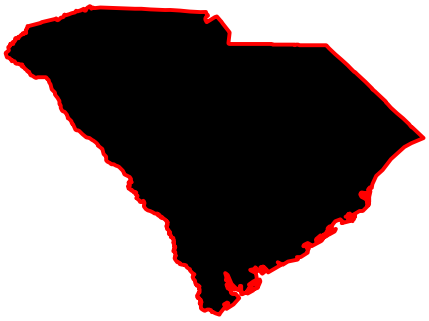

STATE MATCH

South Carolina Academic Standards

English Language Arts, Mathematics, and Science
Grades 8–12

and

EXPLORE®, PLAN®, the ACT®, and WorkKeys®

December 2007

ACT®

About This Report

EXECUTIVE SUMMARY
(pp 1–3)

This portion summarizes the findings of the alignment between South Carolina's Academic Standards and ACT's Educational Planning and Assessment System (EPAS™) tests—EXPLORE® (8th, and 9th grades); PLAN® (10th grade); and the ACT® (11th and 12th grades) and ACT's WorkKeys® assessments (Reading for Information, Applied Mathematics, and Locating Information). It also presents ACT's involvement in meeting NCLB requirements and describes additional critical information that ACT could provide to South Carolina.

SECTION A
(pp. 5–7)

This section provides tables by content area (English Language Arts, Mathematics, and Science) listing the precise number of South Carolina Academic Standards measured by ACT's EPAS tests and WorkKeys assessments by grade level.

SECTION B
(pp. 9–43)

All South Carolina Academic Standards are listed here; each one highlighted is measured by ACT's EPAS tests and/or WorkKeys assessments. South Carolina Standards listed here are from the South Carolina Academic Standards as presented on the South Carolina Department of Education's website in April 2007:

South Carolina Academic Standards	Document Dated
English Language Arts Academic Standards	2007
Mathematics Academic Standards	2007
Science Academic Standards	11/2005

Underlined science content indicates that the content topics are included in, but not directly measured by, ACT's EPAS Science tests.

SECTION C
(pp. 45–54)

ACT's College Readiness Standards™ appear here. Highlighting indicates that a statement reflects one or more statements in the South Carolina Standards. College Readiness Standards® not highlighted are not addressed in the South Carolina Standards.

SECTION D
(pp. 55–56)

WorkKeys Skills appear here. Highlighting indicates that a statement reflects one or more statements in the South Carolina Standards. Skills not highlighted are not addressed in the South Carolina Standards.

A supplement is available that identifies the specific ACT College Readiness Standard(s) and WorkKeys Skill(s) corresponding to each South Carolina Academic Standard in a side-by-side format. To request this supplement, please e-mail ACT at **statematch@act.org**.

Executive Summary

We at ACT believe our programs offer many advantages to South Carolina students and educators, and this report offers strong evidence for this belief. This alignment analysis clearly answers four critical questions:

1. To what extent do ACT's Educational Planning and Assessment System (EPAS™) tests—EXPLORE® (8th and 9th grades); PLAN® (10th grade); and the ACT® (11th and 12th grades)—and ACT's WorkKeys® assessments (Reading for Information, Applied Mathematics, and Locating Information) measure South Carolina's Standards?
2. Can the results from ACT's testing programs be used to meet South Carolina's NCLB requirement?
3. Why should South Carolina choose EPAS?
4. Why choose to include WorkKeys assessments?

ACT'S TESTS MEASURE MOST OF SOUTH CAROLINA'S ACADEMIC STANDARDS IN ENGLISH LANGUAGE ARTS, MATHEMATICS, AND SCIENCE.

1. Match Results: Comparisons conducted by our content specialists show that ACT's Reading, English, Writing, Mathematics, and Science tests and WorkKeys Reading for Information and Applied Mathematics measure nearly all of South Carolina's English Language Arts, Mathematics, and Science Standards:

- English Language Arts: 2 out of 3 Strands

  Almost all of South Carolina's English Language Arts Standards are covered by ACT's EPAS English, Reading, and Writing tests and WorkKeys Reading for Information assessment.

- Mathematics: 35 out of 36 Standards across the Mathematics courses

  All of South Carolina's Mathematics Standards, Strands, and nearly all content topic expectations are covered by ACT's EPAS Mathematics tests and WorkKeys Applied Mathematics assessment.

- Science:

  Almost all of the indicators listed under the Scientific Inquiry Standard in each science course are directly measured by ACT's EPAS Science tests. All other standards across the science courses are indirectly measured by EPAS Science tests.

  (A note about science content: ACT's Science tests present content from biology, chemistry, physics, and Earth/space sciences. Although content knowledge in these content areas is needed to answer some of the test questions, the test questions emphasize scientific reasoning and are based in experimental science contexts. Factual content knowledge, although needed to answer some of the test questions, is not systematically sampled from the full content knowledge domain. Therefore, each ACT Science Test covers some, but not all, of the discrete science content knowledge specifically described in the South Carolina Science Standards.

  To emphasize the point that content is included, but not necessarily covered in its entirety, on every test form, science content match results appear in parentheses in Section A of this document (which describes the number of South Carolina Standards measured by ACT's tests), and are underlined rather than highlighted in Section B. Our goal here is to clearly communicate that science content will be included, but each specific content topic will not be covered consistently enough for inferences to be made about student proficiency in all areas.)

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STATES CHOOSE ACT BECAUSE:

- **STUDENT MOTIVATION IS HIGH.**
- **ACT'S IS THE ONLY CURRICULUM-BASED ASSESSMENT SYSTEM THAT MEASURES STUDENT READINESS ALONG A CONTINUUM OF EMPIRICALLY DERIVED COLLEGE READINESS BENCHMARKS.**
- **EPAS DATA PROVIDE HELPFUL FEEDBACK FOR TEACHERS, STUDENTS, AND POLICYMAKERS TO MAKE EDUCATIONAL DECISIONS AND IDENTIFY WAYS TO IMPROVE.**

ACT BUILDS ITS DEFINITION OF COLLEGE READINESS ON A SOUND EMPIRICAL BASE:

1. **THE ACT NATIONAL CURRICULUM SURVEY**
2. **ACT'S COLLEGE READINESS BENCHMARK SCORES**
3. **ACT'S COLLEGE READINESS STANDARDS™**

Most exceptions to a match between ACT's tests and South Carolina's Standards arise from standards not being assessable in group settings, standards that are personal in nature, and standards requiring measurement over extended time. If additional testing is deemed necessary, ACT would be interested in working with South Carolina on developing any necessary augmentation.

2. NCLB requirement? Yes; states like Illinois intend to use ACT components as part of testing that will be submitted to the U.S. Department of Education for NCLB approval.

3. Why choose EPAS? States and school districts choose ACT's EPAS programs because student motivation is high, and EPAS is the *only curriculum-based assessment system that measures student readiness along a continuum of empirically derived college readiness benchmarks*. Various groups claim to describe what students truly need to know and be able to do for college and/or workplace readiness. Such groups typically ask individual experts in education to gather and discuss what they feel is important for students to understand. Not surprisingly, the answers vary. In contrast, ACT defines college readiness through a unique and rigorous empirical process:

- **The knowledge and skills necessary for students to be ready for college-level work are empirically identified via the ACT National Curriculum Survey®**

  ACT surveys thousands of secondary and postsecondary instructors across the nation to determine which skills and knowledge are most important at each course level and for college and work readiness. The responses drive the test specifications for EXPLORE, PLAN, and the ACT.

- **The empirically derived performance levels necessary for students to be ready to succeed in college-level work are defined in ACT's College Readiness Benchmark Scores.**

  ACT analyzed thousands of student records to identify the ACT scores associated with success in postsecondary coursework (i.e., a 50% chance of earning a B or better in credit-bearing first-year college courses): 18 for English, 22 for Math, 21 for Reading, and 24 for Science.

- **Skills and knowledge a student currently has and areas for improvement can be identified by the empirically derived ACT College Readiness Standards.**

  Using thousands of student records and responses, content and measurement experts worked backwards to develop data-driven, empirically derived statements of what students typically know and are able to do in various score ranges on ACT's English, Reading, Writing, Mathematics, and Science tests. These statements provide specific details about students' college readiness and can be used to identify next steps for improvement.

ACT

4. Why choose to include WorkKeys assessments? States and communities nationwide are using WorkKeys to create credentials for job applicants through cooperation between businesses and schools. These credentials are based on the same skills assessments no matter where they are used. Thus they are portable. Test takers in one state can show prospective employers in another state that they have the skills needed for jobs. And the employers, looking at job applicants, know that WorkKeys Level scores will have the same meaning regardless of where the tests were administered. These employers know that prospective employees have attained a certain level of performance in the essential skills required for most jobs.

Test takers can most commonly be certified in the skills areas of Applied Mathematics, Locating Information, and Reading for Information. Higher scores qualify test takers for more jobs than do lower scores. Virginia, Louisiana, Kentucky, Indiana, North Carolina, and New Mexico already have initiated certificate programs. Many other states have similar programs in the development stages.

In sum, ACT's EPAS and WorkKeys programs provide abundant data relevant to South Carolina's Standards and to South Carolina students' readiness for college and work.

Section A: Number of South Carolina Standards Measured by EXPLORE, PLAN, the ACT, and WorkKeys

Table A-1. Number of South Carolina English Language Arts Standards Measured by EXPLORE, PLAN, the ACT, and WorkKeys

South Carolina Strands*	Number of South Carolina Standards Measured by ACT's tests	Aspects of Not-Measured South Carolina Strands
Reading	8: 3 out of 3 Eng 1: 3 out of 3 Eng 2: 3 out of 3 Eng 3: 3 out of 3 Eng 4: 3 out of 3	
Writing	8: 1 out of 2 Eng 1: 1 out of 2 Eng 2: 1 out of 2 Eng 3: 1 out of 2 Eng 4: 1 out of 2	Use proofreading skills to edit for the correct use of written Standard American English.
Researching	8: 0 out of 1 Eng 1: 0 out of 1 Eng 2: 0 out of 1 Eng 3: 0 out of 1 Eng 4: 0 out of 1	The student will access and use information from a variety of sources.
TOTALS 2 out of 3 Strands	8: 4 out of 6 Eng 1: 4 out of 6 Eng 2: 4 out of 6 Eng 3: 4 out of 6 Eng 4: 4 out of 6	

*Refer to South Carolina's English Language Arts Standards on pages 9–18

Table A-2. Number of South Carolina Mathematics Standards Measured by EXPLORE, PLAN, the ACT, and WorkKeys		
South Carolina Courses*	Number of South Carolina Standards Measured by ACT's tests	Aspects of Not-Measured South Carolina Courses
Grade 8 Mathematics	6 out of 6	
Elementary Algebra	6 out of 6	
Intermediate Algebra	6 out of 6	
Geometry	7 out of 7	
Precalculus	6 out of 6	
Data Analysis and Probability and Statistics	4 out of 5	The student will demonstrate through the mathematical processes an understanding of the design of a statistical study.
TOTALS 6 out of 6 Courses	35 out of 36	

*Refer to South Carolina's Mathematics Standards on pages 19–30

Table A-3. Number of South Carolina Science Standards Measured by EXPLORE, PLAN, and the ACT		
South Carolina Courses*	Number of South Carolina Standards Measured by ACT's tests	Aspects of Not-Measured South Carolina Standards
Grade 8 Science	1(5) out of (6)	Use appropriate safety procedures when conducting investigations.
Physical Science	1(6) out of (7)	
Biology	1(5) out of (6)	
Chemistry	1(5) out of (6)	
Physics	1(9) out of (10)	
Earth Science	1(5) out of (6)	

*Refer to South Carolina's Science Standards on pages 31–43
Note: Almost all of the indicators listed under Standard 1 (Scientific Inquiry) for each course are measured directly by ACT's Science tests.

ACT

English Language Arts

SOUTH CAROLINA Grade 8 English Language Arts Standards

READING

Understanding and Using Literary Texts

Standard 8-1. The student will read and comprehend a variety of literary texts in print and nonprint formats.

- **8-1.1.** Compare/contrast ideas within and across literary texts to make inferences.
- **8-1.2.** Explain the effect of point of view on a given literary text.
- **8-1.3.** Interpret devices of figurative language (including extended metaphor, oxymoron, and paradox).
- **8-1.4.** Analyze a given literary text to determine its theme.
- **8-1.5.** Analyze the effect of the author's craft (including tone and the use of imagery, flashback, foreshadowing, symbolism, irony, and allusion) on the meaning of literary texts.
- **8-1.6.** Create responses to literary texts through a variety of methods such as written works, oral presentations, media productions, and the visual and performing arts.
- **8-1.7.** Carry out independent reading for extended periods of time to derive pleasure.

Understanding and Using Informational Texts

Standard 8-2. The student will read and comprehend a variety of informational texts in print and nonprint formats.

- **8-2.1**. Compare/contrast central ideas within and across informational texts.
- **8-2.2.** Compare/contrast information within and across texts to draw conclusions and make inferences.
- **8-2.3.** Analyze informational texts for indicators of author bias such as word choice and the exclusion and inclusion of particular information.
- **8-2.4.** Create responses to informational texts through a variety of methods such as drawings, written works, oral presentations, and media productions.
- **8-2.5.** Carry out independent reading for extended periods of time to gain information.
- **8-2.6.** Analyze the impact that text elements such as print styles and chapter headings have on the meaning of a given informational text.
- **8-2.7.** Analyze information from graphic features such as charts and graphs in informational texts.
- **8-2.8.** Exemplify the use of propaganda techniques (including card stacking, plain folks, and transfer) in informational texts.

Building Vocabulary

Standard 8-3. The student will use word analysis and vocabulary strategies to read fluently.

- **8-3.1.** Use context clues such as those that provide an example, a definition, a restatement, or a comparison/contrast to generate the meanings of unfamiliar and multiple-meaning words.
- **8-3.2.** . Analyze the meaning of words by using a knowledge of Greek and Latin roots and affixes.
- **8-3.3.** . Interpret the meaning of idioms and euphemisms encountered in texts.
- **8-3.4.** Interpret the connotations of words to understand the meaning of a given text.

WRITING

Developing Written Communications

Standard 8-4. The student will create written work that has a clear focus, sufficient detail, coherent organization, effective use of voice, and correct use of the conventions of written Standard American English.

- **8-4.1.** Use prewriting techniques to organize written works.
- **8-4.2.** Use complete sentences in a variety of types: simple, compound, complex, and compound-complex.
- **8-4.3.** Create multiple-paragraph compositions that include a central idea with supporting details and use appropriate transitions between paragraphs.
- **8-4.4.** Use the conventions of written Standard American English.
- **8-4.5.** Use proofreading skills to edit for the correct use of written Standard American English.
- **8-4.6.** Use revision strategies to improve clarity, tone, voice, and the development of ideas in written works.

Producing Written Communications in a Variety of Forms

Standard 8-5. The student will write for a variety of purposes and audiences.

- **8-5.1.** Create informational pieces such as reports and letters of request, inquiry, or complaint that use language appropriate for the specific audience.
- **8-5.2.** Create narratives such as memoirs that communicate the significance of particular personal relationships.
- **8-5.3.** Create descriptions for use in other modes of written works such as narrative, expository, and persuasive essays.

8-5.4. Create persuasive pieces such as editorials, essays, or speeches that support a clearly stated position with concrete evidence.

RESEARCHING

Applying the Skills of Inquiry and Oral Communication

Standard 8-6. The student will access and use information from a variety of sources.

8-6.1. Clarify and refine a research topic.

8-6.2. Use direct quotations, paraphrasing, or summaries to incorporate into oral or written works the information gathered from a variety of research sources.

8-6.3. Create a list of sources that contains information (including author, title, and full publication details) necessary to properly credit and document the work of others.

8-6.4. Use vocabulary (including Standard American English) that is appropriate for the particular audience or purpose.

8-6.5. Use appropriate organizational strategies to prepare written works and oral and visual presentations.

8-6.6. Select appropriate graphics, in print or electronic form, to support written works and oral and visual presentations.

8-6.7. Use a variety of print and electronic reference materials.

8-6.8. Design and carry out research projects by selecting a topic, constructing inquiry questions, accessing resources, and organizing information.

SOUTH CAROLINA
English 1 Standards

READING

Understanding and Using Literary Texts

Standard E1-1. The student will read and comprehend a variety of literary texts in print and nonprint formats.

- **E1-1.1.** Compare/contrast ideas within and across literary texts to make inferences.
- **E1-1.2.** Analyze the impact of point of view on literary texts.
- **E1-1.3.** Interpret devices of figurative language (including extended metaphor, oxymoron, and paradox).
- **E1-1.4.** Analyze the relationship among character, plot, and theme in a given literary text.
- **E1-1.5.** Analyze the effect of the author's craft (including tone and the use of imagery, flashback, foreshadowing, symbolism, irony, and allusion) on the meaning of literary texts.
- **E1-1.6.** Create responses to literary texts through a variety of methods such as written works, oral presentations, media productions, and the visual and performing arts.
- **E1-1.7.** Carry out independent reading for extended periods of time to derive pleasure.

Understanding and Using Informational Texts

Standard E1-2. The student will read and comprehend a variety of informational texts in print and nonprint formats.

- **E1-2.1.** Compare/contrast theses within and across informational texts.
- **E1-2.2.** Compare/contrast information within and across texts to draw conclusions and make inferences.
- **E1-2.3.** Analyze informational texts for indicators of author bias such as word choice, the exclusion and inclusion of particular information, and unsupported opinion.
- **E1-2.4.** Create responses to informational texts through a variety of methods such as drawings, written works, oral presentations, and media productions.
- **E1-2.5.** Carry out independent reading for extended periods of time to gain information.
- **E1-2.6.** Analyze the impact that text elements have on the meaning of a given informational text.
- **E1-2.7.** Analyze information from graphic features such as charts and graphs in informational texts.
- **E1-2.8**. Analyze informational texts to identify propaganda techniques.

Building Vocabulary

Standard E1-3. The student will use word analysis and vocabulary strategies to read fluently.

