



STATE MATCH

Mississippi Curriculum Framework

Language Arts, Mathematics,
and Science
Grades 7–12

and

ACT[®]

EXPLORE, PLAN,
and ACT

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About This Report

EXECUTIVE SUMMARY

(pp. 1–2)

This portion summarizes the findings of the alignment between EXPLORE® (8th and 9th grades); PLAN® (10th grade); and the ACT (11th and 12th grades) and Mississippi's Curriculum Framework. It also presents ACT's involvement in meeting NCLB requirements and describes additional critical information that ACT could provide to Mississippi.

SECTION A

(pp. 3–8)

This section provides tables by content area (Language Arts, Mathematics, and Science) listing the precise number of Mississippi Competencies and Objectives measured by ACT's EPAS tests by grade level.

SECTION B

(pp. 9–47)

All Mississippi Competencies and Objectives are listed here; each one highlighted is measured by ACT's EPAS tests. Underlined science content indicates that the content topics are included in, but not directly measured by, ACT's EPAS Science Tests.

SECTION C

(pp. 49–63)

ACT's College Readiness Standards appear here. Highlighting indicates that a statement reflects one or more statements in the Mississippi Competencies and Objectives. College Readiness Standards not highlighted are not addressed in the Mississippi Curriculum Framework.

A supplement is available that identifies the specific ACT College Readiness Standard(s) corresponding to each Mississippi Competency or Objective, in a side-by-side format. To request this supplement for any grade or content level, please e-mail ACT at statematch@act.org.



Executive Summary

We at ACT believe our programs offer many advantages to Mississippi students and educators, and this report offers strong evidence for this belief. This alignment analysis clearly answers three 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)—measure Mississippi's Competencies and Objectives?
2. Can ACT's EPAS test results be used to meet Mississippi's NCLB requirement?
3. Why should Mississippi choose ACT?

ACT'S TESTS MEASURE
MANY IMPORTANT
MISSISSIPPI
COMPETENCIES AND
OBJECTIVES IN
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 measure many of Mississippi's Language Arts, Mathematics, and Science Competencies and Objectives:

■ Language Arts: 9 out of 14 Competencies

Many important Language Arts Competencies and Objectives are covered by ACT's English, Reading, and Writing Tests.

■ Mathematics: 8 out of 8 Competencies

All of Mississippi's Mathematics Competencies and nearly all of the Objectives are covered by ACT's Mathematics Tests.

■ Science: *Process Objectives*: 13 out of 15
Content Objectives: 282 out of 283

Almost all of Mississippi's Science Competencies and Objectives are covered by ACT's 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 Science Competencies and Objectives.)

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 Competencies and Objectives 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.)

Most exceptions to a match between ACT's tests and Mississippi's Competencies and Objectives 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 Mississippi on developing any necessary augmentation.



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**

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

3. Why choose ACT? 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.

In sum, ACT's EPAS programs provide abundant data relevant to Mississippi's Curriculum Framework and to Mississippi students' readiness for college and work.



Section A: **Number of Mississippi Competencies and Objectives Measured by EXPLORE, PLAN, and the ACT**

Table A-1. Number of Language Arts Competencies and Objectives Measured by EXPLORE, PLAN, and the ACT

Mississippi Competency*	Number of Mississippi's Objectives per Competency Measured by ACT's tests	Aspects of Not-Measured Mississippi Curriculum Framework
Competency 1	7th: 2 out of 4 8th: 2 out of 4 9th: 2 out of 5 10th: 1 out of 4 11th: 6 out of 8 12th: 3 out of 4	Write a reaction to what has been said or heard Produce individual or group projects
Competency 2	7th: 0 out of 4 8th: 0 out of 4 9th: 0 out of 3 10th: 0 out of 3 11th: 0 out of 5 12th: 0 out of 3	Speak coherently, effectively Listen to determine main idea Speak with proper intonation, gestures Participate in student-to-student discussion
Competency 3	7th: 0 out of 4 8th: 0 out of 4 9th: 0 out of 3 10th: 0 out of 4 11th: 0 out of 4 12th: 0 out of 3	Complete projects Use computers Use reference sources Present information in written and oral format Gather information from several sources
Competency 4	7th: 1 out of 3 8th: 2 out of 3 9th: 0 out of 2 10th: 0 out of 2 11th: 0 out of 2 12th: 1 out of 2	Listen to and view multi-media sources Interact with peers to examine ideas Develop leadership skills Assume various group roles
Competency 5	7th: 0 out of 2 8th: 0 out of 2 9th: 0 out of 3 10th: 0 out of 3 11th: 0 out of 3 12th: 0 out of 3	Develop self-monitoring skills Complete oral and written presentations
Competency 6	7th: 0 out of 6 8th: 0 out of 6 9th: 0 out of 5 10th: 0 out of 4 11th: 1 out of 5 12th: 0 out of 5	Participate cooperatively Explore cultural contributions to English language Recognize root words, prefixes, suffixes Relate how vocabulary and spelling have changed over time
Competency 7	7th: 1 out of 5 8th: 1 out of 5 9th: 2 out of 5 10th: 2 out of 5 11th: 3 out of 6 12th: 2 out of 4	Discover history Read aloud with fluency and expression Listen to recognize beauty of language



Table A-1. Number of Language Arts Competencies and Objectives Measured by EXPLORE, PLAN, and the ACT

Mississippi Competency*	Number of Mississippi's Objectives per Competency Measured by ACT's tests	Aspects of Not-Measured Mississippi Curriculum Framework
Competency 8	7th: 1 out of 3 8th: 1 out of 3 9th: 2 out of 5 10th: 2 out of 5 11th: 1 out of 2 12th: 2 out of 4	Read for enjoyment Incorporate the use of arts such as music to internalize what is read
Competency 9	7th: 3 out of 6 8th: 3 out of 6 9th: 4 out of 5 10th: 4 out of 5 11th: 5 out of 5 12th: 2 out of 3	Give oral presentations Use clear oral language
Competency 10	7th: 9 out of 11 8th: 10 out of 12 9th: 1 out of 2 10th: 1 out of 2 11th: 2 out of 6 12th: 1 out of 2	Depict characters using a variety of artistic media Write a reaction to what has been read Use notetaking, learning logs, journals
Competency 11	7th: 5 out of 6 8th: 4 out of 5	Apply principles of cursive writing and penmanship
Competency 12	7th: 1 out of 3 8th: 1 out of 3	Demonstrate correct spelling Use dictionary, thesaurus, computer spell check
Competency 13	7th: 1 out of 2 8th: 1 out of 2	Identify and location information from community resources through inquiries and interviews
Competency 14	8th: 0 out of 2	Locate information to solve real-life problems
TOTALS	7th: 24 out of 59 8th: 25 out of 61 9th: 11 out of 38 10th: 10 out of 37 11th: 18 out of 46 12th: 11 out of 33	

*Refer to Mississippi's Language Arts Competencies and Objectives on pages 9–21



Table A-2. Number of Mathematics Competencies and Objectives Measured by EXPLORE, PLAN, and the ACT

Mississippi Competency*	Number of Mississippi's Objectives per Competency Measured by ACT's tests	Aspects of Not-Measured Mississippi Curriculum Framework
Competency 1	7th: 7 out of 7 8th: 7 out of 7 Pr-A: 7 out of 7 Al 1: 4 out of 4 Geo: 3 out of 4 Al 2: 3 out of 4 Ad A: 5 out of 5 T: 6 out of 6 Pr-C: 5 out of 5	Differentiate between inductive and deductive reasoning Use acronyms
Competency 2	7th: 7 out of 7 8th: 5 out of 6 Pr-A: 5 out of 6 Al 1: 4 out of 4 Geo: 4 out of 4 Al 2: 3 out of 4 Ad A: 4 out of 5 T: 2 out of 2 Pr-C: 3 out of 5	Explore methods of solving systems Explore relationships of Pascal's Triangle
Competency 3	7th: 3 out of 3 8th: 7 out of 8 Pr-A: 6 out of 9 Al 1: 5 out of 5 Geo: 3 out of 4 Al 2: 3 out of 3 Ad A: 5 out of 6 T: 6 out of 6 Pr-C: 3 out of 4	Expand and apply the Binomial Theorem
Competency 4	7th: 6 out of 8 8th: 6 out of 7 Pr-A: 2 out of 3 Al 1: 4 out of 6 Geo: 4 out of 4 Al 2: 5 out of 6 Ad A: 4 out of 5 T: 3 out of 5 PC: 4 out of 5	Explain processes orally Use convincing arguments Graph conic sections Investigate optimization problems
Competency 5	7th: 10 out of 12 8th: 3 out of 4 Pr-A: 5 out of 5 Al 1: 4 out of 5 Geo: 3 out of 7 Al 2: 3 out of 3 Ad A: 3 out of 3 Pr-C: 2 out of 2	Reinforce formulas Use protractors Compare, contrast, and classify figures



Table A-2. Number of Mathematics Competencies and Objectives Measured by EXPLORE, PLAN, and the ACT

Mississippi Competency*	Number of Mississippi's Objectives per Competency Measured by ACT's tests	Aspects of Not-Measured Mississippi Curriculum Framework
Competency 6	7th: 4 out of 4 8th: 9 out of 9 Pr-A: 5 out of 7 Al 1: 5 out of 6 Geo: 4 out of 6 Al 2: 4 out of 4 Ad A: 3 out of 3 Pr-C: 3 out of 3	Distinguish between linear and non-linear equations Create designs, tessellations
Competency 7	7th: 4 out of 5 8th: 7 out of 7 Pr-A: 5 out of 8 Al 1: 3 out of 4 Al 2: 4 out of 4	Define slope
Competency 8	7th: 9 out of 10 8th: 4 out of 4 Al 1: 3 out of 3	Write a corresponding real-life situation from an algebraic equation
TOTALS	7th: 50 out of 56 8th: 48 out of 52 Pr-A: 35 out of 45 Al 1: 33 out of 34 Geo: 21 out of 29 Al 2: 25 out of 28 Ad A: 24 out of 27 T: 17 out of 19 Pr-C: 20 out of 24	

*Refer to Mississippi's Mathematics Competencies and Objectives on pages 22–34



**Table A-3. Number of Science Competencies and Objectives
Measured by EXPLORE, PLAN, and the ACT**

Mississippi Competency*	Number of Mississippi's Objectives per Competency Measured by ACT's tests	Aspects of Not-Measured Mississippi Curriculum Framework	
Competency 1	7th: (5) out of 5 8th: (4) out of 4 Bio 1: 4 out of 5 Ch 1: (7) out of 7 ES: (2) out of 2 PS: 3 out of 3 Phys: 3 out of 4		
Competency 2	7th: (3) out of 3 8th: (4) out of 4 Bio 1:(6) out of 6 Ch 1:(5) out of 5 ES: (1) out of 1 PS: (4) out of 4 Phys:(5) out of 5		
Competency 3	7th: (2) out of 2 8th: (1) out of 2 Bio 1:(8) out of 8 Ch 1:(6) out of 6 ES: (1) out of 1 PS: (8) out of 8 Phys:(8) out of 8		
Competency 4	7th: (4) out of 4 8th: (3) out of 3 Bio 1:(3) out of 3 Ch 1:(4) out of 4 ES: (3) out of 3 PS: (6) out of 6 Phys:(3) out of 3		
Competency 5	7th: (3) out of 3 8th: (3) out of 3 Bio 1:(6) out of 6 Ch 1:(6) out of 6 ES: (2) out of 2 PS: (5) out of 5 Phys:(2) out of 2		
Competency 6	7th: (7) out of 7 8th: (3) out of 3 Bio 1:(6) out of 6 Ch 1:(5) out of 5 ES: (3) out of 3 PS: (4) out of 4 Phys:(3) out of 3		



