose and defend solutions to identified problems of population change.	MA-HS-DAP-S-ES1 Students will understand and explain the differences among various kinds of studies (e.g., randomized experiments and observational studies) and which types of inferences can be legitimately be drawn from each.	
Determine which model(s) is (are) supported or weakened by new information	SC-H-MF-S-7 Students will create conceptual and mathematical models of motion and test them against real-life phenomena. SC-H-I-S-4 Students will examine existing models of global population growth and the factors affecting population change (e.g., geography,	MA-HS-DAP-S-ES1 Students will understand and explain the differences among various kinds of studies (e.g., randomized experiments and observational studies) and which types of inferences can be legitimately be drawn from each.	EL-7-DCS-S-13 Students will recognize faulty reasoning and false premises in an argument. EL-9-IT-S-5 Students will demonstrate understanding of informational passages/texts: g) accept or reject an argument based on evidence

	diseases, natural events, birth/death rates). Propose and defend solutions to identified problems of population change.		EL-10-IT-S-6 Students will demonstrate understanding of informational passages/texts: d) use text references to support conclusions about what is read; for example, an author's opinion about a subject e) understand cause-effect inferences g) accept or reject an argument based on evidence EL-10-DCS-S-10 Students will identify claims and evidences and evaluate connections among evidences and inferences. EL-11-DCS-S-9 Students will evaluate claims and evidences. EL-11-DCS-10 Students will evaluate the range and quality of evidence used to support or oppose an argument.
Select a data presentation or a model that supports or contradicts a hypothesis, prediction or conclusion	SC-H-MF-S-7 Students will create conceptual and mathematical models of motion and test them against real-life phenomena. SC-H-I-S-4 Students will examine existing models of global population growth and the factors affecting population change (e.g., geography, diseases, natural events, birth/death rates). Propose and defend solutions to identified problems of population change.	MA-7-DAP-S-DR6 Students will make decisions about how misleading representations affect interpretations and conclusions about data (e.g. changing the scale on a graph). MA-8-DAP-S-DR4 Students will relate different representations of data (e.g., tables, graphs, diagrams, plots) and explain how misleading representations affect interpretations and conclusions about data.	EL-7-DCS-S-11 Students will evaluate the quality of evidence used to support or oppose an argument.
Score Range 28-32			
Select a complex hypothesis, prediction, or conclusion that is supported by a data presentation or model		MA-HS-DAP-S-ES4 Students will evaluate published reports that are based on interpretations of data by examining the design of the study, the appropriateness of the data analysis and the validity of the conclusions.	EL-10-IT-S-6 Students will demonstrate understanding of informational passages/texts: d) use text references to support conclusions about what is read; for example, an author's opinion about a subject

			e) understand cause-effect inferences g) accept or reject an argument based on evidence EL-11-IT-S-6 Students will demonstrate understanding of informational passages/texts: d) use text references to support conclusions about what is read; for example, author's opinion about a subject e) accept or reject arguments using supporting evidence
Determine whether new information supports or weakens a model, and why	SC-H-STM-S-6 Students will use evidence/data from chemical reactions to predict the effects of changes in variables (concentration, temperature, properties of reactants, surface area and catalysts). SC-H-UD-S-11 Students will identify and investigate areas of current research/innovation in biological science. Make inferences/predictions of the effects of this research on society and/or the environment and support or defend these predictions with scientific data.		EL-10-IT-S-6 Students will demonstrate understanding of informational passages/texts: d) use text references to support conclusions about what is read; for example, an author's opinion about a subject e) understand cause-effect inferences g) accept or reject an argument based on evidence EL-11-IT-S-6 Students will demonstrate understanding of informational passages/texts: d) use text references to support conclusions about what is read; for example, author's opinion about a subject e) accept or reject arguments using supporting evidence EL-11-DCS-S-7 Students will make comparisons and synthesize information within and across texts (e.g., comparing themes, ideas, concept development, literary elements, events, genres).
Use new information to make a prediction based on a model			