- **E1-3.1.** Use context clues to determine the meaning of technical terms and other unfamiliar words.
- **E1-3.2.** Analyze the meaning of words by using knowledge of Greek and Latin roots and affixes.
- **E1-3.3.** Interpret the connotations of words to understand the meaning of a given text.

WRITING

Developing Written Communications

Standard E1-4. The student will create written work that has a clear focus, sufficient detail, coherent organization, effective use of voice, correct use of the conventions of written Standard American English.

- **E1-4.1.** Use prewriting techniques such as creating lists, having discussions, using graphic organizers, using models, and using outlines to organize written works.
- **E1-4.2.** Use complete sentences in a variety of types: simple, compound, complex, and compound-complex.
- **E1-4.3.** Create multiple-paragraph compositions that have an introduction and a conclusion, include a coherent thesis, and use support such as definitions and descriptions.
- **E1-4.4.** Use the conventions of written Standard American English.
- **E1-4.5.** Use proofreading skills to edit for the correct use of written Standard American English.
- **E1-4.6.** Use revision strategies to improve the organization and development of content and the quality of voice in written works.

Producing Written Communications in a Variety of Forms

Standard E1-5. The student will write for a variety of purposes and audiences.

- **E1-5.1.** Create informational pieces such as letters of request, inquiry, or complaint that use language appropriate for the specific audience.
- **E1-5.2.** Create narratives such as personal essays, memoirs, or narrative poems that use descriptive language to create tone and mood.
- **E1-5.3.** Create descriptions for use in other modes of written works such as narratives and expository or persuasive pieces.
- **E1-5.4.** Create persuasive pieces such as editorials, essays, speeches, or reports that develop a clearly stated thesis and use support such as facts, statistics, and firsthand accounts.

RESEARCHING

Applying the Skills of Inquiry and Oral Communication

Standard E1-6. The student will access and use information from a variety of sources.

- **E1-6.1.** Clarify and refine a research topic.
- **E1-6.2.** Use direct quotations, paraphrasing, or summaries to incorporate into oral or written works the information gathered from a variety of research sources.

E1-6.3. Use a standardized system of documentation (including a list of sources with full publication information and the use of in-text citations) to properly credit the work of others.

E1-6.4. Use vocabulary (including Standard American English) that is appropriate for the particular audience or purpose.

E1-6.5. Create written works and oral and visual presentations that are designed for a specific audience and purpose.

E1-6.6. Select appropriate graphics, in print or electronic form, to support written works and oral and visual presentations.

E1-6.7. Use a variety of print and electronic reference materials.

E1-6.8. Design and carry out research projects by selecting a topic, constructing inquiry questions, accessing resources, and organizing information.

SOUTH CAROLINA
English 2 Standards

READING

Understanding and Using Literary Texts

Standard E2-1. The student will read and comprehend a variety of literary texts in print and nonprint formats.

- **E2-1.1.** Compare/contrast ideas within and across literary texts to make inferences.
- **E2-1.2.** Analyze the impact of point of view on literary texts.
- **E2-1.3.** Analyze devices of figurative language (including extended metaphor, oxymoron, and paradox).
- **E2-1.4.** Analyze the relationship among character, plot, and theme in a given literary text.
- **E2-1.5.** Analyze the effect of the author's craft (including tone and the use of imagery, flashback, foreshadowing, symbolism, irony, and allusion) on the meaning of literary texts.
- **E2-1.6.** Create responses to literary texts through a variety of methods such as written works, oral presentations, media productions, and the visual and performing arts.
- **E2-1.7.** Carry out independent reading for extended periods of time to derive pleasure.

Understanding and Using Informational Texts

Standard E2-2. The student will read and comprehend a variety of informational texts in print and nonprint formats.

- **E2-2.1.** Compare/contrast theses within and across informational texts.
- **E2-2.2.** Compare/contrast information within and across texts to draw conclusions and make inferences.
- **E2-2.3.** Analyze informational texts for indicators of author bias such as word choice, the exclusion and inclusion of particular information, and unsupported opinion.
- **E2-2.4.** Create responses to informational texts through a variety of methods such as drawings, written works, oral presentations, and media productions.
- **E2-2.5.** Carry out independent reading for extended periods of time to gain information.
- **E2-2.6.** Analyze the impact that text elements have on the meaning of a given informational text.
- **E2-2.7.** Analyze information from graphic features such as charts and graphs in informational texts.
- **E2-2.8** . Analyze informational texts to identify propaganda techniques.

Building Vocabulary

Standard E2-3. The student will use word analysis and vocabulary strategies to read fluently.

- **E2-3.1.** Use context clues to determine the meaning of technical terms and other unfamiliar words.
- **E2-3.2.** Analyze the meaning of words by using knowledge of Greek and Latin roots and affixes.
- **E2-3.3.** Interpret the connotations of words to understand the meaning of a given text.

WRITING

Developing Written Communications

Standard E2-4. The student will create written work that has a clear focus, sufficient detail, coherent organization, effective use of voice, and correct use of the conventions of written Standard American English.

- **E2-4.1.** Use prewriting techniques such as creating lists, having discussions, using graphic organizers, using models, and using outlines to organize written works.
- **E2-4.2.** Use complete sentences in a variety of types in written works.
- **E2-4.3.** Create multiple-paragraph compositions that have an introduction and a conclusion, include a coherent thesis, and use support such as definitions and descriptions.
- **E2-4.4.** Use the conventions of written Standard American English.
- **E2-4.5.** Use proofreading skills to edit for the correct use of written Standard American English.
- **E2-4.6.** Use revision strategies to improve the organization and development of content and the quality of voice in written works.

Producing Written Communications in a Variety of Forms

Standard E2-5. The student will write for a variety of purposes and audiences.

- **E2-5.1.** Produce clear and concise career-oriented/technical writings such as memos, business letters, résumés, technical reports, and information analyses.
- **E2-5.2.** Create narratives such as personal essays, memoirs, and narrative poems that use descriptive language to enhance setting and characterization.
- **E2-5.3.** Create descriptions for use in other modes of written works such as narratives and expository or persuasive pieces.
- **E2-5.4.** Create persuasive writings such as editorials, essays, speeches, or reports that address a specific audience and support a clearly stated thesis with facts, statistics, and/or first-hand accounts.

RESEARCHING

Applying the Skills of Inquiry and Oral Communication

Standard E2-6. The student will access and use information from a variety of sources.

- **E2-6.1.** Clarify and refine a research topic.
- **E2-6.2.** Use direct quotations, paraphrasing, or summarizing to incorporate into oral or written works the information gathered from a variety of research sources.

E2-6.3. Use a standardized system of documentation (including a list of sources with full publication information and the use of in-text citations) to properly credit the work of others.

E2-6.4. Use vocabulary (including Standard American English) that is appropriate for the particular audience or purpose.

E2-6.5. Create written works and oral and visual presentations that are designed for a specific audience and purpose.

E2-6.6. Select appropriate graphics, in print or electronic form, to support written works and oral and visual presentations.

E2-6.7. Use a variety of print and electronic reference materials.

E2-6.8. Design and carry out research projects by selecting a topic, constructing inquiry questions, accessing resources, and organizing information.

SOUTH CAROLINA
English 3 Standards

READING

Understanding and Using Literary Texts

Standard E3-1. The student will read and comprehend a variety of literary texts in print and nonprint formats.

- **E3-1.1.** Compare/contrast ideas within and across literary texts to make inferences.
- **E3-1.2.** Evaluate the impact of point of view on literary texts.
- **E3-1.3.** Evaluate devices of figurative language figurative language (including extended metaphor, oxymoron, and paradox).
- **E3-1.4.** Evaluate the relationship among character, plot, and theme in a given literary text.
- **E3-1.5.** Analyze the effect of the author's craft (including tone and the use of imagery, flashback, foreshadowing, symbolism, irony, and allusion) on the meaning of literary texts.
- **E3-1.6.** Create responses to literary texts through a variety of methods such as written works, oral presentations, media productions, and the visual and performing arts.
- **E3-1.7.** Carry out independent reading for extended periods of time to derive pleasure.

Understanding and Using Informational Texts

Standard E3-2. The student will read and comprehend a variety of informational texts in print and nonprint formats.

- **E3-2.1.** Evaluate theses within and across informational texts.
- **E3-2.2.** Compare/contrast information within and across texts to draw conclusions and make inferences.
- **E3-2.3.** Analyze informational texts for indicators of author bias such as word choice, the exclusion and inclusion of particular information, and unsupported opinion.
- **E3-2.4.** Create responses to informational texts through a variety of methods such as drawings, written works, oral presentations, and media productions.
- **E3-2.5.** Carry out independent reading for extended periods of time to gain information.
- **E3-2.6.** Evaluate the impact that text elements have on the meaning of a given informational text.
- **E3-2.7.** Evaluate information from graphic features such as charts and graphs in informational texts.
- **E3-2.8** . Evaluate informational texts to identify propaganda techniques.

Building Vocabulary

Standard E3-3. The student will use word analysis and vocabulary strategies to read fluently.

- **E3-3.1.** Use context clues to determine the meaning of technical terms and other unfamiliar words.
- **E3-3.2.** Analyze the meaning of words by using knowledge of Greek and Latin roots and affixes.
- **E3-3.3.** Understand how American history and culture have influenced the use and development of the English language.

WRITING

Developing Written Communications

Standard E3-4. The student will create written work that has a clear focus, sufficient detail, coherent organization, effective use of voice, correct use of the conventions of written Standard American English.

- **E3-4.1.** Use prewriting techniques such as creating lists, having discussions, using graphic organizers, using models, and using outlines to organize written works.
- **E3-4.2.** Use complete sentences in a variety of types in written works.
- **E3-4.3.** Create multiple-paragraph compositions that have an introduction and a conclusion, include a coherent thesis, and use support such as definitions and descriptions.
- **E3-4.4.** Use the conventions of written Standard American English.
- **E3-4.5.** Use proofreading skills to edit for the correct use of written Standard American English.
- **E3-4.6.** Use revision strategies to improve the organization and development of content and the quality of voice in written works.

Producing Written Communications in a Variety of Forms

Standard E3-5. The student will write for a variety of purposes and audiences.

- **E3-5.1.** Produce clear and concise career-oriented/technical writings such as memos, business letters, résumés, technical reports, and information analyses.
- **E3-5.2.** Create narratives such as personal essays, memoirs, or narrative poems that use descriptive language to enhance voice and tone.
- **E3-5.3.** Create descriptions for use in other modes of written works such as narratives and expository or persuasive pieces.
- **E3-5.4.** Create persuasive writings such as editorials, essays, speeches, or reports that address a specific audience and use logical arguments supported by facts or expert opinions.

RESEARCHING

Applying the Skills of Inquiry and Oral Communication

Standard E3-6. The student will access and use information from a variety of sources.

- **E3-6.1.** Clarify and refine a research topic.
- **E3-6.2.** Use direct quotations, paraphrasing, or summarizing to incorporate into oral or written works the information gathered from a variety of research sources.

= Measured by the ACT English, Reading and/or Writing tests and WorkKeys Reading for Information Test

E3-6.3. Use a standardized system of documentation (including a list of sources with full publication information and the use of in-text citations) to properly credit the work of others.

E3-6.4. Use vocabulary (including Standard American English) that is appropriate for the particular audience or purpose.

E3-6.5. Create written works and oral and visual presentations that are designed for a specific audience and purpose.

E3-6.6. Select appropriate graphics, in print or electronic form, to support written works and oral and visual presentations.

E3-6.7. Use a variety of print and electronic reference materials.

E3-6.8. Design and carry out research projects by selecting a topic, constructing inquiry questions, accessing resources, and organizing information.

SOUTH CAROLINA
English 4 Standards

READING

Understanding and Using Literary Texts

Standard E4-1. The student will read and comprehend a variety of literary texts in print and nonprint formats.

- **E4-1.1.** Compare/contrast ideas within and across literary texts to make inferences.
- **E4-1.2.** Evaluate the impact of point of view on literary texts.
- **E4-1.3.** Evaluate devices of figurative language (including extended metaphor, oxymoron, and paradox).
- **E4-1.4.** Evaluate the relationship among character, plot, and theme in a given literary text.
- **E4-1.5.** Analyze the effect of the author's craft (including tone and the use of imagery, flashback, foreshadowing, symbolism, irony, and allusion) on the meaning of literary texts.
- **E4-1.6.** Create responses to literary texts through a variety of methods such as written works, oral presentations, media productions, and the visual and performing arts.
- **E4-1.7.** Carry out independent reading for extended periods of time to derive pleasure.

Understanding and Using Informational Texts

Standard E4-2. The student will read and comprehend a variety of informational texts in print and nonprint formats.

- **E4-2.1.** Evaluate theses within and across informational texts.
- **E4-2.2.** Compare/contrast information within and across texts to draw conclusions and make inferences.
- **E4-2.3.** Analyze informational texts for indicators of author bias such as word choice, the exclusion and inclusion of particular information, and unsupported opinion.
- **E4-2.4.** Create responses to informational texts through a variety of methods such as drawings, written works, oral presentations, and media productions.
- **E4-2.5.** Carry out independent reading for extended periods of time to gain information.
- **E4-2.6.** Evaluate the impact that text elements have on the meaning of a given informational text.
- **E4-2.7.** Evaluate information from graphic features such as charts and graphs in informational texts.
- **E4-2.8 .** Evaluate informational texts to identify propaganda techniques.

Building Vocabulary

Standard E4-3. The student will use word analysis and vocabulary strategies to read fluently.

- **E4-3.1.** Use context clues to determine the meaning of technical terms and other unfamiliar words.
- **E4-3.2.** Analyze the meaning of words by using knowledge of Greek and Latin roots and affixes.
- **E4-3.3.** Understand how British history and culture have influenced the use and development of the English language.

WRITING

Developing Written Communications

Standard E4-4. The student will create written work that has a clear focus, sufficient detail, coherent organization, effective use of voice, and correct use of the conventions of written Standard American English.

- **E4-4.1.** Use prewriting techniques such as creating lists, having discussions, using graphic organizers, using models, and using outlines to organize written works.
- **E4-4.2.** Use complete sentences in a variety of types in written works.
- **E4-4.3.** Create multiple-paragraph compositions that have an introduction and a conclusion, include a coherent thesis, and use support such as definitions and descriptions.
- **E4-4.4.** Use the conventions of written Standard American English.
- **E4-4.5.** Use proofreading skills to edit for the correct use of written Standard American English.
- **E4-4.6**. Use revision strategies to improve the organization and development of content and the quality of voice in written works.

Producing Written Communications in a Variety of Forms

Standard E4-5. The student will write for a variety of purposes and audiences.

- **E4-5.1.** Produce clear and concise career-oriented/technical writings such as memos, business letters, résumés, technical reports, and information analyses.
- **E4-5.2.** Create narratives such as personal essays, memoirs, and narrative poems that use descriptive language to enhance voice and tone.
- **E4-5.3.** Create descriptions for use in other modes of written works such as narratives and expository or persuasive pieces.
- **E4-5.4.** Create persuasive writings such as editorials, essays, speeches, or reports that address a specific audience and use logical arguments supported by facts or expert opinions.

RESEARCHING

Applying the Skills of Inquiry and Oral Communication

Standard E4-6. The student will access and use information from a variety of sources.

- **E4-6.1.** Clarify and refine a research topic.
- **E4-6.2.** Use direct quotations, paraphrasing, or summarizing to incorporate into oral or written works the information gathered from a variety of research sources.

= Measured by the ACT English, Reading and/or Writing tests and WorkKeys Reading for Information Test

E4-6.3. Use a standardized system of documentation (including a list of sources with full publication information and the use of in-text citations) to properly credit the work of others.

E4-6.4. Use vocabulary (including Standard American English) that is appropriate for the particular audience or purpose.

E4-6.5. Create written works and oral and visual presentations that are designed for a specific audience and purpose.

E4-6.6. Select appropriate graphics, in print or electronic form, to support written works and oral and visual presentations.

E4-6.7. Use a variety of print and electronic reference materials.

E4-6.8. Design and carry out research projects by selecting a topic, constructing inquiry questions, accessing resources, and organizing information.

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SOUTH CAROLINA
Grade 8 Mathematics Standards

MATHEMATICAL PROCESSES

Standard 8-1. The student will understand and utilize the mathematical processes of problem solving, reasoning and proof, communication, connections, and representation.

- **8-1.1.** Generate and solve complex abstract problems that involve modeling physical, social, or mathematical phenomena.
- **8-1.2.** Evaluate conjectures and pose follow-up questions to prove or disprove conjectures.
- **8-1.3.** Use inductive and deductive reasoning to formulate mathematical arguments.
- **8-1.4.** Understand equivalent symbolic expressions as distinct symbolic forms that represent the same relationship.
- **8-1.5.** Generalize mathematical statements based on inductive and deductive reasoning.
- **8-1.6.** Use correct and clearly written or spoken words, variables, and notations to communicate about significant mathematical tasks.
- **8-1.7.** Generalize connections among a variety of representational forms and real-world situations.
- **8-1.8.** Use standard and nonstandard representations to convey and support mathematical relationships.

NUMBER AND OPERATIONS

Standard 8-2. The student will demonstrate through the mathematical processes an understanding of operations with integers, the effects of multiplying and dividing with rational numbers, the comparative magnitude of rational and irrational numbers, the approximation of cube and square roots, and the application of proportional reasoning.

- **8-2.1.** Apply an algorithm to add, subtract, multiply, and divide integers.
- **8-2.2.** Understand the effect of multiplying and dividing a rational number by another rational number.
- **8-2.3.** Represent the approximate location of irrational numbers on a number line.
- **8-2.4.** Compare rational and irrational numbers by using the symbols ≤, ≥, <, >, and =.
- **8-2.5.** Apply the concept of absolute value.
- **8-2.6.** Apply strategies and procedures to approximate between two whole numbers the square roots or cube roots of numbers less than 1,000.
- **8-2.7.** Apply ratios, rates, and proportions.

ALGEBRA

Standard 8-3. The student will demonstrate through the mathematical processes an understanding of equations, inequalities, and linear functions.