Table A-3. Number of Science Competencies and Objectives Measured by EXPLORE, PLAN, and the ACT

Mississippi Competency*	Number of Mississippi's Objectives per Competency Measured by ACT's tests	Aspects of Not-Measured Mississippi Curriculum Framework	
Competency 7	7th: (5) out of 5 8th: (6) out of 6 Bio 1:(7) out of 7 Ch 1: (8) out of 8 ES: (2) out of 2 PS: (4) out of 4 Phys:(4) out of 4		
Competency 8	7th: (5) out of 5 8th: (7) out of 7 Ch 1: (6) out of 6 ES: (2) out of 2 PS: (5) out of 5		
Competency 9	7th: (3) out of 3 8th: (2) out of 2 Ch 1: (3) out of 3 ES: (4) out of 4 PS: (5) out of 5		
Competency 10	7th: (3) out of 3 8th: (5) out of 5 Ch 1: (3) out of 3 ES: (2) out of 2		
Competency 11	Ch 1: (5) out of 5 ES: (3) out of 3		
Competency 12	Ch 1: (2) out of 2 ES: (2) out of 2		
Competency 13	Ch 1: (5) out of 5 ES: 3 out of 3		
TOTALS	7th: 40 out of 40 8th: 38 out of 39 Bio1: 36 out of 36 Ch1: 65 out of 65 ES: 27 out of 27 PS: 41 out of 41 Phys: 35 out of 35	Content Topics	
	Bio 1: 4 out of 5 ES: 3 out of 3 PS: 3 out of 3 Phys: 3 out of 4	Process Skills	

*Refer to Mississippi's Science Competencies and Objectives on pages 35–47



Section B: Mississippi's Grades 7–12 Curriculum Framework Measured by EXPLORE, PLAN, and the ACT

Language Arts

MISSISSIPPI Grade 7 English Language Arts Competencies and Objectives

1. **Communicate** for a variety of purposes through different forms of writing **using processes of reading, writing**, listening, and viewing for an expanding audience. (R, W, L, V)
 - a. **Accomplish a writing process through** planning, drafting, **revising, editing**, publishing, and self-reflecting on written communications such as various types of paragraphs (narrative, descriptive, expository, persuasive), **essays**, research papers, creative writing, etc. for different audiences and purposes with minimal guidance.
 - b. Write in various forms such as news articles, critical reviews, poems, short stories, speeches, timelines, etc.
 - c. Write a reaction to, interpretation of, or summary of what has been read or heard.
 - d. **Revise to ensure effective introductions, wording**, topic sentences, **supporting details, and conclusions**.
2. Speak coherently and listen effectively to exchange ideas and opinions for a variety of purposes and audiences. (S, L)
 - e. Show increased proficiency in self-evaluation and begin peer evaluation of presentation skills such as voice quality, articulation, body language, and stage presence.
 - f. Express ideas and opinions using formats such as panel discussion, debates, etc.
 - g. Use standard English in oral presentations with increasing proficiency and complexity.
 - h. Listen to determine the main idea and to distinguish fact from opinion.
3. Complete projects and tasks in an organized and coherent manner. (R, W, S, L, V)
 - i. Identify the purpose of and audience for a project or task.
 - j. Use reading as a source of ideas and information for a project or task.
 - k. Follow logical sequence/multi-step directions to complete a product.
 - l. Demonstrate increased proficiency, complexity, and independence in completing a product. (See glossary for clarification of increased proficiency, etc).
4. **Read**, listen to, and view multimedia **sources to select and use information**. (R, W, S, L, V)
 - m. Locate and use key words, illustrations, subheadings, periodicals, table of contents, an index, etc., to find and gather sources of information.
 - n. Compose a variety of oral, visual, and written presentations from information gathered.
 - o. **Distinguish fact from opinion**.
5. Develop self-monitoring skills to work independently and cooperatively. (R, W, L, S, V)
 - a. Assume a given role in a group such as reporter, recorder, etc.
 - b. Assess and monitor individual contributions to the group's effort.
6. Participate cooperatively while engaging in small group activities to analyze and interpret information, to make decisions, to solve problems, and to produce a given product. (R, W, S, L, V)
 - a. Participate in team building through concrete and abstract activities.
 - b. Develop strategies for listening and speaking that respect the rights and contributions of others.
 - c. Analyze, evaluate, and compromise to arrive at a consensus.
 - d. Reorganize ideas and information to achieve a designated purpose.
 - e. Work collaboratively to develop a complete product with increasing independence.
 - f. Develop strategies for conflict resolution.
7. Discover the history and inherent beauty of cultural expression in language and literature. (R, W, S, L, V)
 - g. Read an increasingly wider variety of literature to investigate issues common to all people, including multi-cultural experiences through literature, language, and culture.
 - h. Recognize the interrelatedness of language, literature, and culture.
 - i. Use root words, prefixes, suffixes, and vocabulary adopted from other languages into English.
 - j. Recognize that language differs according to dialect and social settings.

- k. Identify the tone of a written passage
8. Read and use print and non-print media to experience the rhythm, energy, and pictorial qualities of language. (R, W, S, L, V)
- Incorporate the use of the arts such as drama, music, multimedia, etc., to internalize the language they have read.
 - Express what has been read through performance of the arts, such as poetry, drama, dance, etc.
 - Recognize characteristics of literature such as rhyme, rhythm, repetition, alliteration, and figurative language, and incorporate them into written and oral forms.
9. Read independently with fluency and for meaning using a variety of strategies. (R, W, S, L, V)
- Use comprehension and reading strategies (skim, scan, predict, infer, draw a conclusion, modify or confirm original predictions, compare, contrast, etc.) to respond to literary selections and to enhance fluency and meaning.
 - Adjust reading strategies for different purposes.
 - Use prior knowledge to identify commonalities between personal experiences and story elements.
 - Use word recognition strategies and resources (phonics, contextual clues, reference guides, etc.) to gain meaning from print.
 - Model by reading aloud (student and/or teacher).
 - Read materials for information, communication, pleasure, and to perform a task, using various strategies.
10. Read, analyze, and respond in written and oral language or other art forms to increasingly challenging literature and other resources. (R, W, L, S, V)
- Paraphrase important details from multimedia resources.
 - Depict characters or scenes from stories using a variety of artistic media.
 - Describe story elements such as setting, plot/events, characters, theme, motivation, mood, problems/conflict, solution, denouement, and conclusion.
 - Distinguish the author's purpose as informative, persuasive, or entertaining.
 - Determine if the author's purpose is achieved.
 - Use supporting details to identify the implied or stated main idea of a paragraph or other written passage.
 - Paraphrase a sequence of events.
 - Identify and determine meaning of figurative language (similes, metaphors, hyperboles, idioms, etc.).
 - Write first and third person narratives.
 - Recognize implied and stated cause and effect relationships in written passages.
 - Write a reaction to, interpretation of, or summary of what has been read.
11. Demonstrate continuous progress toward control of penmanship, grammar, mechanics, sentence structure, and usage of standard English in the context of writing and speaking. (R, W, S, L, V)
- Demonstrate knowledge of grammar and usage, including, but not limited to, parts of speech, all punctuation marks, capitalization, verb tense, subject-verb agreement, subordination, pronoun reference, and basic sentence elements.
 - Interact with increasing competency using standard English skills when writing and speaking in a variety of situations.
 - Apply correct grammar skills in speaking and writing.
 - Apply correct usage in speaking, writing, and editing/proofreading.
 - Use correct sentence structure in speaking, writing, and editing/proofreading.
 - Apply principles of cursive writing and penmanship in written products.
12. Acquire and use appropriate vocabulary and spelling concepts. (R, W, S, L, V)
- Demonstrate correct spelling.
 - Utilize the dictionary, thesaurus, and/or computerized spell check as reference tools.
 - Use appropriate vocabulary for specific situations, purposes, and audiences.
13. Use language to record observations, to clarify thoughts, to synthesize information, and to analyze and evaluate language in order to facilitate continuous learning. (R, W, S, L, V)
- Interpret oral, visual, and written language in order to think critically and to solve problems.
 - Identify and locate information from community resources through inquiries, interviews, research, etc., to form ideas and opinions.

MISSISSIPPI Grade 8 English Language Arts
Competencies and Objectives

1. **Communicate** for a variety of purposes through different forms of writing **using processes of reading, writing**, listening, and viewing for an expanding audience. (R, W, L, V)
 - a. **Accomplish a writing process through** planning, drafting, **revising, editing**, publishing, and self-reflecting on written communications such as various **short papers** (narrative, descriptive, expository, persuasive), essay test questions and responses, character analysis, etc., for different audiences and purposes with increasing independence.
 - b. Write with increasing complexity in various forms such as poetry, anecdotes, fables, tall tales, myths, skits, plays, stories, etc.
 - c. Write a reaction to, interpretation of, or summary of what has been read or heard.
 - d. **Revise to ensure effective introductions, wording**, topic sentences, **supporting details, and conclusions**.
2. Speak coherently and listen effectively to exchange ideas and opinions for a variety of purposes and audiences. (S, L)
 - a. Show increased proficiency in self and peer evaluation of presentation skills such as voice quality, articulation, body language, and stage presence.
 - b. Use an organized format to express ideas and opinions in both formal and informal presentations such as panel discussion and debate.
 - c. Use standard English with increased proficiency and complexity in oral presentations.
 - d. Listen to determine the main idea, distinguishing fact from opinion, and determine speaker's purpose or bias.
3. Complete projects and tasks in an organized and coherent manner. (R, W, S, L, V)
 - a. Identify the purpose of and audience for a project or task.
 - b. Use reading as a source of ideas and information for a project or task.
 - c. Follow logical sequence/multi-step directions to complete a product.
 - d. Demonstrate increased proficiency, complexity, and independence in completing a product. (See glossary for clarification of increased proficiency etc.)
4. **Read**, listen to, and view multimedia **sources to select and use information**. (R, W, S, L, V)
 - a. **Use** an appropriate research process and table of contents, **key words**, indices, periodicals, and electronic card catalog **to** locate good sources and **gather information**.
 - b. Compose a variety of oral, visual, and written presentations from information gathered through multimedia sources.
 - c. **Distinguish fact from opinion**.
5. Develop self-monitoring skills to work independently and cooperatively. (R, W, L, S, V)
 - a. Assume a given role in a group, such as reporter, recorder, etc
 - b. Assess and monitor individual contributions to the group's effort.
6. Participate cooperatively while engaging in small group activities to analyze and interpret information, to make decisions, to solve problems, and to produce a given product. (R, W, S, L, V)
 - a. Participate in team building through concrete and abstract activities.
 - b. Develop strategies for listening and speaking that respect the rights and contributions of others.
 - c. Analyze, evaluate, and compromise to arrive at a consensus.
 - d. Reorganize ideas and information to achieve a designated purpose.
 - e. Develop strategies for conflict resolution.
 - f. Work collaboratively to complete a product.
7. Discover the history and inherent beauty of cultural expression in language and literature. (R, W, S, L, V)
 - a. Read an increasingly wider variety of literature to investigate issues common to all people including multi-cultural experiences through literature, language, and culture.
 - b. Recognize the interrelatedness of language, literature, and culture.
 - c. Recognize root words, prefixes, suffixes, and vocabulary adopted from other languages into English.
 - d. Recognize that language differs according to dialect and social settings.
 - e. **Use words to achieve a certain effect in writing** or speaking.