Score Range 33-36			
Select a complex hypothesis, prediction, or conclusion that is supported by two or more data presentations or models			EL-11-IT-S-6 Students will demonstrate understanding of informational passages/texts: d) use text references to support conclusions about what is read; for example, author's opinion about a subject e) accept or reject arguments using supporting evidence
Determine whether given information supports or contradicts a complex hypothesis or conclusion, and why	SC-H-STM-S-6 Students will use evidence/data from chemical reactions to predict the effects of changes in variables (concentration, temperature, properties of reactants, surface area and catalysts). SC-H-UD-S-11 Students will identify and investigate areas of current research/innovation in biological science. Make inferences/predictions of the effects of this research on society and/or the environment and support or defend these predictions with scientific data.		EL-10-IT-S-6 Students will demonstrate understanding of informational passages/texts: d) use text references to support conclusions about what is read; for example, an author's opinion about a subject e) understand cause-effect inferences g) accept or reject an argument based on evidence EL-11-IT-S-6 Students will demonstrate understanding of informational passages/texts: d) use text references to support conclusions about what is read; for example, author's opinion about a subject e) accept or reject arguments using supporting evidence EL-11-DCS-S-7 Students will make comparisons and synthesize information within and across texts (e.g., comparing themes, ideas, concept development, literary elements, events, genres).

Science Test
EPAS Test Breakdown
Supplemental Information

What does the Science Test Measure? The Science Test is "designed to assess the knowledge and thinking skills, processes, and strategies students acquire in…science courses. These skills include analyzing and interpreting data, comparing experimental designs and methods, comparing assumptions underlying experiments, making generalizations, and identifying and evaluating conflicting points of view….The intent is to present students with a situation to engage their reasoning skills…" The Science Test is not a test of content knowledge; however, the questions presented are in the context of science.

Science Test		
EXPLORE	**EXPLORE Science Test Design—**30 minutes to complete 6 sets of questions and answer 28 multiple choice questions	
	Science Context—Life, Earth/Space, Physical	
	Content Area (Strands)	**Percent of Questions**
	Data Representation—graph reading, interpretation of scatterplots , and interpretation of information presented in tables	43%
	Research Summaries—questions focus upon the design of experiments and the interpretation of experimental results	36%
	Conflicting Viewpoints—questions focus upon the understanding, analysis, comparison, and evaluation of the alternative viewpoints	21%
PLAN	**PLAN Science Test Design—**25 minutes to complete 5 sets of questions and answer 30 multiple choice questions	
	Science Context—Life, Earth/Space, Physical, Chemistry	
	Content Area (Strands)	**Percent of Questions**
	Data Representation-- graph reading, interpretation of scatterplots , and interpretation of information presented in tables	33%
	Research Summaries—questions focus upon the design of experiments and the interpretation of experimental results	47%
	Conflicting Viewpoints—questions focus upon the understanding, analysis, comparison, and evaluation of the alternative viewpoints	20%
ACT	**ACT Science Test Design**—35 minutes to complete 7 sets of questions and answer 40 multiple choice questions	
	Science Context—Life, Earth/Space, Physical, Chemistry	
	Content Area (Strands)	**Percent of Questions**
	Data Representation— graph reading, interpretation of scatterplots , and interpretation of information presented in tables	38%
	Research Summaries—questions focus upon the design of experiments and the interpretation of experimental results	45%

	Conflicting Viewpoints—questions focus upon the understanding, analysis, comparison, and evaluation of the alternative viewpoints	17%

Science Strands

Interpretation of Data (IOD)
Scientific Investigation (SIN)
Evaluation of Models, Inferences, and Experimental Results (EMI)

The Science Test contains questions that fall under three cognitive levels.

- Understanding—these questions are based upon the comprehension of the information presented.
- Analysis—these questions relate a number of various components to one another.
- Generalization—these questions ask one to think beyond the presented material.

Reference

The ACT: Connecting College Readiness Standards to the Classroom for Science Teachers. ACT, Inc., Iowa City, IA. 2005: 12-13.