- **8-3.1.** Translate among verbal, graphic, tabular, and algebraic representations of linear functions.
- **8-3.2.** Represent algebraic relationships with equations and inequalities.
- **8-3.3.** Use commutative, associative, and distributive properties to examine the equivalence of a variety of algebraic expressions.
- **8-3.4.** Apply procedures to solve multistep equations.
- **8-3.5.** Classify relationships between two variables in graphs, tables, and/or equations as either linear or nonlinear.
- **8-3.6.** Identify the coordinates of the *x*– and *y*–intercepts of a linear equation from a graph, equation, and/or table.
- **8-3.7.** Identify the slope of a linear equation from a graph, equation, and/or table.

GEOMETRY

Standard 8-4. The student will demonstrate through the mathematical processes an understanding of the Pythagorean theorem; the use of ordered pairs, equations, intercepts, and intersections to locate points and lines in a coordinate plane; and the effect of a dilation in a coordinate plane.

- **8-4.1.** Apply the Pythagorean theorem.
- **8-4.2.** Use ordered pairs, equations, intercepts, and intersections to locate points and lines in a coordinate plane.
- **8-4.3.** Apply a dilation to a square, rectangle, or right triangle in a coordinate plane.
- **8-4.4.** Analyze the effect of a dilation on a square, rectangle, or right triangle in a coordinate plane.

MEASUREMENT

Standard 8-5. The student will demonstrate through the mathematical processes an understanding of the proportionality of similar figures; the necessary levels of accuracy and precision in measurement; the use of formulas to determine circumference, perimeter, area, and volume; and the use of conversions within and between the U.S. Customary System and the metric system.

- **8-5.1.** Use proportional reasoning and the properties of similar shapes to determine the length of a missing side.
- **8-5.2.** Explain the effect on the area of two-dimensional shapes and on the volume of three-dimensional shapes when one or more of the dimensions are changed.

8-5.3. Apply strategies and formulas to determine the volume of the three-dimensional shapes cone and sphere.

8-5.4. Apply formulas to determine the exact (*pi*) circumference and area of a circle.

8-5.5. Apply formulas to determine the perimeters and areas of trapezoids.

8-5.6. Analyze a variety of measurement situations to determine the necessary level of accuracy and precision.

8-5.7. Use multistep unit analysis to convert between and within U.S. Customary System and the metric system.

DATA ANALYSIS AND PROBABILITY

Standard 8-6. The student will demonstrate through the mathematical processes an understanding of the relationships between two variables within one population or sample.

8-6.1. Generalize the relationship between two sets of data by using scatterplots and lines of best fit.

8-6.2. Organize data in matrices or scatterplots as appropriate.

8-6.3. Use theoretical and experimental probability to make inferences and convincing arguments about an event or events.

8-6.4. Apply procedures to calculate the probability of two dependent events.

8-6.5. Interpret the probability for two dependent events.

8-6.6. Apply procedures to compute the odds of a given event.

8-6.7. Analyze probability using area models.

8-6.8. Interpret graphic and tabular data representations by using range and the measures of central tendency (mean, median, and mode).

SOUTH CAROLINA
Elementary Algebra Standards

Standard EA-1. The student will understand and utilize the mathematical processes of problem solving, reasoning and proof, communication, connections, and representation.

- **EA-1.1.** Communicate a knowledge of algebraic relationships by using mathematical terminology appropriately.
- **EA-1.2.** Connect algebra with other branches of mathematics.
- **EA-1.3.** Apply algebraic methods to solve problems in real-world contexts.
- **EA-1.4.** Judge the reasonableness of mathematical solutions.
- **EA-1.5.** Demonstrate an understanding of algebraic relationships by using a variety of representations (including verbal, graphic, numerical, and symbolic).
- **EA-1.6.** Understand how algebraic relationships can be represented in concrete models, pictorial models, and diagrams.
- **EA-1.7.** Understand how to represent algebraic relationships by using tools such as handheld computing devices, spreadsheets, and computer algebra systems (CASs).

Standard EA-2. The student will demonstrate through the mathematical processes an understanding of the real number system and operations involving exponents, matrices, and algebraic expressions.

- **EA-2.1.** Exemplify elements of the real number system (including integers, rational numbers, and irrational numbers).
- **EA-2.2.** Apply the laws of exponents and roots to solve problems.
- **EA-2.3.** Carry out a procedure to perform operations (including multiplication and division) with numbers written in scientific notation.
- **EA-2.4.** Use dimensional analysis to convert units of measure within a system.
- **EA-2.5.** Carry out a procedure using the properties of real numbers (including commutative, associative, and distributive) to simplify expressions.
- **EA-2.6.** Carry out a procedure to evaluate an expression by substituting a value for the variable.
- **EA-2.7.** Carry out a procedure (including addition, subtraction, multiplication, and division by a monomial) to simplify polynomial expressions.
- **EA-2.8.** Carry out a procedure to factor binomials, trinomials, and polynomials by using various techniques (including the greatest common factor, the difference between two squares, and quadratic trinomials).
- **EA-2.9.** Carry out a procedure to perform operations with matrices (including addition, subtraction, and scalar multiplication).
- **EA-2.10.** Represent applied problems by using matrices.

Standard EA-3. The student will demonstrate through the mathematical processes an understanding of relationships and functions.

- **EA-3.1.** Classify a relationship as being either a function or not a function when given data as a table, set of ordered pairs, or graph.
- **EA-3.2.** Use function notation to represent functional relationships.
- **EA-3.3.** Carry out a procedure to evaluate a function for a given element in the domain.
- **EA-3.4.** Analyze the graph of a continuous function to determine the domain and range of the function.
- **EA-3.5.** Carry out a procedure to graph parent functions (including $y = x$, $y = x^2$, $y = \sqrt{x}$, $y = |x|$, and $y = \frac{1}{x}$).
- **EA-3.6.** Classify a variation as either direct or inverse.
- **EA-3.7.** Carry out a procedure to solve literal equations for a specified variable.
- **EA-3.8.** Apply proportional reasoning to solve problems.

Standard EA-4. The student will demonstrate through the mathematical processes an understanding of the procedures for writing and solving linear equations and inequalities.

- **EA-4.1.** Carry out a procedure to write an equation of a line with a given slope and a *y*-intercept.
- **EA-4.2.** Carry out a procedure to write an equation of a line with a given slope passing through a given point.
- **EA-4.3.** Carry out a procedure to write an equation of a line passing through two given points.
- **EA-4.4.** Use a procedure to write an equation of a trend line from a given scatterplot.
- **EA-4.5.** Analyze a scatterplot to make predictions.
- **EA-4.6.** Represent linear equations in multiple forms (including point-slope, slope-intercept, and standard).
- **EA-4.7.** Carry out procedures to solve linear equations for one variable algebraically.
- **EA-4.8.** Carry out procedures to solve linear inequalities for one variable algebraically and then to graph the solution.
- **EA-4.9.** Carry out a procedure to solve systems of two linear equations graphically.
- **EA-4.10.** Carry out a procedure to solve systems of two linear equations algebraically.

Standard EA-5. The student will demonstrate through the mathematical processes an understanding of the graphs and characteristics of linear equations and inequalities.

- **EA-5.1.** Carry out a procedure to graph a line when given the equation of the line.

= Measured by the EXPLORE, PLAN, and/or ACT Mathematics tests and WorkKeys Applied Mathematics Test

EA-5.2. Analyze the effects of changes in the slope, m, and the y-intercept, b, on the graph of $y = mx + b$.

EA-5.3. Carry out a procedure to graph the line with a given slope and a y-intercept.

EA-5.4. Carry out a procedure to graph the line with a given slope passing through a given point.

EA-5.5. Carry out a procedure to determine the x-intercept and y-intercept of lines from data given tabularly, graphically, symbolically, and verbally.

EA-5.6. Carry out a procedure to determine the slope of a line from data given tabularly, graphically, symbolically, and verbally.

EA-5.7. Apply the concept of slope as a rate of change to solve problems.

EA-5.8. Analyze the equations of two lines to determine whether the lines are perpendicular or parallel.

EA-5.9. Analyze given information to write a linear function that models a given problem situation.

EA-5.10. Analyze given information to determine the domain and range of a linear function in a problem situation.

EA-5.11. Analyze given information to write a system of linear equations that models a given problem situation.

EA-5.12. Analyze given information to write a linear inequality in one variable that models a given problem situation.

Standard EA-6. The student will demonstrate through the mathematical processes an understanding of quadratic relationships and functions.

EA-6.1. Analyze the effects of changing the leading coefficient a on the graph of $y = ax^2$.

EA-6.2. Analyze the effects of changing the constant c on the graph of $y = x^2 + c$.

EA-6.3. Analyze the graph of a quadratic function to determine its equation.

EA-6.4. Carry out a procedure to solve quadratic equations by factoring.

EA-6.5. Carry out a graphic procedure to approximate the solutions of quadratic equations.

EA-6.6. Analyze given information to determine the domain of a quadratic function in a problem situation.

SOUTH CAROLINA
Intermediate Algebra Standards

Standard IA-1. The student will understand and utilize the mathematical processes of problem solving, reasoning and proof, communication, connections, and representation.

- **IA-1.1.** Communicate a knowledge of algebraic relationships by using mathematical terminology appropriately.
- **IA-1.2.** Connect algebra with other branches of mathematics.
- **IA-1.3.** Apply algebraic methods to solve problems in real-world contexts.
- **IA-1.4.** Judge the reasonableness of mathematical solutions.
- **IA-1.5.** Demonstrate an understanding of algebraic relationships by using a variety of representations (including verbal, graphic, numerical, and symbolic).
- **IA-1.6.** Understand how algebraic relationships can be represented in concrete models, pictorial models, and diagrams.
- **IA-1.7.** Understand how to represent algebraic relationships by using tools such as handheld computing devices, spreadsheets, and computer algebra systems (CASs).

Standard IA-2. The student will demonstrate through the mathematical processes an understanding of functions, systems of equations, and systems of linear inequalities.

- **IA-2.1.** Carry out a procedure to solve a system of linear inequalities algebraically.
- **IA-2.2.** Carry out a procedure to solve a system of linear inequalities graphically.
- **IA-2.3.** Analyze a problem situation to determine a system of linear inequalities that models the problem situation.
- **IA-2.4.** Use linear programming to solve contextual problems involving a system of linear inequalities.
- **IA-2.5.** Carry out procedures to perform operations on polynomial functions (including $f(x) + g(x)$, $f(x) - g(x)$, $f(x) \times g(x)$, and $\frac{f(x)}{g(x)}$.
- **IA-2.6.** Apply a procedure to write the equation of a composition of given functions.
- **IA-2.7.** Carry out a procedure to graph translations of parent functions (including $y = x$, $y = x^2$, $y = \sqrt{x}$, $y = |x|$, and $y = \frac{1}{x}$).
- **IA-2.8.** Carry out a procedure to graph transformations of parent functions (including $y = x$, $y = x^2$, and $y = |x|$).
- **IA-2.9.** Carry out a procedure to graph discontinuous functions (including piecewise and step functions).
- **IA-2.10.** Carry out a procedure to determine the domain and range of discontinuous functions (including piecewise and step functions).
- **IA-2.11.** Carry out a procedure to solve a system of equations (including two linear functions and one linear function with one quadratic function).

Standard IA-3. The student will demonstrate through the mathematical processes an understanding of quadratic equations and the complex number system.

- **IA-3.1.** Carry out a procedure to simplify expressions involving powers of *i*.
- **IA-3.2.** Carry out a procedure to perform operations with complex numbers (including addition, subtraction, multiplication, and division).
- **IA-3.3.** Carry out a procedure to solve quadratic equations algebraically (including factoring, completing the square, and applying the quadratic formula).
- **IA-3.4.** Use the discriminant to determine the number and type of solutions of a quadratic equation.
- **IA-3.5.** Analyze given information (including quadratic models) to solve contextual problems.
- **IA-3.6.** Carry out a procedure to write an equation of a quadratic function when given its roots.

Standard IA-4. The student will demonstrate through the mathematical processes an understanding of algebraic expressions and nonlinear functions.

- **IA-4.1.** Carry out a procedure to perform operations (including multiplication, exponentiation, and division) with polynomial expressions.
- **IA-4.2.** Carry out a procedure to determine specified points (including zeros, maximums, and minimums) of polynomial functions.
- **IA-4.3.** Carry out a procedure to solve polynomial equations (including factoring by grouping, factoring the difference between two squares, factoring the sum of two cubes, and factoring the difference between two cubes).
- **IA-4.4.** Analyze given information (including polynomial models) to solve contextual problems.
- **IA-4.5.** Carry out a procedure to simplify algebraic expressions involving rational exponents.
- **IA-4.6.** Carry out a procedure to simplify algebraic expressions involving logarithms.
- **IA-4.7.** Carry out a procedure to perform operations with expressions involving rational exponents (including addition, subtraction, multiplication, division, and exponentiation).
- **IA-4.8.** Carry out a procedure to perform operations with rational expressions (including addition, subtraction, multiplication, and division).
- **IA-4.9.** Carry out a procedure to solve radical equations algebraically.
- **IA-4.10.** Carry out a procedure to solve logarithmic equations algebraically.
- **IA-4.11.** Carry out a procedure to solve logarithmic equations graphically.

= Measured by the ACT Mathematics Test and WorkKeys Applied Mathematics Test

IA-4.12. Carry out a procedure to solve rational equations algebraically.

IA-4.13. Carry out a procedure to graph logarithmic functions.

IA-4.14. Carry out a procedure to graph exponential functions.

Standard IA-5. The student will demonstrate through the mathematical processes an understanding of conic sections.

IA-5.1. Carry out a procedure to graph the circle whose equation is the form $x^2 + y^2 = r^2$.

IA-5.2. Carry out a procedure to write an equation of a circle centered at the origin when given its radius.

IA-5.3. Carry out a procedure to graph the ellipse whose equation is the form $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$.

IA-5.4. Carry out a procedure to write an equation of an ellipse centered at the origin when given information from among length of major axis, length of minor axis, and vertices.

IA-5.5. Carry out a procedure to graph the hyperbola whose equation is the form $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$.

IA-5.6. Carry out a procedure to write an equation of a hyperbola centered at the origin with specified vertices.

IA-5.7. Match the equation of a conic section with its graph.

Standard IA-6. The student will demonstrate through the mathematical processes an understanding of sequences and series.

IA-6.1. Categorize a sequence as arithmetic, geometric, or neither.

IA-6.2. Carry out a procedure to write a specified term of an arithmetic or geometric sequence when given the nth term of the sequence.

IA-6.3. Carry out a procedure to write a formula for the nth term of an arithmetic or geometric sequence when given at least four consecutive terms of the sequence.

IA-6.4. Carry out a procedure to write a formula for the nth term of an arithmetic or geometric sequence when given at least four terms of the sequence.

IA-6.5. Represent an arithmetic or geometric series by using sigma notation.

IA-6.6. Carry out a procedure to calculate the sum of an arithmetic or geometric series written in sigma notation.

IA-6.7. Carry out a procedure to determine consecutive terms of a sequence that is defined recursively.

IA-6.8. Carry out a procedure to define a sequence recursively when given four or more consecutive terms of the sequence.

IA-6.9. Translate between the explicit form and the recursive form of sequences.

SOUTH CAROLINA
Geometry Standards

Standard G-1. The student will understand and utilize the mathematical processes of problem solving, reasoning and proof, communication, connections, and representation.

- **G-1.1.** Demonstrate an understanding of the axiomatic structure of geometry by using undefined terms, definitions, postulates, theorems, and corollaries.
- **G-1.2.** Communicate knowledge of geometric relationships by using mathematical terminology appropriately.
- **G-1.3.** Apply basic rules of logic to determine the validity of the converse, inverse, and contrapositive of a conditional statement.
- **G-1.4.** Formulate and test conjectures by using a variety of tools such as concrete models, graphing calculators, spreadsheets, and dynamic geometry software.
- **G-1.5.** Use inductive reasoning to formulate conjectures.
- **G-1.6.** Use deductive reasoning to validate conjectures with formal and informal proofs, and give counterexamples to disprove a statement.
- **G-1.7.** Understand the historical development of geometry.
- **G-1.8.** Connect geometry with other branches of mathematics.
- **G-1.9.** Demonstrate an understanding of how geometry applies to in real-world contexts (including architecture, construction, farming, and astronomy).
- **G-1.10.** Demonstrate an understanding of geometric relationships (including constructions through investigations by using a variety of tools such as straightedge, compass, Patty Paper, dynamic geometry software, and handheld computing devices).

Standard G-2. The student will demonstrate through the mathematical processes an understanding of the properties of basic geometric figures and the relationships between and among them.

- **G-2.1.** Infer missing elements of visual or numerical geometric patterns (including triangular and rectangular numbers and the number of diagonals in polygons).
- **G-2.2.** Apply properties of parallel lines, intersecting lines, and parallel lines cut by a transversal to solve problems.
- **G-2.3.** Use the congruence of line segments and angles to solve problems.
- **G-2.4.** Use direct measurement to determine the length of a segment, degree of an angle, and distance from a point to a line.
- **G-2.5.** Carry out a procedure to create geometric constructions (including the midpoint of a line segment, the angle bisector, the perpendicular bisector of a line segment, the line through a given point that is parallel to a given line, and the line through a given point that is perpendicular to a given line).
- **G-2.6.** Use scale factors to solve problems involving scale drawings and models.
- **G-2.7.** Use geometric probability to solve problems.

Standard G-3. The student will demonstrate through the mathematical processes an understanding of the properties and special segments of triangles and the relationships between and among triangles.