8. Read and use print and non-print media to experience the rhythm, energy, and pictorial qualities of language. (R, W, S, L, V)
 - a. Incorporate the use of the arts such as drama, music, multimedia, etc., to internalize the language they have read.
 - b. Express the language of what they have read through performance of the arts, such as poetry, drama, dance, etc.
 - c. Recognize characteristics of literature such as rhyme, rhythm, alliteration, repetition, and figurative language, and incorporate them into written and oral forms.
9. Read independently with fluency and for meaning using a variety of strategies. (R, W, S, L, V)
 - a. Use comprehension and reading strategies (skim, scan, predict, infer, draw a conclusion, modify or confirm original prediction, understand, compare, contrast, etc.) to respond to literary selections and to enhance fluency and meaning.
 - b. Adjust reading strategies according to purposes.
 - c. Use prior knowledge to identify commonalities between personal experiences and story elements.
 - d. Use word recognition strategies and resources (phonics, contextual clues, reference guides, etc.) to gain meaning from print.
 - e. Model by reading aloud (students and/or teacher).
 - f. Read materials for information, communication, pleasure, and to perform a task, using various strategies.
10. Read, analyze, and respond in written and oral language or other art forms to increasingly challenging literature and other resources. (R, W, S, L, V)
 - a. Paraphrase important details from multimedia resources.
 - b. Depict characters or scenes from stories using a variety of artistic media.
 - c. Describe story elements such as setting, plot/events, characters, motivation, mood, problems/conflicts, solution, theme, denouement, and conclusion.
 - d. Distinguish the author's purpose as informative, persuasive, or entertaining.
 - e. Determine if the author's purpose is achieved.
 - f. Use supporting details, implied or stated, to identify the implied or stated main idea of a paragraph or other written passage.
 - g. Paraphrase a sequence of events.
 - h. Identify and determine meaning of figurative language (similes, metaphors, hyperboles, idioms, etc.).
 - i. Write first and third person narratives.
 - j. Recognize implied and stated cause and effect relationships in a written passage.
 - k. Recognize the reason for an author's choice of words in a passage.
 - l. Write a reaction to, interpretation of, or summary of what has been read.
11. Demonstrate continuous progress toward control of penmanship, grammar, mechanics, sentence structure, and usage of standard English in the context of writing and speaking. (R, W, S, L, V)
 - a. Demonstrate knowledge of grammar and usage, including, but not limited to, verb forms, verbals, modifiers, pronoun-antecedent agreement, compound complex sentences, punctuation, and capitalization.
 - b. Interact competently using standard English skills when writing and speaking in a variety of situations.
 - c. Apply correct grammar skills in speaking, writing, and reading.
 - d. Apply correct usage in speaking, writing, and editing/proofreading.
 - e. Demonstrate full control in cursive writing in written assignments.
12. Acquire and use appropriate vocabulary and spelling concepts. (R, W, S, L, V)
 - a. Demonstrate correct spelling.
 - b. Utilize the dictionary, thesaurus, and/or computerized spell check as reference tools.
 - c. Use appropriate vocabulary for specific situations, purposes, and audiences.
13. Use language to record observations, to clarify thoughts, to synthesize information, and to analyze and evaluate language in order to facilitate continuous learning. (R, W, S, L, V)
 - a. Interpret oral, visual, and written language in order to think critically and to solve real-life problems.
 - b. Identify and locate information from community resources through inquiries, interviews, research, etc., to form ideas and opinions.

14. **Construct meaning** by applying personal experiences and **by reading**, writing, speaking, listening, and viewing. (R, W, S, L, V)
- a. Identify and locate information to solve real-life problems.
 - b. Integrate speaking, listening, writing, and reading to interpret personal ideas/opinions and those of others.

MISSISSIPPI Grade 9 English Language Arts
Competencies and Objectives

1. Produce writing which reflects increasing proficiency through planning, writing, revising, and editing and which is specific to audience and purpose. (R, W, S, L, V)
 - a. Produce individual or group writings or projects in a variety of forms such as poems, stories, journals, paragraphs, etc., to inform, describe, persuade, predict, etc.
 - b. Edit writing to reflect correct grammar, usage, and mechanics.
 - c. Write a response, reaction, interpretation, analysis, summary, etc. of literature, other reading matter, or orally presented material.
 - d. Revise to ensure effective introductions, details, wording, topic sentences, and conclusions.
 - e. Write business and social correspondence.
2. Communicate ideas for a variety of school and other life situations through listening, speaking, and reading aloud. (L, S, R)
 - a. Listen to determine the main idea and supporting details, to distinguish fact from opinion, and to determine a speaker's purpose or bias.
 - b. Speak with appropriate intonation, articulation, gestures, and facial expression.
 - c. Speak effectively to explain and justify ideas to peers, to inform, to summarize, to persuade, to entertain, to describe, etc.
3. Read, evaluate, and use print, non-print, and technological sources to research issues and problems, to present information, and to complete projects. (R, W, S, L, V)
 - a. Read, view, and listen to distinguish fact from opinion.
 - b. Access print, non-print, and technological sources to produce oral or written research projects.
 - c. Use reference sources, indices, electronic card catalog, and appropriate information gathering procedures to gather and synthesize information.
4. Work individually and as a member of a team to analyze and interpret information, to make decisions, to solve problems, and to reflect, using increasingly complex and abstract thinking. (R, W, S, L, V)
 - a. Interact with peers to examine real world and literary issues and ideas.
 - b. Develop leadership skills and build self-esteem through cooperation and compromise in groups by assuming a role, self-monitoring participation, and contributing to the completion of a task.
5. Complete oral and written presentations which exhibit interaction and consensus within a group. (R, W, S, L, V)
 - a. Share, critique, and evaluate works in progress and completed works through a process approach.
 - b. Communicate effectively in a group to present completed projects and/or compositions.
 - c. Edit oral and written presentations to reflect correct grammar, usage, and mechanics.
6. Explore cultural contributions to the history of the English language and its literature. (R, W, S, L, V)
 - a. Examine the influence of culture and history on language and literature.
 - b. Recognize that language is shaped by cultural, social, and geographical differences.
 - c. Identify instances of dialectal differences which create stereotypes, perceptions, and identities.
 - d. Recognize root words, prefixes, suffixes, and cognates.
 - e. Relate how vocabulary and spelling have changed over time.
7. Discover the power and effect of language by reading and listening to selections from various literary genres. (R, W, S, L, V)
 - a. Read aloud with fluency and expression.
 - b. Listen to selected works to recognize and respond to the beauty and power of the language.
 - c. Analyze the stylistic devices, such as alliteration, assonance, word order, rhyme, onomatopoeia, etc., that make a passage achieve a certain effect.
 - d. Demonstrate how the use of language can confuse or inform, repel or persuade, or inspire or enrage.
 - e. Analyze how grammatical structure or style helps to create a certain effect.
8. Read, discuss, analyze, and evaluate literature from various genres and other written material. (R, W, S, L, V)

- a. Read a variety of literature such as poetry, drama, novels, short stories, and nonfiction and understand literary elements such as theme, tone, characters, point of view, etc.
 - b. Identify literature that has produced a lasting impact on society.
 - c. Read for enjoyment, appreciation, information, and completion of a task.
 - d. Read to increase vocabulary and enhance learning.
 - e. Read analytically to distinguish fact from opinion, to determine cause and effect, and to infer information.
9. Sustain progress toward fluent control of grammar, mechanics, and usage of standard English in the context of writing and speaking. (R, W, S, L, V)
- a. Employ editing skills to identify and correct problems of specific grammar conventions in various kinds of writings.
 - b. Demonstrate, in the context of their own writing, proficient use of the conventions of standard English, including but not limited to, the following, complete sentences, subject-verb agreement, plurals, spelling, possessives, verb forms, punctuation, capitalization, pronouns, pronoun-antecedent agreement, and parallel structure.
 - c. Give oral presentations to reinforce the use of standard spoken English.
 - d. Manipulate basic sentence patterns through sentence expansion and combining.
 - e. Recognize and use various grammatical structures, such as a variety of clauses, phrases, etc., to convey and clarify thought.
10. Use language and critical thinking strategies to serve as tools for learning. (R, W, S, L, V)
- a. Use language to facilitate continuous learning, to record observations, to clarify thought, to synthesize information, and to analyze and evaluate language.
 - b. Interpret visual material orally and in writing.

MISSISSIPPI Grade 10 English Language Arts
Competencies and Objectives

1. Produce writing which reflects increasing proficiency through planning, writing, revising, and editing and which is specific to audience and purpose. (R, W, S, L, V)
 - a. Produce individual and/or group compositions and/or projects to persuade, tell a story, describe, create an effect, explain or justify an action or event, inform, entertain, etc.
 - b. Produce writing typically used in the workplace such as social, business, and technical correspondence; explanation of procedures; status reports; research findings; narratives for graphs; justification of decisions, actions, or expenses; etc.
 - c. Write a response, reaction, interpretation, analysis, summary, etc., of literature, other reading matter, or orally presented material.
 - d. Revise to ensure effective introductions, details, wording, topic sentences, and conclusions.
2. Communicate ideas for a variety of school and other life situations through listening, speaking, and reading aloud. (L, S, R)
 - a. Listen to determine the main idea and supporting details, to distinguish fact from opinion, and to determine a speaker's purpose or bias.
 - b. Speak with appropriate intonation, articulation, gestures, and facial expression.
 - c. Speak effectively to explain and justify ideas to peers, to inform, to summarize, to persuade, to entertain, to describe, etc.
3. Read, evaluate, and use print, non-print, and technological sources to research issues and problems, to present information, and to complete projects. (R, W, S, L, V)
 - a. Read, view, and listen to distinguish fact from opinions and to recognize persuasive and manipulative techniques.
 - b. Access both print and non-print sources to produce an I-Search paper, research paper, or project.
 - c. Use computers and audio-visual technology to access and organize information for purposes such as resumes, career search projects, and analytical writings, etc.
 - d. Use reference sources, indices, electronic card catalog, and appropriate research procedures to gather and synthesize information.
4. Work individually and as a member of a team to analyze and interpret information, to make decisions, to solve problems, and to reflect, using increasingly complex and abstract thinking. (R, W, S, L, V)
 - a. Interact with peers to examine real world and literary issues and ideas.
 - b. Show growth in critical thinking, leadership skills, consensus building, and self-confidence by assuming a role in a group, negotiating compromise, and reflecting on individual or group work.
5. Complete oral and written presentations which exhibit interaction and consensus within a group. (R, W, S, L, V)
 - a. Share, critique, and evaluate works in progress and completed works through a process approach.
 - b. Communicate effectively in a group to present completed projects and/or compositions.
 - c. Edit oral and written presentations to reflect correct grammar, usage, and mechanics.
6. Explore cultural contributions to the history of the English language and its literature. (R, W, S, L, V)
 - a. Explore a variety of works from various historical periods, geographical locations, and cultures, recognizing their influence on language and literature.
 - b. Identify instances of dialectal differences which create stereotypes, perceptions, and identities.
 - c. Recognize root words, prefixes, suffixes, and cognates.
 - d. Relate how vocabulary and spelling have changed over time.
7. Discover the power and effect of language by reading and listening to selections from various literary genres. (R, W, S, L, V)
 - a. Listen to and read aloud selected works to recognize and respond to the rhythm and power of language to convey a message.
 - b. Read aloud with fluency and expression.
 - c. Analyze the stylistic devices, such as alliteration, assonance, word order, rhyme, onomatopoeia, etc., that make a passage achieve a certain effect.
 - d. Demonstrate how the use of language can confuse or inform, repel or persuade, or inspire or enrage.
 - e. Analyze how grammatical structure or style helps to create a certain effect.

8. Read, discuss, analyze, and evaluate literature from various genres and other written material. (R, W, S, L, V)
 - a. Read and explore increasingly complete works, both classic and contemporary, for oral discussion and written analysis.
 - b. Read, discuss, and interpret literature to make connections to life.
 - c. Read from a variety of genres to understand how the literary elements contribute to the overall quality of the work.
 - d. Identify qualities in increasingly complex literature that have produced a lasting impact on society.
 - e. Read for enjoyment, appreciation, and comprehension of plot, style, vocabulary, etc.
9. Sustain progress toward fluent control of grammar, mechanics, and usage of standard English in the context of writing and speaking. (R, W, S, L, V)
 - a. Infuse the study of grammar and vocabulary into written and oral communication.
 - b. Demonstrate, in the context of their own writing, proficient use of the conventions of standard English, including, but not limited to, the following: complete sentences, subject-verb agreement, plurals, spellings, homophones, possessives, verb forms, punctuation, capitalization, pronouns, pronoun-antecedent agreement, parallel structure, and dangling and misplaced modifiers.
 - c. Give oral presentations to reinforce the use of standard English.
 - d. Employ increasingly proficient editing skills to identify and solve problems in grammar, usage, and structure.
10. Use language and critical thinking strategies to serve as tools for learning. (R, W, S, L, V)
 - a. Use language to facilitate continuous learning, to record observations, to clarify thought, to synthesize information, and to analyze and evaluate language.
 - b. Interpret visual material orally and in writing.

MISSISSIPPI Grade 11 English Language Arts
Competencies and Objectives

1. Produce writing which reflects increasing proficiency through planning, writing, revising, and editing and which is specific to audience and purpose. (R, W, S, L, V)
 - a. Spontaneously employ a writing process.
 - b. Compose complex and sustained texts using a blend of modes and purposes.
 - c. Write a response, reaction, interpretation, analysis, summary, etc., of literature, other reading matter, or orally presented material.
 - d. Adapt an appropriate formality of language and tone.
 - e. Read and write to create insightful responses to personal works and other pieces of writing in order to monitor self-growth.
 - f. Edit writing to reflect correct grammar, usage, and mechanics.
 - g. Produce writing typically used in workplace and in other real-life situations such as memos, faxes, explanation of procedures; status reports; justification of decisions, actions, or expenses; research findings; etc.
 - h. Revise to ensure effective introductions, transitions, details, wording, and conclusions.
2. Communicate ideas for a variety of school and other life situations through listening, speaking, and reading aloud. (L, S, R)
 - a. Participate in student-to-student discussion.
 - b. Develop and express informed opinions.
 - c. Listen to determine the main idea and supporting details, to distinguish fact from opinion, and to determine speaker's purpose or bias.
 - d. Speak effectively to explain and justify ideas to peers and to inform, summarize, persuade, entertain, describe, etc.
 - e. Speak with appropriate intonation, articulation, gestures, and facial expression.
3. Read, evaluate, and use print, non-print, and technological sources to research issues and problems, to present information, and to complete projects. (R, W, S, L, V)
 - a. Locate and discern appropriate sources of print, non-print information, and technologically derived information.
 - b. Use reference sources, bibliographies, indices, electronic card catalog, and appropriate research procedures to gather information.
 - c. Blend information from several sources into a coherent whole.
 - d. Present information in written and oral format.
4. Work individually and as a member of a team to analyze and interpret information, to make decisions, to solve problems, and to reflect, using increasingly complex and abstract thinking. (R, W, S, L, V)
 - a. Initiate peer interaction to examine real life and literary issues and ideas.
 - b. Assume various group roles and monitor group effectiveness with minimal teacher direction.
5. Complete oral and written presentations which exhibit interaction and consensus within a group. (R, W, S, L, V)
 - c. Work collaboratively to produce a finished product for a given purpose such as entertainment, persuasion, information, etc.
 - d. Develop competency in critical thinking, leadership skills, consensus building, and self-confidence.
 - e. Edit oral and written presentations to reflect correct grammar, usage, and mechanics.
6. Explore cultural contributions to the history of the English language and its literature. (R, W, S, L, V)
 - a. Examine the influence of culture and history of language and literature.
 - b. Recognize that language is shaped by social, cultural, and geographical differences.
 - c. Identify instances of dialectal differences which create stereotypes, perceptions, and identities.
 - d. Recognize root words, prefixes, suffixes, and cognates.
 - e. Relate how vocabulary and spelling have changed over time.
7. Discover the power and effect of language by reading and listening to selections from various literary genres. (R, W, S, L, V)
 - a. Respond to the beauty and power of the language.
 - b. Read selected works aloud with fluency and expression.

- c. Recognize, select, and incorporate effective oral techniques (inflection, tone of voice, etc.) in original works.
 - d. Analyze the stylistic devices, such as alliteration, assonance, word order, rhyme, onomatopoeia, etc., that make a passage achieve a certain effect.
 - e. Demonstrate how the use of language can confuse or inform, repel or persuade, or inspire or enrage.
 - f. Analyze how grammatical structure or style helps to create a certain effect.
8. Read, discuss, analyze, and evaluate literature from various genres and other written material. (R, W, S, L, V)
- a. Read increasingly challenging works and choose a method to analyze, critique, evaluate, and interpret.
 - b. Read to associate literary experiences with contemporary issues, such as those dealing with religion, politics, government, economics, etc.
9. Sustain progress toward fluent control of grammar, mechanics, and usage of standard English in the context of writing and speaking. (R, W, S, L, V)
- a. Understand the features and structure of conventional English to produce texts free of substandard usage.
 - b. Demonstrate, in the context of their own writing, proficient use of the conventions of standard English, including, but not limited to, the following: complete sentences, subject-verb agreement, plurals, spellings, homophones, possessives, verb forms, punctuation, capitalization, pronouns, pronoun-antecedent agreement, parallel structure, dangling and misplaced modifiers, and shifts in voice, tense, structure, and person.
 - c. Exhibit control of language in context by manipulating sentence structure.
 - d. Use editing strategies to improve writing proficiency.
 - e. Use vocabulary appropriate to the complexity of the content.
10. Use language and critical thinking skills to serve as tools for learning. (R, W, S, L, V)
- a. Use language to facilitate continuous learning, to record observations, to clarify thought, to synthesize information, and to analyze and evaluate language.
 - b. Interrelate new concepts and words before, during, and after listening, speaking, reading, viewing, and writing.
 - c. Synthesize language skills to communicate beyond the immediate environment.
 - d. Use writing strategies, such as notetaking, reflecting, and making predictions to promote learning.
 - e. Use writing strategies, such as learning logs, summaries, journals, and analyses, to apply learning.
 - f. Interpret visual material orally and in writing.

MISSISSIPPI Grade 12 English Language Arts
Competencies and Objectives

1. Produce writing which reflects increasing proficiency through planning, writing, revising, and editing and which is specific to audience and purpose. (R, W, S, L, V)
 - a. Produce purposeful academic, practical, and creative writings that reflect advanced proficiency.
 - b. Read and write to create insightful responses to personal works and other pieces of writing in order to monitor self-growth.
 - c. Write a response, reaction, interpretation, analysis, summary, etc., of literature, other reading matter, or orally presented material.
 - d. Revise to ensure effective introductions, details, wording, transitions, and conclusions.
2. Communicate ideas for a variety of school and other life situations through listening, speaking, and reading aloud. (L, S, R)
 - a. Listen to determine the main idea and supporting details, to distinguish fact from opinion, and to determine a speaker's purpose or bias.
 - b. Speak with appropriate intonation, articulation, gestures, and facial expression.
 - c. Speak effectively to explain and justify ideas to peers, to inform, to summarize, to persuade, to entertain, to describe, etc.
3. Read, evaluate, and use print, non-print, and technological sources to research issues and problems, to present information, and to complete projects. (R, W, S, L, V)
 - a. Exhibit independent use of multimedia technology and other resources for various research purposes.
 - b. Use reference sources, indices, electronic card catalog, and appropriate research procedures to locate and gather information.
 - c. Gather information from several sources, synthesize information, and report findings and conclusions in writing, oral, and visual form.
4. Work individually and as a member of a team to analyze and interpret information, to make decisions, to solve problems, and to reflect, using increasingly complex and abstract thinking. (R, W, S, L, V)
 - a. Participate in self-directed groups to examine authentic and literary issues and ideas, such as man's experiences with war and peace.
 - b. Exhibit proficiency in critical thinking, leadership skills, and consensus building.
5. Complete oral and written presentations which exhibit interaction and consensus within a group. (R, W, S, L, V)
 - a. Share, critique, and evaluate works in progress and completed works through a process approach.
 - b. Communicate effectively in a group to present completed projects and/or compositions.
 - c. Edit oral and written presentations to correct grammar, usage, and mechanics.
6. Explore cultural contributions to the history of the English language and its literature. (R, W, S, L, V)
 - a. Examine how historical and cultural events influence literary works and how literature affects society.
 - b. Respond to literary texts to gain understanding of the human condition in particular cultures and during specific literary periods.
 - c. Recognize that language is shaped by cultural, social, and geographical differences.
 - d. Identify instances of dialectal differences which create stereotypes, perceptions, and identities.
 - e. Relate how vocabulary and spelling have changed over time.
7. Discover the power and effect of language by reading and listening to selections from various literary genres. (R, W, S, L, V)
 - a. Increase awareness of and respond to the music of language through listening, reading, and speaking.
 - b. Analyze the stylistic devices, such as alliteration, assonance, word order, rhyme, onomatopoeia, etc., that give a passage the intended effect.
 - c. Demonstrate how the use of language can invoke a range of emotions.
 - d. Analyze how grammatical structure or style helps to create an intended effect.
8. Read, discuss, analyze, and evaluate literature from various genres and other written material. (R, W, S, L, V)
 - a. Explore themes and issues in challenging literary works, both fiction and nonfiction.
 - b. Relate personal, contemporary, and cultural experiences to the texts.