- **G-3.1.** Carry out a procedure to compute the perimeter of a triangle.
- **G-3.2.** Carry out a procedure to compute the area of a triangle.
- **G-3.3.** Analyze how changes in dimensions affect the perimeter or area of triangles.
- **G-3.4.** Apply properties of isosceles and equilateral triangles to solve problems.
- **G-3.5.** Use interior angles, exterior angles, medians, angle bisectors, altitudes, and perpendicular bisectors to solve problems.
- **G-3.6.** Apply the triangle sum theorem to solve problems.
- **G-3.7.** Apply the triangle inequality theorem to solve problems.
- **G-3.8.** Apply congruence and similarity relationships among triangles to solve problems.
- **G-3.9.** Apply theorems to prove that triangles are either similar or congruent.
- **G-3.10.** Use the Pythagorean theorem and its converse to solve problems.
- **G-3.11.** Use the properties of 45-45-90 and 30-60-90 triangles to solve problems.
- **G-3.12.** Use trigonometric ratios (including sine, cosine, and tangent) to solve problems involving right triangles.

Standard G-4. The student will demonstrate through the mathematical processes an understanding of the properties of quadrilaterals and other polygons and the relationships between and among them.

- **G-4.1.** Carry out a procedure to compute the perimeter of quadrilaterals, regular polygons, and composite figures.
- **G-4.2.** Carry out a procedure to find the area of quadrilaterals, regular polygons, and composite figures.
- **G-4.3.** Apply procedures to compute measures of interior and exterior angles of polygons.

= Measured by the PLAN, and/or ACT Mathematics tests and WorkKeys Applied Mathematics Test

G-4.4. Analyze how changes in dimensions affect the perimeter or area of quadrilaterals and regular polygons.

G-4.5. Apply the properties and attributes of quadrilaterals and regular polygons and their component parts to solve problems.

G-4.6. Apply congruence and similarity relationships among shapes (including quadrilaterals and polygons) to solve problems.

Standard G-5. The student will demonstrate through the mathematical processes an understanding of the properties of circles, the lines that intersect them, and the use of their special segments.

G-5.1. Carry out a procedure to compute the circumference of circles.

G-5.2. Carry out a procedure to compute the area of circles.

G-5.3. Analyze how a change in the radius affects the circumference or area of a circle.

G-5.4. Carry out a procedure to compute the length of an arc or the area of a sector of a circle.

G-5.5. Apply the properties of the component parts of a circle (including radii, diameters, chords, sectors, arcs, and segments) to solve problems.

G-5.6. Apply the properties of lines that intersect circles (including two secants, two tangents, and a secant and a tangent) to solve problems.

G-5.7. Apply the properties of central angles, inscribed angles, and arcs of circles to solve problems.

Standard G-6. The student will demonstrate through the mathematical processes an understanding of transformations, coordinate geometry, and vectors.

G-6.1. Use the distance formula to solve problems.

G-6.2. Use the midpoint formula to solve problems.

G-6.3. Apply transformations—translation, reflection, rotation, and dilation—to figures in the coordinate plane by using sketches and coordinates.

G-6.4. Apply transformations (including translation and dilation) to figures in the coordinate plane by using matrices.

G-6.5. Carry out a procedure to represent the sum of two vectors geometrically by using the parallelogram method.

G-6.6. Carry out a procedure to determine the magnitude and direction of the resultant of two vectors by using a scale drawing and direct measurement.

G-6.7. Carry out a procedure to compute the magnitude of the resultant of two perpendicular vectors by using the Pythagorean theorem.

G-6.8. Carry out a procedure to determine the direction of the resultant of two perpendicular vectors by using a scale drawing and direct measurement.

Standard G-7. The student will demonstrate through the mathematical processes an understanding of the surface area and volume of three-dimensional objects.

G-7.1. Carry out a procedure to compute the surface area of three-dimensional objects (including cones, cylinders, pyramids, prisms, spheres, and hemispheres).

G-7.2. Carry out a procedure to compute the volume of three-dimensional objects (including cones, cylinders, pyramids, prisms, spheres, hemispheres, and composite objects).

G-7.3. Analyze how changes in dimensions affect the volume of objects (including cylinders, prisms, and spheres).

G-7.4. Apply congruence and similarity relationships among geometric objects to solve problems.

G-7.5. Apply a procedure to draw a top view, front view, and side view of a three-dimensional object.

G-7.6. Apply a procedure to draw an isometric view of a three-dimensional object.

SOUTH CAROLINA
Precalculus Standards

Standard PC-1. The student will understand and utilize the mathematical processes of problem solving, reasoning and proof, communication, connections, and representation.

- **PC-1.1.** Communicate knowledge of algebraic and trigonometric relationships by using mathematical terminology appropriately.
- **PC-1.2.** Connect algebra and trigonometry with other branches of mathematics.
- **PC-1.3.** Apply algebraic methods to solve problems in real-world contexts.
- **PC-1.4.** Judge the reasonableness of mathematical solutions.
- **PC-1.5.** Demonstrate an understanding of algebraic and trigonometric relationships by using a variety of representations (including verbal, graphic, numerical, and symbolic).
- **PC-1.6.** Understand how algebraic and trigonometric relationships can be represented in concrete models, pictorial models, and diagrams.
- **PC-1.7.** Understand how to represent algebraic and trigonometric relationships by using tools such as handheld computing devices, spreadsheets, and computer algebra systems (CASs).

Standard PC-2. The student will demonstrate through the mathematical processes an understanding of the characteristics and behaviors of functions and the effect of operations on functions.

- **PC-2.1.** Carry out a procedure to graph parent functions (including $y = x^n$, $y = \log_a x$, $y = \ln x$, $y = \frac{1}{x}$, $y = e^x$, $y = a^x$, $y = \sin x$, $y = \cos x$, $y = \tan x$, $y = \csc x$, $y = \sec x$, and $y = \cot x$).
- **PC-2.2.** Carry out a procedure to graph transformations (including $-f(x)$, $a \cdot f(x)$, $f(x) + d$, $f(x - c)$, $f(-x)$, $f(b \cdot x)$, $|f(x)|$, and $f(|x|)$) of parent functions and combinations of transformations.
- **PC-2.3.** Analyze a graph to describe the transformation (including $-f(x)$, $a \cdot f(x)$, $f(x) + d$, $f(x - c)$, $f(-x)$, $f(b \cdot x)$, $|f(x)|$, and $f(|x|)$) of parent functions.
- **PC-2.4.** Carry out procedures to algebraically solve equations involving parent functions or transformations of parent functions (including $y = x^n$, $y = \log_a x$, $y = \ln x$, $y = \frac{1}{x}$, $y = e^x$, $y = a^x$, $y = \sin x$, $y = \cos x$, $y = \tan x$, $y = \csc x$, $y = \sec x$, and $y = \cot x$).
- **PC-2.5.** Analyze graphs, tables, and equations to determine the domain and range of parent functions or transformations of parent functions (including $y = x^n$, $y = \log_a x$, $y = \ln x$, $y = \frac{1}{x}$, $y = e^x$, $y = a^x$, $y = \sin x$, $y = \cos x$, $y = \tan x$, $y = \csc x$, $y = \sec x$, and $y = \cot x$).
- **PC-2.6.** Analyze a function or the symmetry of its graph to determine whether the function is even, odd, or neither.
- **PC-2.7.** Recognize and use connections among significant points of a function (including roots, maximum points, and minimum points), the graph of a function, and the algebraic representation of a function.
- **PC-2.8.** Carry out a procedure to determine whether the inverse of a function exists.
- **PC-2.9.** Carry out a procedure to write a rule for the inverse of a function, if it exists.

Standard PC-3. The student will demonstrate through the mathematical processes an understanding of the behaviors of polynomial and rational functions.

- **PC-3.1.** Carry out a procedure to graph quadratic and higher-order polynomial functions by analyzing intercepts and end behavior.
- **PC-3.2.** Apply the rational root theorem to determine a set of possible rational roots of a polynomial equation.
- **PC-3.3.** Carry out a procedure to calculate the zeros of polynomial functions when given a set of possible zeros.
- **PC-3.4.** Carry out procedures to determine characteristics of rational functions (including domain, range, intercepts, asymptotes, and discontinuities).
- **PC-3.5.** Analyze given information to write a polynomial function that models a given problem situation.
- **PC-3.6.** Carry out a procedure to solve polynomial equations algebraically.
- **PC-3.7.** Carry out a procedure to solve polynomial equations graphically.
- **PC-3.8.** Carry out a procedure to solve rational equations algebraically.
- **PC-3.9.** Carry out a procedure to solve rational equations graphically.
- **PC-3.10.** Carry out a procedure to solve polynomial inequalities algebraically.
- **PC-3.11.** Carry out a procedure to solve polynomial inequalities graphically.

Standard PC-4. The student will demonstrate through the mathematical processes an understanding of the behaviors of exponential and logarithmic functions.

- **PC-4.1.** Carry out a procedure to graph exponential functions by analyzing intercepts and end behavior.
- **PC-4.2.** Carry out a procedure to graph logarithmic functions by analyzing intercepts and end behavior.
- **PC-4.3.** Carry out procedures to determine characteristics of exponential functions (including domain, range, intercepts, and asymptotes).
- **PC-4.4.** Carry out procedures to determine characteristics of logarithmic functions (including domain, range, intercepts, and asymptotes).
- **PC-4.5.** Apply the laws of exponents to solve problems involving rational exponents.

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PC-4.6. Analyze given information to write an exponential function that models a given problem situation.

PC-4.7. Apply the laws of logarithms to solve problems.

PC-4.8. Carry out a procedure to solve exponential equations algebraically.

PC-4.9. Carry out a procedure to solve exponential equations graphically.

PC-4.10. Carry out a procedure to solve logarithmic equations algebraically.

PC-4.11. Carry out a procedure to solve logarithmic equations graphically.

Standard PC-5. The student will demonstrate through the mathematical processes an understanding of the behaviors of trigonometric functions.

PC-5.1. Understand how angles are measured in either degrees or radians.

PC-5.2. Carry out a procedure to convert between degree and radian measures.

PC-5.3. Carry out a procedure to plot points in the polar coordinate system.

PC-5.4. Carry out a procedure to graph trigonometric functions by analyzing intercepts, periodic behavior, and graphs of reciprocal functions.

PC-5.5. Carry out procedures to determine the characteristics of trigonometric functions (including domain, range, intercepts, and asymptotes).

PC-5.6. Apply a procedure to evaluate trigonometric expressions.

PC-5.7. Analyze given information to write a trigonometric function that models a given problem situation involving periodic phenomena.

PC-5.8. Analyze given information to write a trigonometric equation that models a given problem situation involving right triangles.

PC-5.9. Carry out a procedure to calculate the area of a triangle when given the lengths of two sides and the measure of the included angle.

PC-5.10. Carry out a procedure to solve trigonometric equations algebraically.

PC-5.11. Carry out a procedure to solve trigonometric equations graphically.

PC-5.12. Apply the laws of sines and cosines to solve problems.

PC-5.13. Apply a procedure to graph the inverse functions of sine, cosine, and tangent.

PC-5.14. Apply trigonometric relationships (including reciprocal identities; Pythagorean identities; even and odd identities; addition and subtraction formulas of sine, cosine, and tangent; and double angle formulas) to verify other trigonometric identities.

PC-5.15. Carry out a procedure to compute the slope of a line when given the angle of inclination of the line.

Standard PC-6. The student will demonstrate through the mathematical processes an understanding of the behavior of conic sections both geometrically and algebraically.

PC-6.1. Carry out a procedure to graph the circle whose equation is the form $(x - h)^2 + (y - k)^2 = r^2$.

PC-6.2. Analyze given information about the center and the radius or the center and the diameter to write an equation of a circle.

PC-6.3. Apply a procedure to calculate the coordinates of points where a line intersects a circle.

PC-6.4. Carry out a procedure to graph the ellipse whose equation is the form $\frac{(x-h)^2}{a^2} + \frac{(y-k)^2}{b^2} = 1$.

PC-6.5. Carry out a procedure to graph the hyperbola whose equation is the form $\frac{(x-h)^2}{a^2} - \frac{(y-k)^2}{b^2} = 1$.

PC-6.6. Carry out a procedure to graph the parabola whose equation is the form $y - k = a(x - h)^2$.

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SOUTH CAROLINA
Data Analysis and Probability and Statistics Standards

Standard DA-1. The student will understand and utilize the mathematical processes of problem solving, reasoning and proof, communication, connections, and representation.

- **DA-1.1.** Execute procedures to conduct simple probability experiments and collect data by using manipulatives (including spinners, dice, cards, and coins).
- **DA-1.2.** Execute procedures to find measures of probability and statistics by using tools such as handheld computing devices, spreadsheets, and statistical software.
- **DA-1.3.** Execute procedures to conduct a simulation by using random number tables and/or technology (including handheld computing devices and computers).
- **DA-1.4.** Design and conduct a statistical research project and produce a report that summarizes the findings.
- **DA-1.5.** Apply the principles of probability and statistics to solve problems in real-world contexts.
- **DA-1.6.** Communicate a knowledge of data analysis and probability by using mathematical terminology appropriately.
- **DA-1.7.** Judge the reasonableness of mathematical solutions on the basis of the source of the data, the design of the study, the way the data are displayed, and the way the data are analyzed.
- **DA-1.8.** Compare data sets by using graphs and summary statistics.

Standard DA-2. The student will demonstrate through the mathematical processes an understanding of the design of a statistical study.

- **DA-2.1.** Classify a data-collection procedure as a survey, an observational study, or a controlled experiment.
- **DA-2.2.** Compare various random sampling techniques (including simple, stratified, cluster, and systematic).
- **DA-2.3.** Analyze a data-collection procedure to classify the technique used as either simple cluster, systematic, or convenience sampling.
- **DA-2.4.** Critique data-collection methods and describe how bias can be controlled.
- **DA-2.5.** Judge which of two or more possible experimental designs will best answer a given research question.
- **DA-2.6.** Generate a research question and design a statistical study to answer a given research question.

Standard DA-3. The student will demonstrate through the mathematical processes an understanding of the methodology for collecting, organizing, displaying, and interpreting data.

- **DA-3.1.** Use manipulatives, random number tables, and technology to collect data and conduct experiments and simulations.
- **DA-3.2.** Organize and interpret data by using pictographs, bar graphs, pie charts, dot plots, histograms, time-series plots, stem-and-leaf plots, box-and-whiskers plots, and scatterplots.
- **DA-3.3.** Select appropriate graphic display(s) from among pictographs, bar graphs, pie charts, dot plots, histograms, time-series plots, stem-and-leaf plots, box-and-whiskers plots, and scatterplots when given a data set or problem situation.
- **DA-3.4.** Represent frequency distributions by using displays such as categorical frequency distributions/Pareto charts, histograms, frequency polygons, and cumulative frequency distributions/ogives.
- **DA-3.5.** Classify a scatterplot by shape (including linear, quadratic, and exponential).
- **DA-3.6.** Classify graphically and analytically the correlation between two variables as either positive, negative, or zero.
- **DA-3.7.** Carry out a procedure to determine an equation of a trend line for a scatterplot exhibiting a linear pattern by using visual approximation.
- **DA-3.8.** Carry out a procedure using technology to determine a line of best fit for a scatterplot exhibiting a linear pattern.
- **DA-3.9.** Explain the meaning of the correlation coefficient *r*.
- **DA-3.10.** Use interpolation or extrapolation to predict values based on the relationship between two variables.

Standard DA-4. The student will demonstrate through the mathematical processes an understanding of basic statistical methods of analyzing data.

- **DA-4.1.** Classify a variable as either a statistic or a parameter.
- **DA-4.2.** Compare descriptive and inferential statistics.
- **DA-4.3.** Classify a variable as either discrete or continuous and as either categorical or quantitative.
- **DA-4.4.** Use procedures and/or technology to find measures of central tendency (mean, median, and mode) for given data.
- **DA-4.5.** Predict the effect of transformations of data on measures of central tendency, variability, and the shape of the distribution.
- **DA-4.6.** Use procedures and/or technology to find measures of spread (range, variance, standard deviation, and interquartile range) and outliers for given data.
- **DA-4.7.** Use procedures and/or technology to find measures of position (including median, quartiles, percentiles, and standard scores) for given data.

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DA-4.8. Classify a distribution as either symmetric, positively skewed, or negatively skewed.

DA-4.9. Explain the significance of the shape of a distribution.

DA-4.10. Use a knowledge of the empirical rule to solve problems involving data that are distributed normally.

DA-4.11. Use control charts to determine whether a process is in control.

Standard DA-5. The student will demonstrate through the mathematical processes an understanding of the basic concepts of probability.

DA-5.1. Construct a sample space for an experiment and represent it as a list, chart, picture, or tree diagram.

DA-5.2. Use counting techniques to determine the number of possible outcomes for an event.

DA-5.3. Classify events as either dependent or independent.

DA-5.4. Categorize two events either as mutually exclusive or as not mutually exclusive of one another.

DA-5.5. Use the concept of complementary sets to compute probabilities.

DA-5.6. Use the binomial probability distribution to solve problems.

DA-5.7. Carry out a procedure to compute simple probabilities and compound probabilities (including conditional probabilities).

DA-5.8. Use a procedure to find geometric probability in real-world contexts.

DA-5.9. Compare theoretical and experimental probabilities.

DA-5.10. Construct and compare theoretical and experimental probability distributions.

DA-5.11. Use procedures to find the expected value of discrete random variables and construct meaning within contexts.

DA-5.12. Understand the law of large numbers.

DA-5.13. Carry out a procedure to compute conditional probability by using two-way tables.

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Science

SOUTH CAROLINA
Grade 8 Science Standards

SCIENTIFIC INQUIRY

Standard 8-1: The student will demonstrate an understanding of technological design and scientific inquiry, including process skills, mathematical thinking, controlled investigative design and analysis, and problem solving.

8-1.1. Design a controlled scientific investigation.

8-1.2. Recognize the importance of a systematic process for safely and accurately conducting investigations.

8-1.3. Construct explanations and conclusions from interpretations of data obtained during a controlled scientific investigation.

8-1.4. Generate questions for further study on the basis of prior investigations.

8-1.5. Explain the importance of and requirements for replication of scientific investigations.

8-1.6. Use appropriate tools and instruments (including convex lenses, plane mirrors, color filters, prisms, and slinky springs) safely and accurately when conducting a controlled scientific investigation.