- c. Discuss how theme is developed and conveyed through literary conventions, forms, styles, and devices, such as tone, symbolism, characterization, point of view, plot, etc.
 - d. Read challenging works from a variety of genres to emulate style, tone, form, purpose, point of view, etc., of specific works.
9. Sustain progress toward fluent control of grammar, mechanics, and usage of standard English in the context of writing and speaking. (R, W, S, L, V)
- a. Construct pieces of writing in which the author communicates with the audience in a consistently clear, concise manner.
 - b. Use consistently clear, concise oral language.
 - c. Use diction appropriate to the complexity of the content.
10. Use language and critical thinking strategies to serve as tools for learning. (R, W, S, L, V)
- a. Use language to facilitate continuous learning, to record observations, to clarify thought, to synthesize information, and to analyze and evaluate language.
 - b. Interpret visual material orally and in writing.

Mathematics

MISSISSIPPI Grade 7 Mathematics Competencies and Objectives

1. Apply concepts and perform the basic operations with decimals, fractions, and mixed numbers. (P, M, N)
 - a. Compare, order, round, and estimate decimals.
 - b. Add, subtract, multiply, and divide decimals in real-life situations with and without calculators.
 - c. Use powers of ten to multiply and divide decimals.
 - d. Convert among decimals, fractions, and mixed numbers.
 - e. Express ratios as fractions.
 - f. Add, subtract, multiply, and divide fractions and mixed numbers.
 - g. Use estimation to add, subtract, multiply, and divide fractions.
2. Apply and use basic principles of number sense. (P, M, N)
 - a. Use patterns to develop the concept of exponents.
 - b. Write numbers in standard and exponential form.
 - c. Convert between standard form and scientific notation.
 - d. Find and use prime factorization with exponents to obtain the greatest common factor (GCF) and least common multiple (LCM).
 - e. Describe and extend patterns in sequences.
 - f. Identify and use the commutative, associative, distributive, and identity properties.
 - g. Use patterns to develop the concepts of roots of perfect squares with and without calculators.
3. Use units of measurement with standard systems. (P, D, M, G, N)
 - a. Convert within a standard measurement system (English and metric).
 - b. Convert temperature using the Fahrenheit and Celsius formulas.
 - c. Use standard units of measurement to solve application problems.
4. Collect, organize, and summarize data and use simple probability. (P, D, M, G, N)
 - a. Organize data in a frequency table.
 - b. Interpret and construct histograms, line, and bar graphs.
 - c. Interpret and construct circle graphs when given degrees.
 - d. Interpret and construct stem and leaf plots and line plots from data.
 - e. Estimate and compare data including mean, median, mode, and range of a set of data.
 - f. Predict and recognize data from statistical graphs.
 - g. Determine probability of a single event.
 - h. Use simple permutations and combinations.
5. Use concepts of geometry in angles and polygons and extend the concepts of perimeter and area. (P, G, M, N)
 - a. Identify polygons to twelve sides.
 - b. Classify and compare the properties of quadrilaterals.
 - c. Classify and measure angles of all types.
 - d. Classify triangles by sides and angles.
 - e. Find the perimeter of polygons.
 - f. Find the area of triangles and quadrilaterals.
 - g. Find the circumference and area of a circle.
 - h. Identify congruent segments, angles, and polygons.

- i. Develop relationships of faces, vertices, and edges of three-dimensional figures.
 - j. Perform transformations (rotations, reflections, translations) on plane figures using physical models and graph paper.
 - k. Investigate symmetry of polygons.
 - l. Develop and apply the Pythagorean Theorem to find missing sides of right triangles.
6. Develop and apply the basic operations of integers. (P, D, M, G, N)
- a. Recognize and write integers including opposites and absolute value.
 - b. Compare and order integers.
 - c. Graph ordered pairs on a coordinate plane.
 - d. Add, subtract, multiply, and divide integers with and without calculators.
7. Create and apply algebraic expressions and equations. (P, G, N)
- a. Translate between simple algebraic expressions and verbal phrases.
 - b. Use the order of operations to simplify and/or evaluate numerical and algebraic expressions with and without calculators.
 - c. Solve linear equations using the addition, subtraction, multiplication, and division properties of equality with integer solutions.
 - d. Write and solve equations that represent problem-solving situations.
 - e. Write a real-world situation from a given equation.
8. Survey and apply concepts of ratio, proportion, and percent. (P, D, M, G, N)
- a. Explore equivalent ratios and express them in simplest form.
 - b. Solve problems involving proportions.
 - c. Determine unit rates.
 - d. Use models to illustrate the meaning of percent.
 - e. Convert among decimals, fractions, mixed numbers, and percents.
 - f. Determine the percent of a number.
 - g. Estimate decimals, fractions, and percents.
 - h. Use proportions and equations to solve problems with rate, base, and part with and without calculators.
 - i. Find the percent of increase and decrease.
 - j. Solve problems involving sales tax, discount, and simple interest with and without calculators.

MISSISSIPPI Grade 8 Mathematics
Competencies and Objectives

1. Apply concepts and perform basic operations using real numbers. (P, D, G, N)
 - a. Classify and give examples of real numbers such as natural, whole, integers, rational, and irrational.
 - b. Identify, compare, and order fractions and decimals.
 - c. Round and estimate fractions and decimals.
 - d. Solve real-life problems involving addition, subtraction, multiplication, and division of fractions, decimals, and mixed numbers.
 - e. Determine the absolute value and additive inverse of real numbers.
 - f. Classify, compare, and order integers and rational numbers.
 - g. Add, subtract, multiply, and divide integers and rational numbers with and without calculators.
2. Use basic concepts of number sense and perform operations involving order of operations, exponents, scientific notation. (P, M, N)
 - a. Simplify expressions using order of operations.
 - b. Use the rules of exponents when multiplying or dividing like bases, and when raising a power to a power.
 - c. Multiply and divide numbers by powers of ten.
 - d. Convert between standard form and scientific notation.
 - e. Multiply and divide numbers written in scientific notation.
 - f. Evaluate and estimate powers, squares, and square roots with and without calculators.
3. Use properties to create and simplify algebraic expressions and solve linear equations and inequalities. (P, G, N)
 - a. Identify and apply the commutative, associative, and distributive properties.
 - b. Distinguish between numerical and algebraic expressions, equations, and inequalities.
 - c. Convert between word phrases or sentences and algebraic expressions, equations, or inequalities.
 - d. Simplify and evaluate numerical and algebraic expressions.
 - e. Solve and check one and two-step linear equations and inequalities.
 - f. Solve and check multi-step linear equations using the distributive property.
 - g. Graph solutions to inequalities on a number line.
 - h. Write a corresponding real-life situation from an algebraic expression.
4. Apply the concepts of ratio, proportion, and percent to solve real-life problems. (P, D, M, G, N)
 - a. Write ratios comparing given data.
 - b. Convert among ratios, decimals, and percents.
 - c. Solve proportions.
 - d. Solve for part, rate, or base.
 - e. Find commissions and rates of commission, discounts, sale prices, sales tax, and simple interest.
 - f. Find percent of increase and decrease.
 - g. Write and solve real-life word problems using percents with and without calculators.
5. Convert and use standard units (English and metric) of measurement. (P, D, M, G, N)
 - a. Convert, perform basic operations, and solve word problems using standard measurements.
 - b. Measure line segments and find dimensions of given figures using standard measurements.
 - c. Write and solve real-life problems involving standard measurements.
 - d. Select appropriate units of measurement for real-life problems.
6. Apply geometric principles to polygons, angles, and two and three dimensional figures. (P, M, G, N)
 - a. Identify parallel, perpendicular, intersecting, and skew lines.
 - b. Identify and describe characteristics of polygons.
 - c. Find the perimeter and area of polygons and circumference and area of circles.
 - d. Classify, draw, and measure acute, obtuse, right, and straight angles.

- e. Identify and find the missing angle measure for adjacent, vertical, complementary, and supplementary angles.
 - f. Locate and identify angles formed by parallel lines cut by a transversal (e.g., corresponding, alternate interior, and alternate exterior).
 - g. Classify triangles by sides and angles and find the missing angle measure.
 - h. Identify three-dimensional figures and describe their faces, vertices, and edges.
 - i. Use the Pythagorean Theorem to solve problems, with and without a calculator.
7. Interpret, organize, and make predictions about a variety of data using concepts of probability and statistics. (P, D, M, G, N)
- a. Interpret and construct frequency tables and charts.
 - b. Find mean, median, mode, and range of a given set of data.
 - c. Interpret and construct bar, line, circle graphs, and pictographs from given data.
 - d. Interpret and construct stem-and-leaf, box-and-whisker, and scatterplots from given data.
 - e. Predict patterns or trends based on given data.
 - f. Use combinations and permutations in application problems.
 - g. Calculate and apply basic probability.
8. Apply the principles of graphing in the coordinate system. (P, D, M, G, N)
- a. Identify the x - and y -axis, the origin, and the quadrants of a coordinate plane.
 - b. Plot ordered pairs.
 - c. Label the x and y coordinates for a given point.
 - d. Using tables, graph simple linear equations.

MISSISSIPPI Pre-Algebra
Competencies and Objectives

1. Explain, classify, and perform basic operations on the set of real numbers. (P, D, M, G, N)
 - a. Classify numbers as natural, whole, integer, rational, irrational, and real.
 - b. Identify and apply the properties of real numbers (include the use of mental mathematics and estimation methods).
 - c. Model absolute value of real numbers as a measure of distance.
 - d. Compare and order the real numbers and perform operations with rational numbers.
 - e. Evaluate numerical and algebraic expressions using order of operations.
 - f. Convert between repeating decimals and fractions.
 - g. Recognize and evaluate perfect squares and approximate square roots.
2. Solve, check, and graph linear equations and inequalities in one variable. (P, G, N)
 - a. Relate the language of mathematics to indicate mathematical operations.
 - b. Translate between verbal expressions and algebraic expressions.
 - c. Given an algebraic expression, write a corresponding real-life situation.
 - d. Simplify algebraic expressions by combining like terms and using the distributive property.
 - e. Solve, check, and graph one-step and two-step linear equations and inequalities.
 - f. Solve and check multi-step linear equations and inequalities with variables on both sides involving the distributive property.
3. Recognize and perform basic operations on polynomials. (P, G, N)
 - a. Classify types of polynomials.
 - b. Determine the degree of polynomials.
 - c. Simplify polynomials by combining like terms.
 - d. Arrange polynomials in ascending or descending order of a variable.
 - e. Use the rules of exponents to multiply and divide monomials.
 - f. Use the rules of exponents to multiply monomials by polynomials.
 - g. Model and use the distributive property and rules of exponents to multiply binomials by binomials.
 - h. Multiply and divide numbers involving scientific notation.
 - i. Use manipulative models to demonstrate operations of monomials and polynomials.
4. Use ratios, proportions, and percents to solve problems. (P, M, G, N)
 - a. Represent, convert, and explain relationships among fractions, ratios, decimals, and percents in problem solving.
 - b. Use proportions and equations to find part, rate, or base in real-world situations.
 - c. Explain solutions and processes orally and in writing.
5. Use concepts of probability and statistics to interpret information. (P, D, G, N)
 - a. Model the Fundamental Counting Principle to determine possible outcomes of an event.
 - b. Use combinations and permutations in application problems.
 - c. Calculate and apply basic probability.
 - d. Collect, display, analyze, and draw appropriate conclusions from data.
 - e. Interpret and construct stem-and-leaf, box-and-whisker, and scatter plots from data.
6. Solve, check, and graph solutions of equations and inequalities in two variables using the coordinate system. (P, D, M, G, N)
 - a. Given a set of ordered pairs, draw a coordinate system using an appropriate scale.
 - b. Create a table to graph equations and inequalities that are presented in slope intercept form.
 - c. Use calculators/computers to check accuracy of tables and graphs as needed.
 - d. Identify slope as positive, negative, zero, or undefined from a graph.
 - e. Calculate slope from two points graphically and algebraically.
 - f. Identify x- and y- intercepts from a graph.

- g. Identify the solution of a system of equations from a graph.
- 7. Use and apply properties and formulas to solve geometric problems. (P, D, M, G, N)
 - a. Calculate perimeter, area, circumference, and volume using appropriate formulas.
 - b. Recognize the irrational number π (p) as the ratio of circumference to diameter of any given circle.
 - c. Solve problems involving the use of the Pythagorean Theorem.
 - d. Classify triangles by sides and angles.
 - e. Use properties of similar triangles to solve problems.
 - f. Recognize and determine degree measure of angles formed by parallel lines cut by a transversal.
 - g. Develop, extend, and model the relationships of faces, vertices, and edges of three-dimensional figures.
 - h. Perform transformations on plane figures.

MISSISSIPPI Algebra I
Competencies and Objectives

1. Recognize, classify, and use real numbers and their properties. (P, M, N)
 - a. Describe the real number system using a diagram to show the relationships of component sets of numbers that compose the set of real numbers.
 - b. Model properties and equivalence relationships of real numbers.
 - c. Demonstrate and apply properties of real numbers to algebraic expressions.
 - d. Perform basic operations on square roots excluding rationalizing denominators.
2. Recognize, create, extend, and apply patterns, relations, and functions and their applications. (P, D, G, N)
 - a. Analyze relationships between two variables, identify domain and range, and determine whether a relation is a function.
 - b. Explain and illustrate how change in one variable may result in a change in another variable.
 - c. Determine the rule that describes a pattern and determine the pattern given the rule.
 - d. Apply patterns to graphs and use appropriate technology.
3. Simplify algebraic expressions, solve and graph equations, inequalities and systems in one and two variables. (P, D, G, N)
 - a. Solve, check, and graph linear equations and inequalities in one variable, including rational coefficients.
 - b. Graph and check linear equations and inequalities in two variables.
 - c. Solve and graph absolute value equations and inequalities in one variable.
 - d. Use algebraic and graphical methods to solve systems of linear equations and inequalities.
 - e. Translate problem-solving situations into algebraic sentences and determine solutions.
4. Explore and communicate the characteristics and operations of polynomials. (P, M, G, N)
 - a. Classify polynomials and determine the degree.
 - b. Add, subtract, multiply, and divide polynomial expressions.
 - c. Factor polynomials using algebraic methods and geometric models.
 - d. Investigate and apply real-number solutions to quadratic equations algebraically and graphically.
 - e. Use convincing arguments to justify unfactorable polynomials.
 - f. Apply polynomial operations to problems involving perimeter and area.
5. Utilize various formulas in problem-solving situations. (P, D, M, G, N)
 - a. Evaluate and apply formulas (e.g., circumference, perimeter, area, volume, Pythagorean Theorem, interest, distance, rate, and time).
 - b. Reinforce formulas experimentally to verify solutions.
 - c. Given a literal equation, solve for any variable of degree one.
 - d. Using the appropriate formula, determine the length, midpoint, and slope of a segment in a coordinate plane.
 - e. Use formulas (e.g., point-slope and slope-intercept) to write equations of lines.
6. Communicate using the language of algebra. (P, D, M, G, N)
 - a. Recognize and demonstrate the appropriate use of terms, symbols, and notations.
 - b. Distinguish between linear and non-linear equations.
 - c. Translate between verbal expressions and algebraic expressions.
 - d. Apply the operations of addition, subtraction, and scalar multiplication to matrices.
 - e. Use scientific notation to solve problems.
 - f. Use appropriate algebraic language to justify solutions and processes used in solving problems.
7. Interpret and apply slope as a rate of change. (P, D, M, G, N)
 - a. Define slope as a rate of change using algebraic and geometric representations.
 - b. Interpret and apply slope as a rate of change in problem-solving situations.
 - c. Use ratio and proportion to solve problems including direct variation ($y = kx$).

- d. Apply the concept of slope to parallel and perpendicular lines.
8. Analyze data and apply concepts of probability. (P, D, M, G, N)
- a. Collect, organize, graph, and interpret data sets, draw conclusions, and make predictions from the analysis of data.
 - b. Define *event* and *sample spaces* and apply to simple probability problems.
 - c. Use counting techniques, permutations, and combinations to solve probability problems.

MISSISSIPPI Algebra II
Competencies and Objectives

1. Explore the relationships among coefficients, exponents, degree and roots of equations. (P, M, G, N)
 - a. Use acronyms such as SOPPS (**S**quare, **O**pposite sign, **P**roduct, **P**lus, **S**quare) to teach the sum/difference of cubes.
 - b. Solve and explore equations using the quadratic formula, completing the square, synthetic division, graphing, and technology.
 - c. Classify solutions of quadratic equations through observations of graphs and through use of the discriminant.
 - d. Write a polynomial equation when given its roots.
2. Solve systems of equations and inequalities and interpret solutions. (P, D, M, G, N)
 - a. Explore methods of solving systems of equations to include algebraic methods and matrices.
 - b. Write a system of equations to solve a problem.
 - c. Interpret by graphing, and solve systems of inequalities.
 - d. Introduce linear programming as a method to solve problems.
3. Recognize, classify, and perform operations with irrational and complex numbers. (P, G, N)
 - a. Explore and describe the complex number system.
 - b. Explain and apply complex conjugate methods to simplify problems.
 - c. Perform operations with complex numbers and review radicals.
4. Identify and investigate relations and functions. (P, D, M, G, N)
 - a. Determine the domain, range, roots, and inverse of a function.
 - b. Recognize and determine graphs of linear, quadratic, absolute value, greatest integer, and piece-wise functions.
 - c. Develop a complex coordinate plane for complex numbers ($a + bi$) where reals are represented on the x-axis and imaginary units are represented on the y-axis and model operations of complex numbers.
 - d. Evaluate functions including composite functions.
 - e. Explore and investigate solutions to compound and absolute value inequalities to include interval notation.
 - f. Use scatter plots and apply regression analysis to data.
5. Investigate rational expressions and equations. (P, D, M, G, N)
 - a. Perform basic operations and simplify rational expressions to include complex fractions.
 - b. Solve and verify solutions to equations involving rational expressions.
 - c. Analyze problems involving direct, inverse, joint, and combined variations.
6. Solve, graph, and apply the properties of exponential and logarithmic expressions and equations. (P, D, M, G, N)
 - a. Illustrate and apply the relationships between exponential and logarithmic functions.
 - b. Simplify radical, exponential, and logarithmic expressions.
 - c. Solve equations involving radicals, exponents, and logarithms.
 - d. Collect, organize, and interpret data from exponential, logarithmic, and power functions.
7. Identify characteristics and extend operations and applications of matrices. (P, D, N)
 - a. Explain dimensions of a matrix.
 - b. Find the inverse and determinant of a matrix.
 - c. Solve for unknown values in corresponding elements of equal matrices.
 - d. Perform basic operations and apply to matrices.

MISSISSIPPI Advanced Algebra
Competencies and Objectives

1. Analyze and extend patterns of graphs in families of functions. (P, D, M, G, N)
 - a. Determine domain and range.
 - b. Relate symmetry to the behavior of even and odd functions.
 - c. Use technology to analyze and sketch the graphs of polynomial, rational, exponential, and logarithmic functions.
 - d. Explore properties of composites and inverses and their graphs as they relate to functions.
 - e. Use linear programming to solve problems.
2. Investigate and apply the characteristics and operations connecting sequences and series. (P, D, G, N)
 - a. Express sequences and series using recursive processes.
 - b. Develop and use formulas for sequences.
 - c. Evaluate and apply arithmetic and geometric series.
 - d. Evaluate and apply infinite geometric series.
 - e. Explore the relationships of Pascal's triangle.
3. Explore and apply fundamental principles of probability and statistics. (P, D, G, N)
 - a. Use summation (Σ) and factorial notation to solve problems.
 - b. Expand and apply the Binomial Theorem to problem-solving situations.
 - c. Draw inferences from and construct charts, tables, and/or graphs that summarize data.
 - d. Use and apply the Fundamental Counting Principle, permutations, and combinations as a preface to probability.
 - e. Use theoretical or experimental experiences to determine simple probability.
 - f. Use curve-fitting to predict from data.
4. Identify, explore, and predict equations and graphs of conic sections. (P, M, G, N)
 - a. Identify the parts essential to the graphs of the circle, parabola, ellipse, and hyperbola.
 - b. Analyze and sketch the graphs of conics.
 - c. Recognize conic sections by their graphs and equations.
 - d. Apply algebraic techniques to write conics in standard form.
 - e. Graph conic sections using translations.
5. Extend algebraic techniques to higher degree polynomial and complex rational problems. (P, D, N)
 - a. Factor and find zeros of polynomial equations.
 - b. Solve quadratic and simple polynomial inequalities.
 - c. Solve inequalities containing simple rational expressions.
6. Explore and extend properties and applications of exponential and logarithmic equations. (P, D, M, G, N)
 - a. Explore and simplify exponential expressions and solve exponential equations.
 - b. Evaluate logarithmic expressions and solve logarithmic equations.
 - c. Explore applications of logarithms.