8-1.7. Use appropriate safety procedures when conducting investigations.

EARTH'S BIOLOGICAL HISTORY

Standard 8-2: The student will demonstrate an understanding of Earth's biological diversity over time. (Life Science, Earth Science)

8-2.1. Explain how biological adaptations of populations enhance their survival in a particular environment.

8-2.2. Summarize how scientists study Earth's past environment and diverse life-forms by examining different types of fossils (including molds, casts, petrified fossils, preserved and carbonized remains of plants and animals, and trace fossils).

8-2.3. Explain how Earth's history has been influenced by catastrophes (including the impact of an asteroid or comet, climatic changes, and volcanic activity) that have affected the conditions on Earth and the diversity of its life-forms.

8-2.4. Recognize the relationship among the units—era, epoch, and period—into which the geologic time scale is divided.

8-2.5. Illustrate the vast diversity of life that has been present on Earth over time by using the geologic time scale.

8-2.6. Infer the relative age of rocks and fossils from index fossils and the ordering of the rock layers.

8-2.7. Summarize the factors, both natural and man-made, that can contribute to the extinction of a species.

EARTH'S STRUCTURE AND PROCESSES

Standard 8-3: The student will demonstrate an understanding of materials that determine the structure of Earth and the processes that have altered this structure. (Earth Science)

8-3.1. Summarize the three layers of Earth—crust, mantle, and core—on the basis of relative position, density, and composition.

8-3.2. Explain how scientists use seismic waves—primary, secondary, and surface waves—and Earth's magnetic fields to determine the internal structure of Earth.

8-3.3. Infer an earthquake's epicenter from seismographic data.

8-3.4. Explain how igneous, metamorphic, and sedimentary rocks are interrelated in the rock cycle.

8-3.5. Summarize the importance of minerals, ores, and fossil fuels as Earth resources on the basis of their physical and chemical properties.

8-3.6. Explain how the theory of plate tectonics accounts for the motion of the lithospheric plates, the geologic activities at the plate boundaries, and the changes in landform areas over geologic time.

8-3.7. Illustrate the creation and changing of landforms that have occurred through geologic processes (including volcanic eruptions and mountain-building forces).

8-3.8. Explain how earthquakes result from forces inside Earth.

8-3.9. Identify and illustrate geologic features of South Carolina and other regions of the world through the use of imagery (including aerial photography and satellite imagery) and topographic maps.

ASTRONOMY: EARTH AND SPACE SYSTEMS

Standard 8-4: The student will demonstrate an understanding of the characteristics, structure, and predictable motions of celestial bodies. (Earth Science)

8-4.1. Summarize the characteristics and movements of objects in the solar system (including planets, moons, asteroids, comets, and meteors).

8-4.2. Summarize the characteristics of the surface features of the Sun: photosphere, corona, sunspots, prominences, and solar flares.

8-4.3. Explain how the surface features of the Sun may affect Earth.

8-4.4. Explain the motions of Earth and the Moon and the effects of these motions as they orbit the Sun (including day, year, phases of the Moon, eclipses, and tides).

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8-4.5. Explain how the tilt of Earth's axis affects the length of the day and the amount of heating on Earth's surface, thus causing the seasons of the year.

8-4.6. Explain how gravitational forces are influenced by mass and distance.

8-4.7. Explain the effects of gravity on tides and planetary orbits.

8-4.8. Explain the difference between mass and weight by using the concept of gravitational force.

8-4.9. Recall the Sun's position in the universe, the shapes and composition of galaxies, and the distance measurement unit (light year) needed to identify star and galaxy locations.

8-4.10. Compare the purposes of the tools and the technology that scientists use to study space (including various types of telescopes, satellites, space probes, and spectroscopes).

FORCES AND MOTION

Standard 8-5: The student will demonstrate an understanding of the effects of forces on the motion of an object. (Physical Science)

8-5.1. Use measurement and time-distance graphs to represent the motion of an object in terms of its position, direction, or speed.

8-5.2. Use the formula for average speed, v = d/t, to solve real-world problems.

8-5.3. Analyze the effects of forces (including gravity and friction) on the speed and direction of an object.

8-5.4. Predict how varying the amount of force or mass will affect the motion of an object.

8-5.5. Analyze the resulting effect of balanced and unbalanced forces on an object's motion in terms of magnitude and direction.

8-5.6. Summarize and illustrate the concept of inertia.

WAVES

Standard 8-6: The student will demonstrate an understanding of the properties and behaviors of waves. (Physical Science)

8-6.1. Recall that waves transmit energy but not matter.

8-6.2. Distinguish between mechanical and electromagnetic waves.

8-6.3. Summarize factors that influence the basic properties of waves (including frequency, amplitude, wavelength, and speed).

8-6.4. Summarize the behaviors of waves (including refraction, reflection, transmission, and absorption).

8-6.5. Explain hearing in terms of the relationship between sound waves and the ear.

8-6.6. Explain sight in terms of the relationship between the eye and the light waves emitted or reflected by an object.

8-6.7. Explain how the absorption and reflection of light waves by various materials result in the human perception of color.

8-6.8. Compare the wavelength and energy of waves in various parts of the electromagnetic spectrum (including visible light, infrared, and ultraviolet radiation).

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SOUTH CAROLINA
Physical Science Standards

SCIENTIFIC INQUIRY

Standard PS-1: The student will demonstrate an understanding of how scientific inquiry and technological design, including mathematical analysis, can be used appropriately to pose questions, seek answers, and develop solutions.

PS-1.1. Generate hypotheses on the basis of credible, accurate, and relevant sources of scientific information.

PS-1.2. Use appropriate laboratory apparatuses, technology, and techniques safely and accurately when conducting a scientific investigation.

PS-1.3. Use scientific instruments to record measurement data in appropriate metric units that reflect the precision and accuracy of each particular instrument.

PS-1.4. Design a scientific investigation with appropriate methods of control to test a hypothesis (including independent and dependent variables), and evaluate the designs of sample investigations.

PS-1.5. Organize and interpret the data from a controlled scientific investigation by using mathematics (including formulas and dimensional analysis), graphs, models, and/or technology.

PS-1.6. Evaluate the results of a controlled scientific investigation in terms of whether they refute or verify the hypothesis.

PS-1.7. Evaluate a technological design or product on the basis of designated criteria (including cost, time, and materials).

PS-1.8. Compare the processes of scientific investigation and technological design.

PS-1.9. Use appropriate safety procedures when conducting investigations.

CHEMISTRY: STRUCTURE AND PROPERTIES OF MATTER

Standard PS-2: The student will demonstrate an understanding of the structure and properties of atoms.

PS-2.1. Compare the subatomic particles (protons, neutrons, electrons) of an atom with regard to mass, location, and charge, and explain how these particles affect the properties of an atom (including identity, mass, volume, and reactivity).

PS-2.2. Illustrate the fact that the atoms of elements exist as stable or unstable isotopes.

PS-2.3. Explain the trends of the periodic table based on the elements' valence electrons and atomic numbers.

PS-2.4. Use the atomic number and the mass number to calculate the number of protons, neutrons, and/or electrons for a given isotope of an element.

PS-2.5. Predict the charge that a representative element will acquire according to the arrangement of electrons in its outer energy level.

PS-2.6. Compare fission and fusion (including the basic processes and the fact that both fission and fusion convert a fraction of the mass of interacting particles into energy and release a great amount of energy).

PS-2.7. Explain the consequences that the use of nuclear applications (including medical technologies, nuclear power plants, and nuclear weapons) can have.

Standard PS-3: The student will demonstrate an understanding of various properties and classifications of matter.

PS-3.1. Distinguish chemical properties of matter (including reactivity) from physical properties of matter (including boiling point, freezing/melting point, density [with density calculations], solubility, viscosity, and conductivity).

PS-3.2. Infer the practical applications of organic and inorganic substances on the basis of their chemical and physical properties.

PS-3.3. Illustrate the difference between a molecule and an atom.

PS-3.4. Classify matter as a pure substance (either an element or a compound) or as a mixture (either homogeneous or heterogeneous) on the basis of its structure and/or composition.

PS-3.5. Explain the effects of temperature, particle size, and agitation on the rate at which a solid dissolves in a liquid.

PS-3.6. Compare the properties of the four states of matter—solid, liquid, gas, and plasma—in terms of the arrangement and movement of particles.

PS-3.7. Explain the processes of phase change in terms of temperature, heat transfer, and particle arrangement.

PS-3.8. Classify various solutions as acids or bases according to their physical properties, chemical properties (including neutralization and reaction with metals), generalized formulas, and pH (using pH meters, pH paper, and litmus paper).

Standard PS-4: The student will demonstrate an understanding of chemical reactions and the classifications, structures, and properties of chemical compounds.

PS-4.1. Explain the role of bonding in achieving chemical stability.

PS-4.2. Explain how the process of covalent bonding provides chemical stability through the sharing of electrons.

PS-4.3. Illustrate the fact that ions attract ions of opposite charge from all directions and form crystal lattices.

PS-4.4. Classify compounds as crystalline (containing ionic bonds) or molecular (containing covalent bonds) based on whether their outer electrons are transferred or shared.

PS-4.5. Predict the ratio by which the representative elements combine to form binary ionic compounds, and represent that ratio in a chemical formula.

PS-4.6. Distinguish between chemical changes (including the formation of gas or reactivity with acids) and physical

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changes (including changes in size, shape, color, and/or phase).

PS-4.7. Summarize characteristics of balanced chemical equations (including conservation of mass and changes in energy in the form of heat—that is, exothermic or endothermic reactions).

PS-4.8. Summarize evidence (including the evolution of gas; the formation of a precipitate; and/or changes in temperature, color, and/or odor) that a chemical reaction has occurred.

PS-4.9. Apply a procedure to balance equations for a simple synthesis or decomposition reaction.

PS-4.10. Recognize simple chemical equations (including single replacement and double replacement) as being balanced or not balanced.

PS-4.11. Explain the effects of temperature, concentration, surface area, and the presence of a catalyst on reaction rates.

PHYSICS: THE INTERACTIONS OF MATTER AND ENERGY

Standard PS-5: The student will demonstrate an understanding of the nature of forces and motion.

PS-5.1. Explain the relationship among distance, time, direction, and the velocity of an object.

PS-5.2. Use the formula $v = \frac{d}{t}$ to solve problems related to average speed or velocity.

PS-5.3. Explain how changes in velocity and time affect the acceleration of an object.

PS-5.4. Use the formula $a = \frac{(v_f - v_i)}{t}$ to determine the acceleration of an object.

PS-5.5. Explain how acceleration due to gravity affects the velocity of an object as it falls.

PS-5.6. Represent the linear motion of objects on distance-time graphs.

PS-5.7. Explain the motion of objects on the basis of Newton's three laws of motion: inertia; the relationship among force, mass, and acceleration; and action and reaction forces.

PS-5.8. Use the formula $F = ma$ to solve problems related to force.

PS-5.9. Explain the relationship between mass and weight by using the formula $F_W = ma_g$.

PS-5.10. Explain how the gravitational force between two objects is affected by the mass of each object and the distance between them.

Standard PS-6: The student will demonstrate an understanding of the nature, conservation, and transformation of energy.

PS-6.1. Explain how the law of conservation of energy applies to the transformation of various forms of energy (including mechanical energy, electrical energy, chemical energy, light energy, sound energy, and thermal energy).

PS-6.2. Explain the factors that determine potential and kinetic energy and the transformation of one to the other.

PS-6.3. Explain work in terms of the relationship among the force applied to an object, the displacement of the object, and the energy transferred to the object.

PS-6.4. Use the formula $W = Fd$ to solve problems related to work done on an object.

PS-6.5. Explain how objects can acquire a static electric charge through friction, induction, and conduction.

PS-6.6. Explain the relationships among voltage, resistance, and current in Ohm's law.

PS-6.7. Use the formula $V = IR$ to solve problems related to electric circuits.

PS-6.8. Represent an electric circuit by drawing a circuit diagram that includes the symbols for a resistor, switch, and voltage source.

PS-6.9. Compare the functioning of simple series and parallel electrical circuits.

PS-6.10. Compare alternating current (AC) and direct current (DC) in terms of the production of electricity and the direction of current flow.

PS-6.11. Explain the relationship of magnetism to the movement of electric charges in electromagnets, simple motors, and generators.

Standard PS-7: The student will demonstrate an understanding of the nature and properties of mechanical and electromagnetic waves.

PS-7.1. Illustrate ways that the energy of waves is transferred by interaction with matter (including transverse and longitudinal/compressional waves).

PS-7.2. Compare the nature and properties of transverse and longitudinal/compressional mechanical waves.

PS-7.3. Summarize characteristics of waves (including displacement, frequency, period, amplitude, wavelength, and velocity as well as the relationships among these characteristics).

PS-7.4. Use the formulas $v = f\lambda$ and $v = \frac{d}{t}$ to solve problems related to the velocity of waves.

PS-7.5. Summarize the characteristics of the electromagnetic spectrum (including range of wavelengths, frequency, energy, and propagation without a medium).

PS-7.6. Summarize reflection and interference of both sound and light waves and the refraction and diffraction of light waves.

PS-7.7. Explain the Doppler effect conceptually in terms of the frequency of the waves and the pitch of the sound.

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SOUTH CAROLINA
Biology Standards

SCIENTIFIC INQUIRY

Standard B-1: The student will demonstrate an understanding of how scientific inquiry and technological design, including mathematical analysis, can be used appropriately to pose questions, seek answers, and develop solutions.

B-1.1. Generate hypotheses based on credible, accurate, and relevant sources of scientific information.

B-1.2. Use appropriate laboratory apparatuses, technology, and techniques safely and accurately when conducting a scientific investigation.

B-1.3. Use scientific instruments to record measurement data in appropriate metric units that reflect the precision and accuracy of each particular instrument.

B-1.4. Design a scientific investigation with appropriate methods of control to test a hypothesis (including independent and dependent variables), and evaluate the designs of sample investigations.

B-1.5. Organize and interpret the data from a controlled scientific investigation by using mathematics, graphs, models, and/or technology.

B-1.6. Evaluate the results of a controlled scientific investigation in terms of whether they refute or verify the hypothesis.

B-1.7. Evaluate a technological design or product on the basis of designated criteria (including cost, time, and materials).

B-1.8. Compare the processes of scientific investigation and technological design.

B-1.9. Use appropriate safety procedures when conducting investigations.

Standard B-2: The student will demonstrate an understanding of the structure and function of cells and their organelles.

B-2.1. Recall the three major tenets of cell theory (all living things are composed of one or more cells; cells are the basic units of structure and function in living things; and all presently existing cells arose from previously existing cells).

B-2.2. Summarize the structures and functions of organelles found in a eukaryotic cell (including the nucleus, mitochondria, chloroplasts, lysosomes, vacuoles, ribosomes, endoplasmic reticulum [ER], Golgi apparatus, cilia, flagella, cell membrane, nuclear membrane, cell wall, and cytoplasm).

B-2.3. Compare the structures and organelles of prokaryotic and eukaryotic cells.

B-2.4. Explain the process of cell differentiation as the basis for the hierarchical organization of organisms (including cells, tissues, organs, and organ systems).

B-2.5. Explain how active, passive, and facilitated transport serve to maintain the homeostasis of the cell.

B-2.6. Summarize the characteristics of the cell cycle: interphase (called G1, S, G2); the phases of mitosis (called prophase, metaphase, anaphase, and telophase); and plant and animal cytokinesis.

B-2.7. Summarize how cell regulation controls and coordinates cell growth and division and allows cells to respond to the environment, and recognize the consequences of uncontrolled cell division.

B-2.8. Explain the factors that affect the rates of biochemical reactions (including pH, temperature, and the role of enzymes as catalysts).

Standard B-3: The student will demonstrate an understanding of the flow of energy within and between living systems.

B-3.1. Summarize the overall process by which photosynthesis converts solar energy into chemical energy and interpret the chemical equation for the process.

B-3.2. Summarize the basic aerobic and anaerobic processes of cellular respiration and interpret the chemical equation for cellular respiration.

B-3.3. Recognize the overall structure of adenosine triphosphate (ATP)—namely, adenine, the sugar ribose, and three phosphate groups—and summarize its function (including the ATP-ADP [adenosine diphosphate] cycle).

B-3.4. Summarize how the structures of organic molecules (including proteins, carbohydrates, and fats) are related to their relative caloric values.

B-3.5. Summarize the functions of proteins, carbohydrates, and fats in the human body.

B-3.6. Illustrate the flow of energy through ecosystems (including food chains, food webs, energy pyramids, number pyramids, and biomass pyramids).

Standard B-4: The student will demonstrate an understanding of the molecular basis of heredity.

B-4.1. Compare DNA and RNA in terms of structure, nucleotides, and base pairs.

B-4.2. Summarize the relationship among DNA, genes, and chromosomes.

B-4.3. Explain how DNA functions as the code of life and the blueprint for proteins.

B-4.4. Summarize the basic processes involved in protein synthesis (including transcription and translation).

B-4.5. Summarize the characteristics of the phases of meiosis I and II.

B-4.6. Predict inherited traits by using the principles of Mendelian genetics (including segregation, independent assortment, and dominance).

B-4.7. Summarize the chromosome theory of inheritance and relate that theory to Gregor Mendel's principles of genetics.

B-4.8. Compare the consequences of mutations in body cells with those in gametes.

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B-4.9. Exemplify ways that introduce new genetic characteristics into an organism or a population by applying the principles of modern genetics.

Standard B-5: The student will demonstrate an understanding of biological evolution and the diversity of life.

B-5.1. Summarize the process of natural selection.

B-5.2. Explain how genetic processes result in the continuity of life-forms over time.

B-5.3. Explain how diversity within a species increases the chances of its survival.

B-5.4. Explain how genetic variability and environmental factors lead to biological evolution.

B-5.5. Exemplify scientific evidence in the fields of anatomy, embryology, biochemistry, and paleontology that underlies the theory of biological evolution.

B-5.6. Summarize ways that scientists use data from a variety of sources to investigate and critically analyze aspects of evolutionary theory.