MISSISSIPPI Geometry
Competencies and Objectives

1. **Communicate using the language of geometry.** (P, M, G, N)
 - a. Define and recognize terms and symbols of geometry and use them to communicate mathematical ideas.
 - b. Differentiate between inductive and deductive reasoning.
 - c. Use properties, theorems, postulates, and definitions to justify relationships involved with segment and angle congruence.
 - d. Develop and evaluate mathematical arguments and proofs.
2. **Identify, explore, discuss, and apply properties, theorems, postulates, and definitions related to angles, lines, and circles.** (P, M, G, N)
 - a. Identify and classify angles.
 - b. Identify, explore, and apply angle relationships formed by parallel lines cut by a transversal.
 - c. Explore, discuss, and apply the relationships among parts of a circle and between arcs and angles.
 - d. Use angle and segment relationships to find unknown measures related to circles.
3. **Identify, explore, discuss, and apply properties, theorems, postulates, and definitions related to polygons.** (P, M, G, N)
 - a. Identify and name different types of polygons and their subsets.
 - b. Classify triangles and apply postulates and theorems to test for triangle congruence and triangle inequality.
 - c. Identify altitude, median, angle bisectors, and perpendicular bisectors in a triangle.
 - d. Apply definitions, postulates, and theorems to find angle measurements in polygons.
4. **Explore and demonstrate the connections between algebra and geometry.** (P, M, G, N)
 - a. Apply ratios and proportions to solve for unknown measures in similar polygons.
 - b. Solve for missing measurements in right triangles using the Pythagorean Theorem, special right triangle relationships, geometric mean, and trigonometric functions.
 - c. Relate algebraic formulas to geometric properties to solve problems in the coordinate plane.
 - d. Explore how change in perimeter results in a change in area.
5. **Investigate, classify, compare, and contrast two and three-dimensional geometric figures.** (P, M, G, N)
 - a. Find the areas of triangles, quadrilaterals, and regular polygons.
 - b. Find the area and circumference of a circle.
 - c. Find the volumes of rectangular prisms, cylinders, pyramids, cones, and spheres.
 - d. Use protractors, compasses, rulers, and/or technology to construct geometric figures and drawings.
 - e. Compare, contrast, and classify two-dimensional figures and investigate their characteristics.
 - f. Compare, contrast, and classify three-dimensional figures and investigate their characteristics.
 - g. Use measurement to design and build a three-dimensional object.
6. **Explore applications of patterns and transformational geometry.** (P, D, M, G, N)
 - a. Identify symmetry in common objects as examples of point, line, and rotational symmetry.
 - b. Create designs using symmetry.
 - c. Recognize and describe images of figures obtained by applying reflections, translations, rotations, and dilations.
 - d. Create tessellations using translations and rotations.
 - e. Determine the effect of scale factors on dilations.
 - f. Use geometric probability to predict results.

MISSISSIPPI Trigonometry
Competencies and Objectives

1. Identify, locate, and apply trigonometric functions to the unit circle. (P, M, G, N)
 - a. Identify and locate angles in radians and degrees based on the unit circle.
 - b. Convert between degree and radian measurements of angles.
 - c. Use the definition of the six trigonometric functions to find missing parts of a triangle.
 - d. Determine the values of inverse trigonometric functions.
 - e. Utilize special right triangle relationships and symmetry as they apply to the unit circle.
 - f. Relate the unit circle to the right triangle.
2. Explore, communicate, and apply the connections between the patterns of trigonometric functions and graphing with and without appropriate technology. (P, D, M, G, N)
 - a. Recognize, sketch, and interpret the graphs of the six basic trigonometric functions and their inverses to include restrictions on the domain.
 - b. Recognize, sketch, and interpret graphs of the trigonometric functions using all transformations.
3. Utilize and extend algebraic and geometric techniques to trigonometric equations and applications. (P, D, M, G, N)
 - a. Solve for unknown parts of triangles to include Law of Sines and Law of Cosines
 - b. State, verify, and utilize trigonometric identities.
 - c. Find arc length and area of a sector of a circle.
 - d. Find the area of a triangle using Heron's Formula and/or $\frac{1}{2}bc\sin A$.
 - e. Solve trigonometric equations, using both radians and degrees.
 - f. Model and apply right triangle formulas, Law of Sines, and Law of Cosines to problem-solving situations.
4. Introduce and investigate basic concepts of vectors and operations with vectors. (P, M, G, N)
 - a. Recognize different notations for vectors.
 - b. Apply addition to vector sums and resultants.
 - c. Determine the norm (magnitude) of a vector.
 - d. Create a unit vector in the same and in the opposite direction of a given vector.
 - e. Draw a vector to represent a quantity.

MISSISSIPPI Pre-Calculus
Competencies and Objectives

1. Investigate, predict, and extend patterns of graphs in families of functions. (P, D, M, G, N)
 - a. Demonstrate proficiency in determining domain and range.
 - b. Relate powers and coefficients to the end behavior of graphs of functions.
 - c. Relate symmetry to the behavior of even and odd functions.
 - d. Analyze and sketch the graphs of polynomials, rational, piece-wise, greatest integer, exponential, and logarithmic functions, and verify using technology.
 - e. Explore properties of composites and inverses and their graphs as they relate to functions.
2. Illustrate and explore the characteristics and operations connecting sequences and series. (P, D, G, N)
 - a. Express sequences and series using recursive processes.
 - b. Develop and use formulas for sequences.
 - c. Evaluate and apply arithmetic and geometric series.
 - d. Evaluate and apply infinite geometric series.
 - e. Use the Principle of Mathematical Induction as a form of mathematical proof.
3. Explore and apply fundamental principles of probability. (P, D, G, N)
 - a. Use summation (Σ) and factorial notations to solve problems.
 - b. Expand and apply the Binomial Theorem to problem-solving situations.
 - c. Use and apply the fundamental counting principle, permutations, and combinations as a preface to probability.
 - d. Use theoretical or experimental experiences to determine simple probability.
4. Extend algebraic problem-solving techniques to higher degree polynomial and complex rational equations. (P, D, G, N)
 - a. Factor and find zeros of polynomial equations.
 - b. Graph and write equations using the behavior of linear, even, and odd factors.
 - c. Solve simple polynomial inequalities to include quadratic inequalities.
 - d. Solve inequalities containing simple rational expressions.
 - e. Investigate optimization problems.
5. Extend operations and applications of matrices. (P, N)
 - a. Calculate determinants of matrices to include expansion of minors.
 - b. Solve systems of n equations and explain the solutions.
6. Extend properties and applications of exponential and logarithmic equations. (P, D, M, G, N)
 - a. Explore and simplify exponential expressions and solve exponential equations.
 - b. Evaluate logarithmic expressions and solve logarithmic equations.
 - c. Explore the application of logarithms to problem-solving situations.

Science

MISSISSIPPI Grade 7 Science Competencies and Objectives

1. Compare and contrast structure and function in living systems. (L)
 - a. Compare and contrast plant and animal cells through investigations.
 - b. Describe the process of respiration and the use of its products.
 - c. Illustrate the parts of the digestive system and the interaction of each part.
 - d. Illustrate the parts of and interaction between the respiratory and circulatory system.
 - e. Illustrate the parts of the excretory system and the interaction of each part.
2. Explore the processes of the reproduction and heredity of organisms. (L)
 - a. Distinguish genes as sections of DNA molecules that carry the genetic code for inherited traits.
 - b. Examine the concepts of homozygous and heterozygous traits.
 - c. Explain mitosis and relate it to an organism's growth and repair processes.
3. Determine how organisms co-exist in their environment. (L)
 - a. Demonstrate that cells interact with their environment.
 - b. Investigate homeostasis as it relates to plants and animals.
4. Explore how environmental factors of population influence the formation of an ecosystem. (L,E)
 - a. Describe the process of photosynthesis and the use of its products.
 - b. Design an experiment in plant behavior to include responses to water, gravity, and light.
 - c. Investigate and research environmental concerns of the land, water, and air.
 - d. Analyze the importance of biological diversity in communities and ecosystems.
5. Examine survival strategies of organisms over many generations. (L)
 - a. Apply concepts of adaptation by analyzing how organisms are classified into groups and subgroups.
 - b. Research animal adaptations and behaviors as related to survival strategies.
 - c. Explain how natural and man-made pressures cause extinction.
6. Explore the composition and changes of the Earth system. (E,P)
 - a. Identify minerals by using any or all of the following tests: streak, cleavage, fracture, hardness, specific gravity, and special properties.
 - b. Research and explain how crustal movements result in earthquakes, volcanoes, mountain formation, etc.
 - c. Distinguish between chemical and physical weathering.
 - d. Identify how forces such as erosion and deposition create landforms.
 - e. Research landforms and fossils specific to Mississippi.
 - f. Compare properties and composition of salt water, fresh water, and brackish water.
 - g. Investigate the interactive forces that produce weather to include moisture, temperature, fronts, air masses, and cloud formations.
7. Explain the causes of lunar phases, eclipses, and Earth's seasons. (E)
 - a. Distinguish between radiating objects (the sun and the stars) and reflecting objects (the planets and their moons).
 - b. Characterize lunar phases in terms of their appearance, their visibility at a given time of day or night, and their progression through time.
 - c. Illustrate the relationship between lunar phases and the phase angle between the sun and the moon as seen from Earth.
 - d. Illustrate the alignments of the Earth, the moon, and the sun, which give rise to solar and lunar eclipses and explain why these eclipses do not occur every month.

- e. Explain how the position of the earth in relation to the sun has an effect on seasonal weather changes.
- 8. Investigate chemical and physical properties of matter. (P)
 - a. Determine and measure experimentally: boiling point, melting point, density, and solubility.
 - b. Demonstrate understanding that chemical and physical properties determine a substance's identity.
 - c. Compare common metals, nonmetals, and metalloids by name, symbol, and characteristics.
 - d. Recognize elements that will combine to form compounds.
 - e. Relate density to mass and volume.
- 9. Investigate motions and forces. (P)
 - a. Using SI units, measure and graph the motion of an object by its position, direction of motion, and speed.
 - b. Investigate Newton's Laws of Motion.
 - c. Using the scientific method, design an experiment to test how different types of surfaces affect friction.
- 10. Investigate the sources of energy. (P, E)
 - a. Investigate the sun as a major source of energy.
 - b. Compare and contrast how the three forms of thermal energy flow.
 - c. Research one or more of the sources of energy (nuclear, solar, wind, geothermal, hydro).