B-5.7. Use a phylogenetic tree to identify the evolutionary relationships among different groups of organisms.

Standard B-6: The student will demonstrate an understanding of the interrelationships among organisms and the biotic and abiotic components of their environments.

B-6.1. Explain how the interrelationships among organisms (including predation, competition, parasitism, mutualism, and commensalism) generate stability within ecosystems.

B-6.2. Explain how populations are affected by limiting factors (including density-dependent, density-independent, abiotic, and biotic factors).

B-6.3. Illustrate the processes of succession in ecosystems.

B-6.4. Exemplify the role of organisms in the geochemical cycles (including the cycles of carbon, nitrogen, and water).

B-6.5. Explain how ecosystems maintain themselves through naturally occurring processes (including maintaining the quality of the atmosphere, generating soils, controlling the hydrologic cycle, disposing of wastes, and recycling nutrients).

B-6.6. Explain how human activities (including population growth, technology, and consumption of resources) affect the physical and chemical cycles and processes of Earth.

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SOUTH CAROLINA
Chemistry Standards

SCIENTIFIC INQUIRY

Standard C-1: The student will demonstrate an understanding of how scientific inquiry and technological design, including mathematical analysis, can be used appropriately to pose questions, seek answers, and develop solutions.

C-1.1. Apply established rules for significant digits, both in reading a scientific instrument and in calculating a derived quantity from measurement.

C-1.2. Use appropriate laboratory apparatuses, technology, and techniques safely and accurately when conducting a scientific investigation.

C-1.3. Use scientific instruments to record measurement data in appropriate metric units that reflect the precision and accuracy of each particular instrument.

C-1.4. Design a scientific investigation with appropriate methods of control to test a hypothesis (including independent and dependent variables), and evaluate the designs of sample investigations.

C-1.5. Organize and interpret the data from a controlled scientific investigation by using mathematics (including formulas, scientific notation, and dimensional analysis), graphs, models, and/or technology.

C-1.6. Evaluate the results of a scientific investigation in terms of whether they verify or refute the hypothesis and what the possible sources of error are.

C-1.7. Evaluate a technological design or product on the basis of designated criteria.

C-1.8. Use appropriate safety procedures when conducting investigations.

Standard C-2: Students will demonstrate an understanding of atomic structure and nuclear processes.

C-2.1. Illustrate electron configurations by using orbital notation for representative elements.

C-2.2. Summarize atomic properties (including electron configuration, ionization energy, electron affinity, atomic size, and ionic size).

C-2.3. Summarize the periodic table's property trends (including electron configuration, ionization energy, electron affinity, atomic size, ionic size, and reactivity).

C-2.4. Compare the nuclear reactions of fission and fusion to chemical reactions (including the parts of the atom involved and the relative amounts of energy released).

C-2.5. Compare alpha, beta, and gamma radiation in terms of mass, charge, penetrating power, and the release of these particles from the nucleus.

C-2.6. Explain the concept of half-life, its use in determining the age of materials, and its significance to nuclear waste disposal.

C-2.7. Apply the predictable rate of nuclear decay (half-life) to determine the age of materials.

C-2.8. Analyze a decay series chart to determine the products of successive nuclear reactions and write nuclear equations for disintegration of specified nuclides.

C-2.9. Use the equation $E = mc^2$ to determine the amount of energy released during nuclear reactions.

Standard C-3: The student will demonstrate an understanding of the structures and classifications of chemical compounds.

C-3.1. Predict the type of bonding (ionic or covalent) and the shape of simple compounds by using Lewis dot structures and oxidation numbers.

C-3.2. Interpret the names and formulas for ionic and covalent compounds.

C-3.3. Explain how the types of intermolecular forces present in a compound affect the physical properties of compounds (including polarity and molecular shape).

C-3.4. Explain the unique bonding characteristics of carbon that have resulted in the formation of a large variety of organic structures.

C-3.5. Illustrate the structural formulas and names of simple hydrocarbons (including alkanes and their isomers and benzene rings).

C-3.6. Identify the basic structure of common polymers (including proteins, nucleic acids, plastics, and starches).

C-3.7. Classify organic compounds in terms of their functional group.

C-3.8. Explain the effect of electronegativity and ionization energy on the type of bonding in a molecule.

C-3.9. Classify polymerization reactions as addition or condensation.

C-3.10. Classify organic reactions as addition, elimination, or condensation.

Standard C-4: The student will demonstrate an understanding of the types, the causes, and the effects of chemical reactions.

C-4.1. Analyze and balance equations for simple synthesis, decomposition, single replacement, double replacement, and combustion reactions.

C-4.2. Predict the products of acid-base neutralization and combustion reactions.

C-4.3. Analyze the energy changes (endothermic or exothermic) associated with chemical reactions.

C-4.4. Apply the concept of moles to determine the number of particles of a substance in a chemical reaction, the percent composition of a representative compound, the mass proportions, and the mole-mass relationships.

C-4.5. Predict the percent yield, the mass of excess, and the limiting reagent in chemical reactions.

C-4.6. Explain the role of activation energy and the effects of temperature, particle size, stirring, concentration, and catalysts in reaction rates.

C-4.7. Summarize the oxidation and reduction processes (including oxidizing and reducing agents).

C-4.8. Illustrate the uses of electrochemistry (including electrolytic cells, voltaic cells, and the production of metals from ore by electrolysis).

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C-4.9. Summarize the concept of chemical equilibrium and Le Châtelier's principle.

C-4.10. Explain the role of collision frequency, the energy of collisions, and the orientation of molecules in reaction rates.

Standard C-5: The student will demonstrate an understanding of the structure and behavior of the different phases of matter.

C-5.1. Explain the effects of the intermolecular forces on the different phases of matter.

C-5.2. Explain the behaviors of gas; the relationship among pressure, volume, and temperature; and the significance of the Kelvin (absolute temperature) scale, using the kinetic-molecular theory as a model.

C-5.3. Apply the gas laws to problems concerning changes in pressure, volume, or temperature (including Charles's law, Boyle's law, and the combined gas law).

C-5.4. Illustrate and interpret heating and cooling curves (including how boiling and melting points can be identified and how boiling points vary with changes in pressure).

C-5.5. Analyze the energy changes involved in calorimetry by using the law of conservation of energy as it applies to temperature, heat, and phase changes (including the use of the formulas $q = mc\Delta T$ [temperature change] and $q = mLv$ and $q = mLf$ [phase change] to solve calorimetry problems).

C-5.6. Use density to determine the mass, volume, or number of particles of a gas in a chemical reaction.

C-5.7. Apply the ideal gas law ($pV = nRT$) to solve problems.

C-5.8. Analyze a product for purity by following the appropriate assay procedures.

C-5.9. Analyze a chemical process to account for the weight of all reagents and solvents by following the appropriate material balance procedures.

Standard C-6: The student will demonstrate an understanding of the nature and properties of various types of chemical solutions.

C-6.1. Summarize the process by which solutes dissolve in solvents, the dynamic equilibrium that occurs in saturated solutions, and the effects of varying pressure and temperature on solubility.

C-6.2. Compare solubility of various substances in different solvents (including polar and nonpolar solvents and organic and inorganic substances).

C-6.3. Illustrate the colligative properties of solutions (including freezing point depression and boiling point elevation and their practical uses).

C-6.4. Carry out calculations to find the concentration of solutions in terms of molarity and percent weight (mass).

C-6.5. Summarize the properties of salts, acids, and bases.

C-6.6. Distinguish between strong and weak common acids and bases.

C-6.7. Represent common acids and bases by their names and formulas.

C-6.8. Use the hydronium or hydroxide ion concentration to determine the pH and pOH of aqueous solutions.

C-6.9. Explain how the use of a titration can determine the concentration of acid and base solutions

C-6.10. Interpret solubility curves to determine saturation at different temperatures.

C-6.11. Use a variety of procedures for separating mixtures (including distillation, crystallization filtration, paper chromatography, and centrifuge).

C-6.12. Use solubility rules to write net ionic equations for precipitation reactions in aqueous solution.

C-6.13. Use the calculated molality of a solution to calculate the freezing point depression and the boiling point elevation of a solution.

C-6.14. Represent neutralization reactions and reactions between common acids and metals by using chemical equations.

C-6.15. Analyze the composition of a chemical sample by using gas chromatography.

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SOUTH CAROLINA
Physics Standards

SCIENTIFIC INQUIRY

Standard P-1: The student will demonstrate an understanding of how scientific inquiry and technological design, including mathematical analysis, can be used appropriately to pose questions, seek answers, and develop solutions.

P-1.1. Apply established rules for significant digits, both in reading scientific instruments and in calculating derived quantities from measurement.

P-1.2. Use appropriate laboratory apparatuses, technology, and techniques safely and accurately when conducting a scientific investigation.

P-1.3. Use scientific instruments to record measurement data in appropriate metric units that reflect the precision and accuracy of each particular instrument.

P-1.4. Design a scientific investigation with appropriate methods of control to test a hypothesis (including independent and dependent variables), and evaluate the designs of sample investigations.

P-1.5. Organize and interpret the data from a controlled scientific investigation by using (including calculations in scientific notation, formulas, and dimensional analysis), graphs, tables, models, diagrams, and/or technology.

P-1.6. Evaluate the results of a controlled scientific investigation in terms of whether they refute or verify the hypothesis.

P-1.7. Evaluate conclusions based on qualitative and quantitative data (including the impact of parallax, instrument malfunction, or human error) on experimental results.

P-1.8. Evaluate a technological design or product on the basis of designated criteria (including cost, time, and materials).

P-1.9. Communicate and defend a scientific argument or conclusion.

P-1.10. Use appropriate safety procedures when conducting investigations.

Standard P-2: The student will demonstrate an understanding of the principles of force and motion and relationships between them.

P-2.1. Represent vector quantities (including displacement, velocity, acceleration, and force) and use vector addition.

P-2.2. Apply formulas for velocity or speed and acceleration to one and two-dimensional problems.

P-2.3. Interpret the velocity or speed and acceleration of one and two-dimensional motion on distance-time, velocity-time or speed-time, and acceleration-time graphs.

P-2.4. Interpret the resulting motion of objects by applying Newton's three laws of motion: inertia; the relationship among net force, mass, and acceleration (using $F = ma$); and action and reaction forces.

P-2.5. Explain the factors that influence the dynamics of falling objects and projectiles.

P-2.6. Apply formulas for velocity and acceleration to solve problems related to projectile motion.

P-2.7. Use a free-body diagram to determine the net force and component forces acting upon an object.

P-2.8. Distinguish between static and kinetic friction and the factors that affect the motion of objects.

P-2.9. Explain how torque is affected by the magnitude, direction, and point of application of force.

P-2.10. Explain the relationships among speed, velocity, acceleration, and force in rotational systems.

Standard P-3: The student will demonstrate an understanding of the conservation, transfer, and transformation of mechanical energy.

P-3.1. Apply energy formulas to determine potential and kinetic energy and explain the transformation from one to the other.

P-3.2. Apply the law of conservation of energy to the transfer of mechanical energy through work.

P-3.3. Explain, both conceptually and quantitatively, how energy can transfer from one system to another (including work, power, and efficiency).

P-3.4. Explain, both conceptually and quantitatively, the factors that influence periodic motion.

P-3.5. Explain the factors involved in producing a change in momentum (including impulse and the law of conservation of momentum in both linear and rotary systems).

P-3.6. Compare elastic and inelastic collisions in terms of conservation laws.

Standard P-4: The student will demonstrate an understanding of the properties of electricity and magnetism and the relationships between them.

P-4.1. Recognize the characteristics of static charge and explain how a static charge is generated.

P-4.2. Use diagrams to illustrate an electric field (including point charges and electric field lines).

P-4.3. Summarize current, potential difference, and resistance in terms of electrons.

P-4.4. Compare how current, voltage, and resistance are measured in a series and in a parallel electric circuit and identify the appropriate units of measurement.

P-4.5. Analyze the relationships among voltage, resistance, and current in a complex circuit by using Ohm's law to calculate voltage, resistance, and current at each resistor, any branch, and the overall circuit.

P-4.6. Differentiate between alternating current (AC) and direct current (DC) in electrical circuits.

P-4.7. Carry out calculations for electric power and electric energy for circuits.

P-4.8. Summarize the function of electrical safety components (including fuses, surge protectors, and breakers).

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P-4.9. Explain the effects of magnetic forces on the production of electrical currents and on current carrying wires and moving charges.

P-4.10. Distinguish between the function of motors and generators on the basis of the use of electricity and magnetism by each.

P-4.11. Predict the cost of operating an electrical device by determining the amount of electrical power and electrical energy in the circuit.

Standard P-5: The student will demonstrate an understanding of the properties and behaviors of mechanical and electromagnetic waves.

P-5.1. Analyze the relationships among the properties of waves (including energy, frequency, amplitude, wavelength, period, phase, and speed).

P-5.2. Compare the properties of electromagnetic and mechanical waves.

P-5.3. Analyze wave behaviors (including reflection, refraction, diffraction, and constructive and destructive interference).

P-5.4. Distinguish the different properties of waves across the range of the electromagnetic spectrum.

P-5.5. Illustrate the interaction of light waves with optical lenses and mirrors by using Snell's law and ray diagrams.

P-5.6. Summarize the operation of lasers and compare them to incandescent light.

Standard P-6: The student will demonstrate an understanding of the properties and behaviors of sound.

P-6.1. Summarize the production of sound and its speed and transmission through various media.

P-6.2. Explain how frequency and intensity affect the parts of the sonic spectrum.

P-6.3. Explain pitch, loudness, and tonal quality in terms of wave characteristics that determine what is heard.

P-6.4. Compare intensity and loudness.

P-6.5. Apply formulas to determine the relative intensity of sound.

P-6.6. Apply formulas in order to solve for resonant wavelengths in problems involving open and closed tubes.

P-6.7. Explain the relationship among frequency, fundamental tones, and harmonics in producing music.

P-6.8. Explain how musical instruments produce resonance and standing waves.

P-6.9. Explain how the variables of length, width, tension, and density affect the resonant frequency, harmonics, and pitch of a vibrating string.

Standard P-7: The student will demonstrate an understanding of the properties and behaviors of light and optics.

P-7.1. Explain the particulate nature of light as evidenced in the photoelectric effect.

P-7.2. Use the inverse square law to determine the change in intensity of light with distance.

P-7.3. Illustrate the polarization of light.

P-7.4. Summarize the operation of fiber optics in terms of total internal reflection.

P-7.5. Summarize image formation in microscopes and telescopes (including reflecting and refracting).

P-7.6. Summarize the production of continuous, emission, or absorption spectra.

P-7.7. Compare color by transmission to color by reflection.

P-7.8. Compare color mixing in pigments to color mixing in light.

P-7.9. Illustrate the diffraction and interference of light.

P-7.10. Identify the parts of the eye and explain their function in image formation.

Standard P-8: The student will demonstrate an understanding of nuclear physics and modern physics.

P-8.1. Compare the strong and weak nuclear forces in terms of their roles in radioactivity.

P-8.2. Compare the nuclear binding energy to the energy released during a nuclear reaction, given the atomic masses of the constituent particles.

P-8.3. Predict the resulting isotope of a given alpha, beta, or gamma emission.

P-8.4. Apply appropriate procedures to balance nuclear equations (including fusion, fission, alpha decay, beta decay, and electron capture).

P-8.5. Interpret a representative nuclear decay series.

P-8.6. Explain the relationship between mass and energy that is represented in the equation $E = mc^2$ according to Einstein's special theory of relativity.

P-8.7. Compare the value of time, length, and momentum in the reference frame of an object moving at relativistic velocity to those values measured in the reference frame of an observer by applying Einstein's special theory of relativity.

Standard P-9: The student will demonstrate an understanding of the principles of fluid mechanics.

P-9.1. Predict the behavior of fluids (including changing forces) in pneumatic and hydraulic systems.

P-9.2. Apply appropriate procedures to solve problems involving pressure, force, volume, and area.

P-9.3. Explain the factors that affect buoyancy.

P-9.4. Explain how the rate of flow of a fluid is affected by the size of the pipe, friction, and the viscosity of the fluid.

P-9.5. Explain how depth and fluid density affect pressure.

P-9.6. Apply fluid formulas to solve problems involving work and power.

P-9.7. Exemplify the relationship between velocity and pressure by using Bernoulli's principle.

Standard P-10: The student will demonstrate an understanding of the principles of thermodynamics.

P-10.1. Summarize the first and second laws of thermodynamics.

P-10.2. Explain the relationship among internal energy, heat, and work.

P-10.3. Exemplify the concept of entropy.

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P-10.4. Explain thermal expansion in solids, liquids, and gases in terms of kinetic theory and the unique behavior of water.

P-10.5. Differentiate heat and temperature in terms of molecular motion.

P-10.6. Summarize the concepts involved in phase change.

P-10.7. Apply the concepts of heat capacity, specific heat, and heat exchange to solve calorimetry problems.

P-10.8. Summarize the functioning of heat transfer mechanisms (including engines and refrigeration systems).

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SOUTH CAROLINA
Earth Science Standards

SCIENTIFIC INQUIRY

Standard ES-1: The student will demonstrate an understanding of how scientific inquiry and technological design, including mathematical analysis, can be used appropriately to pose questions, seek answers, and develop solutions.

ES-1.1. Apply established rules for significant digits, both in reading scientific instruments and in calculating derived quantities from measurement.

ES-1.2. Use appropriate laboratory apparatuses, technology, and techniques safely and accurately when conducting a scientific investigation.

ES-1.3. Use scientific instruments to record measurement data in appropriate metric units that reflect the precision and accuracy of each particular instrument.

ES-1.4. Design a scientific investigation with appropriate methods of control to test a hypothesis (including independent and dependent variables), and evaluate the designs of sample investigations.

ES-1.5. Organize and interpret the data from a controlled scientific investigation by using mathematics (including calculations in scientific notation, formulas, and dimensional analysis), graphs, tables, models, diagrams, and/or technology.

ES-1.6. Evaluate the results of a controlled scientific investigation in terms of whether they refute or verify the hypothesis.

ES-1.7. Evaluate conclusions based on qualitative and quantitative data (including the impact of parallax, instrument malfunction, or human error) on experimental results.

ES-1.8. Evaluate a technological design or product on the basis of designated criteria (including cost, time, and materials).

ES-1.9. Communicate and defend a scientific argument or conclusion.

ES-1.10. Use appropriate safety procedures when conducting investigations.

ASTRONOMY

Standard ES-2: Students will demonstrate an understanding of the structure and properties of the universe.

ES-2.1. Summarize the properties of the solar system that support the theory of its formation along with the planets.

ES-2.2. Identify properties and features of the Moon that make it unique among other moons in the solar system.

ES-2.3. Summarize the evidence that supports the big bang theory and the expansion of the universe (including the red shift of light from distant galaxies and the cosmic background radiation).

ES-2.4. Explain the formation of elements that results from nuclear fusion occurring within stars or supernova explosions.

ES-2.5. Classify stars by using the Hertzsprung-Russell diagram.

ES-2.6. Compare the information obtained through the use of x-ray, radio, and visual (reflecting and refracting) telescopes.

ES-2.7. Summarize the life cycles of stars.

ES-2.8. Explain how gravity and motion affect the formation and shapes of galaxies (including the Milky Way).

ES-2.9. Explain how technology and computer modeling have increased our understanding of the universe.

SOLID EARTH

Standard ES-3: Students will demonstrate an understanding of the internal and external dynamics of solid Earth.

ES-3.1. Summarize theories and evidence of the origin and formation of Earth's systems by using the concepts of gravitational force and heat production.

ES-3.2. Explain the differentiation of the structure of Earth's layers into a core, mantle, and crust based on the production of internal heat from the decay of isotopes and the role of gravitational energy.

ES-3.3. Summarize theory of plate tectonics (including the role of convection currents, the action at plate boundaries, and the scientific evidence for the theory).

ES-3.4. Explain how forces due to plate tectonics cause crustal changes as evidenced in earthquake activity, volcanic eruptions, and mountain building.

ES-3.5. Analyze surface features of Earth in order to identify geologic processes (including weathering, erosion, deposition, and glaciation) that are likely to have been responsible for their formation.

ES-3.6. Explain how the dynamic nature of the rock cycle accounts for the interrelationships among igneous, sedimentary, and metamorphic rocks.

ES-3.7. Classify minerals and rocks on the basis of their physical and chemical properties and the environment in which they were formed.

ES-3.8. Summarize the formation of ores and fossil fuels and the impact on the environment that the use of these fuels has had.

EARTH'S ATMOSPHERE

Standard ES-4: The student will demonstrate an understanding of the dynamics of Earth's atmosphere.

ES-4.1. Summarize the thermal structures, the gaseous composition, and the location of the layers of Earth's atmosphere.

ES-4.2. Summarize the changes in Earth's atmosphere over geologic time (including the importance of photosynthesizing organisms to the atmosphere).

ES-4.3. Summarize the cause and effects of convection within Earth's atmosphere.

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ES-4.4. Attribute global climate patterns to geographic influences (including latitude, topography, elevation, and proximity to water).

ES-4.5. Explain the relationship between the rotation of Earth and the pattern of wind belts.

ES-4.6. Summarize possible causes of and evidence for past and present global climate changes.

ES-4.7. Summarize the evidence for the likely impact of human activities on the atmosphere (including ozone holes, greenhouse gases, acid rain, and photochemical smog).

ES-4.8. Predict weather conditions and storms (including thunderstorms, hurricanes, and tornados) on the basis of the relationship among the movement of air masses, high and low pressure systems, and frontal boundaries.

EARTH'S HYDROSPHERE

Standard ES-5: The student will demonstrate an understanding of Earth's freshwater and ocean systems.

ES-5.1. Summarize the location, movement, and energy transfers involved in the movement of water on Earth's surface (including lakes, surface-water drainage basins [watersheds], freshwater wetlands, and groundwater zones).

ES-5.2. Illustrate the characteristics of the succession of river systems.

ES-5.3. Explain how karst topography develops as a result of groundwater processes.

ES-5.4. Compare the physical and chemical properties of seawater and freshwater.

ES-5.5. Explain the results of the interaction of the shore with waves and currents.

ES-5.6. Summarize the advantages and disadvantages of devices used to control and prevent coastal erosion and flooding.

ES-5.7. Explain the effects of the transfer of solar energy and geothermal energy on the oceans of Earth (including the circulation of ocean currents and chemosynthesis).

ES-5.8. Analyze environments to determine possible sources of water pollution (including industrial waste, agriculture, domestic waste, and transportation devices).

THE PALEOBIOSPHERE

Standard ES-6: Students will demonstrate an understanding of the dynamic relationship between Earth's conditions over geologic time and the diversity of its organisms.

ES-6.1. Summarize the conditions of Earth that enable the planet to support life.

ES-6.2. Recall the divisions of the geologic time scale and illustrate the changes (in complexity and/or diversity) of organisms that have existed across these time units.

ES-6.3. Summarize how fossil evidence reflects the changes in environmental conditions on Earth over time.

ES-6.4. Match dating methods (including index fossils, ordering of rock layers, and radiometric dating) with the most appropriate application for estimating geologic time.

ES-6.5. Infer explanations concerning the age of the universe and the age of Earth on the basis of scientific evidence.

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_____ = Content sampled by the EXPLORE, PLAN, and ACT Science tests and WorkKeys LI Test

Section C: ACT's College Readiness Standards Included in South Carolina's Grades 8–12 Standards

Using thousands of student records and responses, content and measurement experts worked backwards to develop data-driven, empirically derived statements of what students know and are typically able to do in various score ranges on the English, Reading, Writing, Mathematics, and Science tests on the EXPLORE, PLAN, and ACT tests. These empirically derived score descriptors are called **ACT's College Readiness Standards**. Because of this unique way they were derived, ACT's College Readiness Standards contain specific descriptions of proficiency and content, including descriptions of the complexity of the test material. The ACT College Readiness Standards prove to be an effective way to communicate the skills and knowledge measured by our EXPLORE, PLAN, and ACT tests.

In this section (Section C), the ACT College Readiness Standards that are highlighted are those that are included in South Carolina's Standards. ACT College Readiness Standards not highlighted are those statements that include specific content, complexity and/or proficiency level descriptions that were not described in South Carolina's Standards.

Because South Carolina educators are the experts on the South Carolina Academic Standards, we would strongly encourage them to examine this document and offer their interpretations.

Table C-1. ACT's College Readiness Standards — English

	Topic Development in Terms of Purpose and Focus	Organization, Unity, and Coherence	Word Choice in Terms of Style, Tone, Clarity, and Economy
13–15		Use conjunctive adverbs or phrases to show time relationships in simple narrative essays (e.g., *then*, *this time*)	Revise sentences to correct awkward and confusing arrangements of sentence elements Revise vague nouns and pronouns that create obvious logic problems
16–19	Identify the basic purpose or role of a specified phrase or sentence Delete a clause or sentence because it is obviously irrelevant to the essay	Select the most logical place to add a sentence in a paragraph	Delete obviously synonymous and wordy material in a sentence Revise expressions that deviate from the style of an essay
20–23	Identify the central idea or main topic of a straightforward piece of writing Determine relevancy when presented with a variety of sentence-level details	Use conjunctive adverbs or phrases to express straightforward logical relationships (e.g., *first*, *afterward*, *in response*) Decide the most logical place to add a sentence in an essay Add a sentence that introduces a simple paragraph	Delete redundant material when information is repeated in different parts of speech (e.g., "alarmingly startled") Use the word or phrase most consistent with the style and tone of a fairly straightforward essay Determine the clearest and most logical conjunction to link clauses
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 Delete material primarily because it disturbs the flow and development of the paragraph Add a sentence to accomplish a fairly straightforward purpose such as illustrating a given statement	Determine the need for conjunctive adverbs or phrases to create subtle logical connections between sentences (e.g., *therefore*, *however*, *in addition*) Rearrange the sentences in a fairly uncomplicated paragraph for the sake of logic Add a sentence to introduce or conclude the essay or to provide a transition between paragraphs when the essay is fairly straightforward	Revise a phrase that is redundant in terms of the meaning and logic of the entire sentence Identify and correct ambiguous pronoun references Use the word or phrase most appropriate in terms of the content of the sentence and tone of the essay
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 Add a sentence to accomplish a subtle rhetorical purpose such as to emphasize, to add supporting detail, or to express meaning through connotation	Make sophisticated distinctions concerning the logical use of conjunctive adverbs or phrases, particularly when signaling a shift between paragraphs Rearrange sentences to improve the logic and coherence of a complex paragraph Add a sentence to introduce or conclude a fairly complex paragraph	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") Correct vague and wordy or clumsy and confusing writing containing sophisticated language
33–36	Determine whether a complex essay has accomplished a specific purpose Add a phrase or sentence to accomplish a complex purpose, often expressed in terms of the main focus of the essay	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 essay	Delete redundant material that involves subtle concepts or that is redundant in terms of the paragraph as a whole

Table C-1. ACT's College Readiness Standards — English (continued)

	Sentence Structure and Formation	Conventions of Usage	Conventions of Punctuation
13–15	Use conjunctions or punctuation to join simple clauses Revise shifts in verb tense between simple clauses in a sentence or between simple adjoining sentences	Solve such basic grammatical problems as how to form the past and past participle of irregular but commonly used verbs and how to form comparative and superlative adjectives	Delete commas that create basic sense problems (e.g., between verb and direct object)
16–19	Determine the need for punctuation and conjunctions to avoid awkward-sounding sentence fragments and fused sentences Decide the appropriate verb tense and voice by considering the meaning of the entire sentence	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 Recognize and use the appropriate word in frequently confused pairs such as *there* and *their*, *past* and *passed*, and *led* and *lead*	Provide appropriate punctuation in straightforward situations (e.g., items in a series) Delete commas that disturb the sentence flow (e.g., between modifier and modified element)
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)	Use idiomatically appropriate prepositions, especially in combination with verbs (e.g., *long for*, *appeal to*) Ensure that a verb agrees with its subject when there is some text between the two	Use commas to set off simple parenthetical phrases 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)
24–27	Revise to avoid faulty placement of phrases and faulty coordination and subordination of clauses in sentences with subtle structural problems Maintain consistent verb tense and pronoun person on the basis of the preceding clause or sentence	Ensure that a pronoun agrees with its antecedent when the two occur in separate clauses or sentences 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*	Use punctuation to set off complex parenthetical phrases Recognize and delete unnecessary commas based on a careful reading of a complicated sentence (e.g., between the elements of a compound subject or compound verb joined by *and*) Use apostrophes to indicate simple possessive nouns Recognize inappropriate uses of colons and semicolons
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 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	Correctly use reflexive pronouns, the possessive pronouns *its* and *your*, and the relative pronouns *who* and *whom* 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 an indefinite pronoun)	Use commas to set off a nonessential/nonrestrictive appositive or clause Deal with multiple punctuation problems (e.g., compound sentences containing unnecessary commas and phrases that may or may not be parenthetical) Use an apostrophe to show possession, especially with irregular plural nouns Use a semicolon to indicate a relationship between closely related independent clauses
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	Provide idiomatically and contextually appropriate prepositions following verbs in situations involving sophisticated language or ideas Ensure that a verb agrees with its subject when a phrase or clause between the two suggests a different number for the verb	Use a colon to introduce an example or an elaboration

Table C-2. ACT's College Readiness Standards — Reading		
	Main Ideas and Author's Approach	**Supporting Details**
13–15	Recognize a clear intent of an author or narrator in uncomplicated literary narratives	Locate basic facts (e.g., names, dates, events) clearly stated in a passage
16–19	Identify a clear main idea or purpose of straightforward paragraphs in uncomplicated literary narratives	Locate simple details at the sentence and paragraph level in uncomplicated passages Recognize a clear function of a part of an uncomplicated passage
20–23	Infer the main idea or purpose of straightforward paragraphs in uncomplicated literary narratives Understand the overall approach taken by an author or narrator (e.g., point of view, kinds of evidence used) in uncomplicated passages	Locate important details in uncomplicated passages Make simple inferences about how details are used in passages
24–27	Identify a clear main idea or purpose of any paragraph or paragraphs in uncomplicated passages Infer the main idea or purpose of straightforward paragraphs in more challenging passages Summarize basic events and ideas in more challenging passages Understand the overall approach taken by an author or narrator (e.g., point of view, kinds of evidence used) in more challenging passages	Locate important details in more challenging passages Locate and interpret minor or subtly stated details in uncomplicated passages Discern which details, though they may appear in different sections throughout a passage, support important points in more challenging passages
28–32	Infer the main idea or purpose of more challenging passages or their paragraphs Summarize events and ideas in virtually any passage Understand the overall approach taken by an author or narrator (e.g., point of view, kinds of evidence used) in virtually any passage	Locate and interpret minor or subtly stated details in more challenging passages Use details from different sections of some complex informational passages to support a specific point or argument
33–36	Identify clear main ideas or purposes of complex passages or their paragraphs	Locate and interpret details in complex passages Understand the function of a part of a passage when the function is subtle or complex

Descriptions of the ACT Reading Passages

Uncomplicated Literary Narratives refers to excerpts from essays, short stories, and novels that tend to use simple language and structure, have a clear purpose and a familiar style, present straightforward interactions between characters, and employ only a limited number of literary devices such as metaphor, simile, or hyperbole.

More Challenging Literary Narratives refers to excerpts from essays, short stories, and novels that tend to make moderate use of figurative language, have a more intricate structure and messages conveyed with some subtlety, and may feature somewhat complex interactions between characters.

Complex Literary Narratives refers to excerpts from essays, short stories, and novels that tend to make generous use of ambiguous language and literary devices, feature complex and subtle interactions between characters, often contain challenging context-dependent vocabulary, and typically contain messages and/or meanings that are not explicit but are embedded in the passage.

Table C-2. ACT's College Readiness Standards — Reading (continued)

	Sequential, Comparative, and Cause-Effect Relationships	Meanings of Words	Generalizations and Conclusions
13–15	Determine when (e.g., first, last, before, after) or if an event occurred in uncomplicated passages Recognize clear cause-effect relationships described within a single sentence in a passage	Understand the implication of a familiar word or phrase and of simple descriptive language	Draw simple generalizations and conclusions about the main characters in uncomplicated literary narratives
16–19	Identify relationships between main characters in uncomplicated literary narratives Recognize clear cause-effect relationships within a single paragraph in uncomplicated literary narratives	Use context to understand basic figurative language	Draw simple generalizations and conclusions about people, ideas, and so on in uncomplicated passages
20–23	Order simple sequences of events in uncomplicated literary narratives Identify clear relationships between people, ideas, and so on in uncomplicated passages Identify clear cause-effect relationships in uncomplicated passages	Use context to determine the appropriate meaning of some figurative and nonfigurative words, phrases, and statements in uncomplicated passages	Draw generalizations and conclusions about people, ideas, and so on in uncomplicated passages Draw simple generalizations and conclusions using details that support the main points of more challenging passages
24–27	Order sequences of events in uncomplicated passages Understand relationships between people, ideas, and so on in uncomplicated passages Identify clear relationships between characters, ideas, and so on in more challenging literary narratives Understand implied or subtly stated cause-effect relationships in uncomplicated passages Identify clear cause-effect relationships in more challenging passages	Use context to determine the appropriate meaning of virtually any word, phrase, or statement in uncomplicated passages Use context to determine the appropriate meaning of some figurative and nonfigurative words, phrases, and statements in more challenging passages	Draw subtle generalizations and conclusions about characters, ideas, and so on in uncomplicated literary narratives Draw generalizations and conclusions about people, ideas, and so on in more challenging passages
28–32	Order sequences of events in more challenging passages Understand the dynamics between people, ideas, and so on in more challenging passages Understand implied or subtly stated cause-effect relationships in more challenging passages	Determine the appropriate meaning of words, phrases, or statements from figurative or somewhat technical contexts	Use information from one or more sections of a more challenging passage to draw generalizations and conclusions about people, ideas, and so on
33–36	Order sequences of events in complex passages Understand the subtleties in relationships between people, ideas, and so on in virtually any passage Understand implied, subtle, or complex cause-effect relationships in virtually any passage	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	Draw complex or subtle generalizations and conclusions about people, ideas, and so on, often by synthesizing information from different portions of the passage Understand and generalize about portions of a complex literary narrative

Uncomplicated Informational Passages refers to materials that tend to contain a limited amount of data, address basic concepts using familiar language and conventional organizational patterns, have a clear purpose, and are written to be accessible.

More Challenging Informational Passages refers to materials that tend to present concepts that are not always stated explicitly and that are accompanied or illustrated by more—and more detailed—supporting data, include some difficult context-dependent words, and are written in a somewhat more demanding and less accessible style.

Complex Informational Passages refers to materials that tend to include a sizable amount of data, present difficult concepts that are embedded (not explicit) in the text, use demanding words and phrases whose meaning must be determined from context, and are likely to include intricate explanations of processes or events.

Table C-3. ACT's College Readiness Standards — Writing

	Expressing Judgments	Focusing on the Topic	Developing a Position
3–4	Show a little understanding of the persuasive purpose of the task but neglect to take or to maintain a position on the issue in the prompt Show limited recognition of the complexity of the issue in the prompt	Maintain a focus on the general topic in the prompt through most of the essay	Offer a little development, with one or two ideas; if examples are given, they are general and may not be clearly relevant; resort often to merely repeating ideas Show little or no movement between general and specific ideas and examples
5–6	Show a basic understanding of the persuasive purpose of the task by taking a position on the issue in the prompt but may not maintain that position Show a little recognition of the complexity of the issue in the prompt by acknowledging, but only briefly describing, a counterargument to the writer's position	Maintain a focus on the general topic in the prompt throughout the essay	Offer limited development of ideas using a few general examples; resort sometimes to merely repeating ideas Show little movement between general and specific ideas and examples
7–8	Show understanding of the persuasive purpose of the task by taking a position on the issue in the prompt Show some recognition of the complexity of the issue in the prompt by • acknowledging counterarguments to the writer's position • providing some response to counter-arguments to the writer's position	Maintain a focus on the general topic in the prompt throughout the essay and attempt a focus on the specific issue in the prompt Present a thesis that establishes focus on the topic	Develop ideas by using some specific reasons, details, and examples Show some movement between general and specific ideas and examples
9–10	Show clear understanding of the persuasive purpose of the task by taking a position on the specific issue in the prompt and offering a broad context for discussion Show recognition of the complexity of the issue in the prompt by • partially evaluating implications and/or complications of the issue, and/or • posing and partially responding to counter-arguments to the writer's position	Maintain a focus on discussion of the specific topic and issue in the prompt throughout the essay Present a thesis that establishes a focus on the writer's position on the issue	Develop most ideas fully, using some specific and relevant reasons, details, and examples Show clear movement between general and specific ideas and examples
11–12	Show clear understanding of the persuasive purpose of the task by taking a position on the specific issue in the prompt and offering a critical context for discussion Show understanding of the complexity of the issue in the prompt by • examining different perspectives, and/or • evaluating implications or complications of the issue, and/or • posing and fully discussing counter-arguments to the writer's position	Maintain a clear focus on discussion of the specific topic and issue in the prompt throughout the essay Present a critical thesis that clearly establishes the focus on the writer's position on the issue	Develop several ideas fully, using specific and relevant reasons, details, and examples Show effective movement between general and specific ideas and examples

Table C-3. ACT's College Readiness Standards — Writing (continued)		
	Organizing Ideas	**Using Language**
3–4	Provide a discernible organization with some logical grouping of ideas in parts of the essay Use a few simple and obvious transitions Present a discernible, though minimally developed, introduction and conclusion	Show limited control of language by • correctly employing some of the conventions of standard English grammar, usage, and mechanics, but with distracting errors that sometimes significantly impede understanding • using simple vocabulary • using simple sentence structure
5–6	Provide a simple organization with logical grouping of ideas in parts of the essay Use some simple and obvious transitional words, though they may at times be inappropriate or misleading Present a discernible, though underdeveloped, introduction and conclusion	Show a basic control of language by • correctly employing some of the conventions of standard English grammar, usage, and mechanics, but with distracting errors that sometimes impede understanding • using simple but appropriate vocabulary • using a little sentence variety, though most sentences are simple in structure
7–8	Provide an adequate but simple organization with logical grouping of ideas in parts of the essay but with little evidence of logical progression of ideas Use some simple and obvious, but appropriate, transitional words and phrases Present a discernible introduction and conclusion with a little development	Show adequate use of language to communicate by • correctly employing many of the conventions of standard English grammar, usage, and mechanics, but with some distracting errors that may occasionally impede understanding • using appropriate vocabulary • using some varied kinds of sentence structures to vary pace
9–10	Provide unity and coherence throughout the essay, sometimes with a logical progression of ideas Use relevant, though at times simple and obvious, transitional words and phrases to convey logical relationships between ideas Present a somewhat developed introduction and conclusion	Show competent use of language to communicate ideas by • correctly employing most conventions of standard English grammar, usage, and mechanics, with a few distracting errors but none that impede understanding • using some precise and varied vocabulary • using several kinds of sentence structures to vary pace and to support meaning
11–12	Provide unity and coherence throughout the essay, often with a logical progression of ideas Use relevant transitional words, phrases, and sentences to convey logical relationships between ideas Present a well-developed introduction and conclusion	Show effective use of language to clearly communicate ideas by • correctly employing most conventions of standard English grammar, usage, and mechanics, with just a few, if any, errors • using precise and varied vocabulary • using a variety of kinds of sentence structures to vary pace and to support meaning

Table C-4. ACT's College Readiness Standards — Mathematics

	Basic Operations & Applications	Probability, Statistics, & Data Analysis	Numbers: Concepts & Properties	Expressions, Equations, & Inequalities
13–15	Perform one-operation computation with whole numbers and decimals Solve problems in one or two steps using whole numbers Perform common conversions (e.g., inches to feet or hours to minutes)	Calculate the average of a list of positive whole numbers Perform a single computation using information from a table or chart	Recognize equivalent fractions and fractions in lowest terms	Exhibit knowledge of basic expressions (e.g., identify an expression for a total as $b + g$) Solve equations in the form $x + a = b$, where a and b are whole numbers or decimals
16–19	Solve routine one-step arithmetic problems (using whole numbers, fractions, and decimals) such as single-step percent Solve some routine two-step arithmetic problems	Calculate the average of a list of numbers Calculate the average, given the number of data values and the sum of the data values Read tables and graphs Perform computations on data from tables and graphs Use the relationship between the probability of an event and the probability of its complement	Recognize one-digit factors of a number Identify a digit's place value	Substitute whole numbers for unknown quantities to evaluate expressions Solve one-step equations having integer or decimal answers Combine like terms (e.g., $2x + 5x$)
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	Calculate the missing data value, given the average and all data values but one Translate from one representation of data to another (e.g., a bar graph to a circle graph) Determine the probability of a simple event Exhibit knowledge of simple counting techniques	Exhibit knowledge of elementary number concepts including rounding, the ordering of decimals, pattern identification, absolute value, primes, and greatest common factor	Evaluate algebraic expressions by substituting integers for unknown quantities Add and subtract simple algebraic expressions Solve routine first-degree equations Perform straightforward word-to-symbol translations Multiply two binomials
24–27	Solve multistep arithmetic problems that involve planning or converting units of measure (e.g., feet per second to miles per hour)	Calculate the average, given the frequency counts of all the data values Manipulate data from tables and graphs Compute straightforward probabilities for common situations Use Venn diagrams in counting	Find and use the least common multiple Order fractions Work with numerical factors Work with scientific notation Work with squares and square roots of numbers Work problems involving positive integer exponents Work with cubes and cube roots of numbers Determine when an expression is undefined Exhibit some knowledge of the complex numbers	Solve real-world problems using first-degree equations 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) Identify solutions to simple quadratic equations Add, subtract, and multiply polynomials Factor simple quadratics (e.g., the difference of squares and perfect square trinomials) Solve first-degree inequalities that do not require reversing the inequality sign
28–32	Solve word problems containing several rates, proportions, or percentages	Calculate or use a weighted average Interpret and use information from figures, tables, and graphs Apply counting techniques Compute a probability when the event and/or sample space are not given or obvious	Apply number properties involving prime factorization Apply number properties involving even/odd numbers and factors/multiples Apply number properties involving positive/negative numbers Apply rules of exponents Multiply two complex numbers	Manipulate expressions and equations Write expressions, equations, and inequalities for common algebra settings Solve linear inequalities that require reversing the inequality sign Solve absolute value equations Solve quadratic equations Find solutions to systems of linear equations
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)	Distinguish between mean, median, and mode for a list of numbers Analyze and draw conclusions based on information from figures, tables, and graphs Exhibit knowledge of conditional and joint probability	Draw conclusions based on number concepts, algebraic properties, and/or relationships between expressions and numbers Exhibit knowledge of logarithms and geometric sequences Apply properties of complex numbers	Write expressions that require planning and/or manipulating to accurately model a situation Write equations and inequalities that require planning, manipulating, and/or solving Solve simple absolute value inequalities

Table C-4. ACT's College Readiness Standards — Mathematics (continued)

	Graphical Representations	Properties of Plane Figures	Measurement	Functions
13–15	Identify the location of a point with a positive coordinate on the number line		Estimate or calculate the length of a line segment based on other lengths given on a geometric figure	
16–19	Locate points on the number line and in the first quadrant	Exhibit some knowledge of the angles associated with parallel lines	Compute the perimeter of polygons when all side lengths are given Compute the area of rectangles when whole number dimensions are given	
20–23	Locate points in the coordinate plane Comprehend the concept of length on the number line Exhibit knowledge of slope	Find the measure of an angle using properties of parallel lines Exhibit knowledge of basic angle properties and special sums of angle measures (e.g., 90°, 180°, and 360°)	Compute the area and perimeter of triangles and rectangles in simple problems Use geometric formulas when all necessary information is given	Evaluate quadratic functions, expressed in function notation, at integer values
24–27	Identify the graph of a linear inequality on the number line Determine the slope of a line from points or equations Match linear graphs with their equations Find the midpoint of a line segment	Use several angle properties to find an unknown angle measure Recognize Pythagorean triples Use properties of isosceles triangles	Compute the area of triangles and rectangles when one or more additional simple steps are required Compute the area and circumference of circles after identifying necessary information Compute the perimeter of simple composite geometric figures with unknown side lengths	Evaluate polynomial functions, expressed in function notation, at integer values Express the sine, cosine, and tangent of an angle in a right triangle as a ratio of given side lengths
28–32	Interpret and use information from graphs in the coordinate plane Match number line graphs with solution sets of linear inequalities Use the distance formula Use properties of parallel and perpendicular lines to determine an equation of a line or coordinates of a point Recognize special characteristics of parabolas and circles (e.g., the vertex of a parabola and the center or radius of a circle)	Apply properties of 30°-60°-90°, 45°-45°-90°, similar, and congruent triangles Use the Pythagorean theorem	Use relationships involving area, perimeter, and volume of geometric figures to compute another measure	Evaluate composite functions at integer values Apply basic trigonometric ratios to solve right-triangle problems
33–36	Match number line graphs with solution sets of simple quadratic inequalities Identify characteristics of graphs based on a set of conditions or on a general equation such as $y = ax^2 + c$ Solve problems integrating multiple algebraic and/or geometric concepts Analyze and draw conclusions based on information from graphs in the coordinate plane	Draw conclusions based on a set of conditions Solve multistep geometry problems that involve integrating concepts, planning, visualization, and/or making connections with other content areas Use relationships among angles, arcs, and distances in a circle	Use scale factors to determine the magnitude of a size change Compute the area of composite geometric figures when planning or visualization is required	Write an expression for the composite of two simple functions Use trigonometric concepts and basic identities to solve problems Exhibit knowledge of unit circle trigonometry Match graphs of basic trigonometric functions with their equations

Table C-5. ACT's College Readiness Standards — Science

	Interpretation of Data	Scientific Investigation	Evaluation of Models, Inferences, and Experimental Results
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) Identify basic features of a table, graph, or diagram (e.g., headings, units of measurement, axis labels)		
16–19	Select two or more pieces of data from a simple data presentation Understand basic scientific terminology Find basic information in a brief body of text Determine how the value of one variable changes as the value of another variable changes in a simple data presentation	Understand the methods and tools used in a simple experiment	
20–23	Select data from a complex data presentation (e.g., a table or graph with more than three variables; a phase diagram) Compare or combine data from a simple data presentation (e.g., order or sum data from a table) Translate information into a table, graph, or diagram	Understand the methods and tools used in a moderately complex experiment Understand a simple experimental design Identify a control in an experiment Identify similarities and differences between experiments	Select a simple hypothesis, prediction, or conclusion that is supported by a data presentation or a model Identify key issues or assumptions in a model
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) Compare or combine data from a complex data presentation Interpolate between data points in a table or graph Determine how the value of one variable changes as the value of another variable changes in a complex data presentation Identify and/or use a simple (e.g., linear) mathematical relationship between data Analyze given information when presented with new, simple information	Understand the methods and tools used in a complex experiment Understand a complex experimental design Predict the results of an additional trial or measurement in an experiment Determine the experimental conditions that would produce specified results	Select a simple hypothesis, prediction, or conclusion that is supported by two or more data presentations or models Determine whether given information supports or contradicts a simple hypothesis or conclusion, and why Identify strengths and weaknesses in one or more models Identify similarities and differences between models Determine which model(s) is(are) supported or weakened by new information Select a data presentation or a model that supports or contradicts a hypothesis, prediction, or conclusion
28–32	Compare or combine data from a simple data presentation with data from a complex data presentation Identify and/or use a complex (e.g., nonlinear) mathematical relationship between data Extrapolate from data points in a table or graph	Determine the hypothesis for an experiment Identify an alternate method for testing a hypothesis	Select a complex hypothesis, prediction, or conclusion that is supported by a data presentation or model Determine whether new information supports or weakens a model, and why Use new information to make a prediction based on a model
33–36	Compare or combine data from two or more complex data presentations Analyze given information when presented with new, complex information	Understand precision and accuracy issues Predict how modifying the design or methods of an experiment will affect results Identify an additional trial or experiment that could be performed to enhance or evaluate experimental results	Select a complex hypothesis, prediction, or conclusion that is supported by two or more data presentations or models Determine whether given information supports or contradicts a complex hypothesis or conclusion, and why

Science College Readiness Standards are measured in the context of science topics students encounter in science courses. These topics may include:

Life Science/Biology	Physical Science/Chemistry, Physics	Earth & Space Science
• Animal behavior • Animal development and growth • Body systems • Cell structure and processes • Ecology • Evolution • Genetics • Homeostasis • Life cycles • Molecular basis of heredity • Origin of life • Photosynthesis • Plant development, growth, structure • Populations • Taxonomy	• Atomic structure • Chemical bonding, equations, nomenclature, reactions • Electrical circuits • Elements, compounds, mixtures • Force and motions • Gravitation • Heat and work • Kinetic and potential energy • Magnetism • Momentum • The Periodic Table • Properties of solutions • Sound and light • States, classes, and properties of matter • Waves	• Earthquakes and volcanoes • Earth's atmosphere • Earth's resources • Fossils and geological time • Geochemical cycles • Groundwater • Lakes, rivers, oceans • Mass movements • Plate tectonics • Rocks, minerals • Solar system • Stars, galaxies, and the universe • Water cycle • Weather and climate • Weathering and erosion

Section D: ACT's WorkKeys Skills Included in South Carolina's Grades 8–12 Standards

Working with Charter States, national education organizations, educators, employers, and experts in employment and training requirements, ACT identified workplace skills that help individuals successfully perform a wide range of jobs. These skills form the basis of the WorkKeys assessments.

In this section (Section D), the WorkKeys Skills that are highlighted are those that are included in South Carolina's Academic Standards. WorkKeys Skills not highlighted are those statements that include specific content, complexity and/or proficiency level descriptions that were not described in South Carolina's Standards.

Because South Carolina educators are the experts on the South Carolina Academic Standards, we would strongly encourage them to examine this document and offer their interpretations.

WorkKeys Skills

Level	Reading for Information	Applied Mathematics	Locating Information
3	Identify main ideas and clearly stated details Choose the correct meaning of a word that is clearly defined in the reading Choose the correct meaning of common, everyday and workplace words Choose when to perform each step in a short series of steps Apply instructions to a situation that is the same as the one in the reading materials	Solve problems that require a single type of mathematics operation (addition, subtraction, multiplication, and division) using whole numbers Add or subtract negative numbers Change numbers from one form to another using whole numbers, fractions, decimals, or percentages Convert simple money and time units (e.g., hours to minutes)	Find one or two pieces of information in a graphic Fill in one or two pieces of information that are missing from a graphic
4	Identify important details that may not be clearly stated Use the reading material to figure out the meaning of words that are not defined Apply instructions with several steps to a situation that is the same as the situation in the reading materials Choose what to do when changing conditions call for a different action (follow directions that include "if-then" statements)	Solve problems that require one or two operations Multiply negative numbers Calculate averages, simple ratios, simple proportions, or rates using whole numbers and decimals Add commonly known fractions, decimals, or percentages (e.g., ½, .75, 25%) Add three fractions that share a common denominator Multiply a mixed number by a whole number or decimal Put the information in the right order before performing calculations	Find several pieces of information in one or two graphics Understand how graphics are related to each other Summarize information from one or two straightforward graphics Identify trends shown in one or two straightforward graphics Compare information and trends shown in one or two straightforward graphics
5	Figure out the correct meaning of a word based on how the word is used Identify the correct meaning of an acronym that is defined in the document Identify the paraphrased definition of a technical term or jargon that is defined in the document Apply technical terms and jargon and relate them to stated situations Apply straightforward instructions to a new situation that is similar to the one described in the material Apply complex instructions that include conditionals to situations described in the materials	Decide what information, calculations, or unit conversions to use to solve the problem Look up a formula and perform single-step conversions within or between systems of measurement Calculate using mixed units (e.g., 3.5 hours and 4 hours 30 minutes) Divide negative numbers Find the best deal using one- and two-step calculations and then comparing results Calculate perimeters and areas of basic shapes (rectangles and circles) Calculate percentage discounts or markups	Sort through distracting information Summarize information from one or more detailed graphics Identify trends shown in one or more detailed or complicated graphics Compare information and trends from one or more complicated graphics
6	Identify implied details Use technical terms and jargon in new situations Figure out the less common meaning of a word based on the context Apply complicated instructions to new situations Figure out the principles behind policies, rules, and procedures Apply general principles from the materials to similar and new situations Explain the rationale behind a procedure, policy, or communication	Use fractions, negative numbers, ratios, percentages, or mixed numbers Rearrange a formula before solving a problem Use two formulas to change from one unit to another within the same system of measurement Use two formulas to change from one unit in one system of measurement to a unit in another system of measurement Find mistakes in items that belong at Levels 3, 4, and 5 Find the best deal and use the result for another calculation Find areas of basic shapes when it may be necessary to rearrange the formula, convert units of measurement in the calculations, or use the result in further calculations Find the volume of rectangular solids Calculate multiple rates	Draw conclusions based on one complicated graphic or several related graphics Apply information from one or more complicated graphics to specific situations Use the information to make decisions
7	Figure out the definitions of difficult, uncommon words based on how they are used Figure out the meaning of jargon or technical terms based on how they are used Figure out the general principles behind the policies and apply them to situations that are quite different from any described in the materials	Solve problems that include nonlinear functions and/or that involve more than one unknown Find mistakes in Level 6 items Convert between systems of measurement that involve fractions, mixed numbers, decimals, and/or percentages Calculate multiple areas and volumes of spheres, cylinders, or cones Set up and manipulate complex ratios or proportions Find the best deal when there are several choices Apply basic statistical concepts	