MISSISSIPPI Grade 8
Competencies and Objectives

1. Analyze and relate structure and function in living systems. (L)
 - a. Analyze body systems and their functions.
 - b. Relate interactions among body systems.
 - c. Identify the parts of and show the interaction between the reproductive and endocrine systems.
 - d. Examine diseases that are the result of body system failures or infection by other organisms.
2. Analyze genetic continuity of organisms. (L)
 - a. Define meiosis by relating the process to genetic continuity.
 - b. Compare and contrast genotype and phenotype.
 - c. Explain the advantages and disadvantages of both hybrid and purebred species of plants and animals.
 - d. Examine genes as a section of a DNA molecule that carries the genetic code for inherited traits.
3. Determine the economic factors that influence the regulation and behavior of organisms. (L,E)
 - a. Appraise the economic factors associated with regulations and protection of the environment.
 - b. Explain environmental degradation to include overpopulation, bio-diversity, sea-level rise, and enhanced greenhouse effect.
4. Examine the physical factors of populations as they relate to the formation of ecosystems. (L, E)
 - a. Analyze the adaptation of representative organisms to aquatic or terrestrial environments.
 - b. Evaluate the effects of urbanization on aquatic or terrestrial ecosystems.
 - c. Analyze how predation and food webs help structure communities.
5. Investigate atmospheric movements that affect the Earth's system. (E, P)
 - a. Analyze the cycles including nitrogen, water, carbon dioxide, and oxygen cycle.
 - b. Use weather maps for analyzing and predicting weather.
 - c. Construct a weather map to forecast the weather over a region, giving temperature in degrees Celsius.
6. Investigate the Earth's geological past. (E, L)
 - a. Identify the components/stages of a geological timetable and discuss how the environment (including animals and landforms) has changed in each period.
 - b. Describe methods and tools used in dating rocks and fossils.
 - c. Discuss Mississippi's geological areas.
7. Describe the appearance and nature of our galaxy and the universe. (E)
 - a. Explain the relationship between distance and light-travel time (light year).
 - b. Identify and describe deep-sky objects visible from Earth (diffuse nebulae, galactic and globular clusters, planetary nebulae, supernova remnants, "spiral nebulae").
 - c. Identify and describe the Milky Way as the galaxy to which we belong.
 - d. Identify and describe our galaxy in terms of its components (core of older stars, spiral arms of gas and dust with younger stars, halo, "dark matter") and our location within it.
 - e. Identify and describe "spiral nebulae" as distant galaxies.
 - f. Identify and describe different types of galaxies in terms of their shape (spiral, barred spiral, elliptical, irregular) and level of activity.
8. Analyze the properties of matter. (P)
 - a. Determine experimentally physical and chemical properties including density, conductivity, and reactions with water, acids, and bases.
 - b. Interpret information given on the periodic table to predict reactions between elements.
 - c. Write simple formulas for compounds.
 - d. Distinguish among atoms, ions, and molecules.
 - e. Determine the density of regular and irregular objects.
 - f. Determine experimentally how acidic or basic a substance is using a pH scale indicator.

- g. Introduce the factor label method for unit conversions in the metric system.
- 9. Explore the application of simple and complex machines. (P)
 - a. Apply and demonstrate Newton's Three Laws of Motion using simple machines.
 - b. Design and construct simple and complex machines.
- 10. Investigate the transfer of energy. (P)
 - a. Measure the transfer of heat between two objects using the Celsius scale.
 - b. Illustrate wave motion in different media.
 - c. Research and discuss energy transformation.
 - d. Convert one energy form to another.
 - e. Analyze mechanical waves (sound waves, water waves, earthquake waves, etc.) and electromagnetic waves (light, infrared, x-rays, etc.).

MISSISSIPPI Earth Science
Competencies and Objectives

1. Describe the elements and compounds related to the composition of the Earth's crust. (E, P)
 - a. List elements in the earth's crust and their percentages by mass.
 - b. Compare the elements in the earth's crust to the elements in the atmosphere and oceans.
2. Characterize the different types of mineral deposits. (E, P)
 - a. Research the six common minerals.
3. Describe the basic types of rocks and how they are formed. (E, P)
 - a. List the three basic types of rocks and the sources of their production.
4. Explain the physical and chemical processes of weathering. (E, P)
 - a. Research the causes of physical (mechanical) and chemical weathering.
 - b. Analyze weathering as a type of erosion.
 - c. Research the effects of physical and chemical weathering.
5. Describe the processes involved in shaping the internal and external features of the Earth. (E, P)
 - a. Research the external processes that shape the earth's features.
 - b. Define the internal processes that shape the earth's features.
6. Illustrate the geological timetable. (L, E)
 - a. Research the origins of the earth.
 - b. Research the scientists responsible for the theories of earth's origin.
 - c. Investigate layering as a process of determining the earth's origin.
7. Explain how the oceans affect other processes on Earth. (L, E, P)
 - a. Determine how ocean currents affect climate.
 - b. Research ocean flora and fauna and their place in the life forms of earth.
8. Describe the composition of the atmosphere. (E, P)
 - a. Investigate the different layers of the atmosphere.
 - b. Research the Greenhouse Effect as it relates to the atmosphere.
9. Describe the processes involved in weather and climate. (E, P)
 - a. Compare and contrast the terms weather and climate.
 - b. Research the circulation of the atmosphere.
 - c. Explore the different climatic zones.
 - d. Determine the causes of the change of seasons.
10. Describe the process of the water cycle. (E, P)
 - a. Explore the water cycle's environmental movement.
 - b. Observe the environmental process of the water cycle.
11. Describe the structure and gravitational interaction of our planetary system. (E, P)
 - a. Investigate the sizes and spacing of the planets in our solar system.
 - b. Define gravity and calculate gravitational pull.
 - c. Determine the relationship between the moon's pull of gravity and the Earth's tides.
12. Explain the orderly and predictable motion of celestial bodies. (E, P)
 - a. Investigate comets.
 - b. Explore the concept of red and blue shift.
13. Demonstrate the proper use of scientific methods and investigative techniques. (L, E, P)
 - a. **Experimentally investigate a problem utilizing the scientific process.**
 - b. **Scientifically communicate the results of an experiment.**

- c. Demonstrate safe and proper use of scientific equipment.

MISSISSIPPI Physical Science
Competencies and Objectives

1. Demonstrate the proper use of scientific methods and investigative techniques. (P)
 - a. Experimentally investigate a problem utilizing the scientific process.
 - b. Scientifically communicate the results of an experiment.
 - c. Demonstrate safe and proper use of scientific equipment.
2. Perform measurements and mathematical calculations using metric units. (P)
 - a. Express numbers and perform operations using scientific notation.
 - b. Identify the significant digits in a given measurement.
 - c. Employ graphs to record, display, and interpret data.
 - d. Perform unit conversions within the metric system.
3. Identify basic structure of matter. (P)
 - a. Define and specify the location of the basic components of an atom.
 - b. Utilize the periodic table to determine atomic composition of elements and periodic patterns.
 - c. Describe the states of matter using the kinetic molecular theory.
 - d. Differentiate between elements, compounds, solutions, and mixtures.
 - e. Compare and contrast atoms, ions, and isotopes.
 - f. Write chemical formulas for compounds.
 - g. Classify compounds as acids, bases, or salts.
 - h. Identify compounds with regard to bond type.
4. Investigate physical and chemical changes in matter. (P)
 - a. Differentiate between physical and chemical changes.
 - b. Identify chemical reactions as endothermic or exothermic.
 - c. Balance equations when chemical formulas are given.
 - d. Identify types of chemical reactions.
 - e. Determine the factors affecting rates of solutions.
 - f. Examine typical acid/base reactions.
5. Investigate matter in motion. (P)
 - a. Show how motion involves a frame of reference.
 - b. Calculate average speed.
 - c. Define the fundamental forces of nature.
 - d. Explain the basic principles found in Newton's Three Laws of Motion.
 - e. Determine net force and the resulting motion of objects.
6. Describe sources, uses, and effects of energy. (P)
 - a. Differentiate between kinetic and potential energy.
 - b. Discuss the transfer and/or transformation of energy (conservation of energy).
 - c. Define heat and temperature and their effect on particle motion.
 - d. Observe and communicate that systems tend to become less orderly over time (entropy).
7. Discuss general properties and characteristics of waves. (P)
 - a. Classify waves as either mechanical or electromagnetic.
 - b. Differentiate among transverse, longitudinal, and surface waves.
 - c. Determine wavelength, frequency, period, and velocity of waves.
 - d. Examine the properties of waves (interference, refraction, reflection, diffraction, Doppler effect, etc.).
8. Explain the continuum of the electromagnetic spectrum. (P)
 - a. Identify the electromagnetic spectrum's divisions according to frequency and/or wavelength.

- b. Describe the emission of light by electrons when moving from higher to lower energy (photons as quanta of light).
 - c. Demonstrate understanding that visible light is composed of the color spectrum.
 - d. Identify primary and secondary colors.
 - e. Demonstrate the additive and subtractive properties of colors.
9. Recognize the interrelationships of electricity and magnetism. (P)
- a. Identify electrical charges and their interactions (likes repel, opposites attract).
 - b. Differentiate between static and current electricity.
 - c. Design and construct simple direct current electrical circuits.
 - d. Identify the two poles of a magnet and the interaction of their fields.
 - e. Describe the relationship between electric current and magnetic fields and the applications of fields in motors and generators.

MISSISSIPPI Biology I
Competencies and Objectives

1. **Utilize critical thinking and scientific problem solving in designing and performing biological research and experimentation.** (L, P, E)
 - a. **Demonstrate the proper use** and care **for scientific equipment used in biology.**
 - b. Observe and practice safe procedures in the classroom and laboratory.
 - c. **Apply the components of scientific processes and methods in the classroom and laboratory investigations.**
 - d. **Communicate results of scientific investigations in** oral, written, and **graphic form.**
2. Investigate the biochemical basis of life. (L, P)
 - a. Identify the characteristics of living things.
 - b. Describe and differentiate between covalent and ionic bonds using examples of each.
 - c. Describe the unique bonding and characteristics of water that makes it an essential component of living systems.
 - d. Classify solutions using the pH scale and relate the importance of pH to organism survival.
 - e. Compare the structure, properties and functions of carbohydrates, lipids, proteins and nucleic acids in living organisms.
 - f. Explain how enzymes work and identify factors that can affect enzyme action.
3. Investigate cell structures, functions, and methods of reproduction. (L)
 - a. Differentiate between prokaryotic and eukaryotic cells.
 - b. Distinguish between plant and animal (eukaryotic) cell structures.
 - c. Identify and describe the structure and basic functions of the major eukaryotic organelles.
 - d. Describe the way in which cells are organized in multicellular organisms.
 - e. Relate cell membrane structure to its function in passive and active transport.
 - f. Describe the main events in the cell cycle and cell mitosis including differences in plant and animal cell divisions.
 - g. Relate the importance of meiosis to sexual reproduction and the maintenance of chromosome number.
 - h. Identify and distinguish among forms of asexual and sexual reproduction.
4. Investigate the transfer of energy from the sun to living systems. (L, P)
 - a. Describe the structure of ATP and its importance in life processes.
 - b. Examine, compare, and contrast the basic processes of photosynthesis and cellular respiration.
 - c. Compare and contrast aerobic and anaerobic respiration.
5. Investigate the principles, mechanisms, and methodology of classical and molecular genetics. (L, P)
 - a. Compare and contrast the molecular structures of DNA and RNA as they relate to replication, transcription, and translation.
 - b. Identify and illustrate how changes in DNA cause mutations and evaluate the significance of these changes.
 - c. Analyze the applications of DNA technology (forensics, medicine, agriculture).
 - d. Discuss the significant contributions of well-known scientists to the historical progression of classical and molecular genetics.
 - e. Apply genetic principles to solve simple inheritance problems including monohybrid crosses, sex linkage, multiple alleles, incomplete dominance, and codominance.
 - f. Examine inheritance patterns using current technology (gel electrophoresis, pedigrees, karyotypes).
6. Investigate concepts of natural selection as they relate to diversity of life. (L)
 - a. Analyze how organisms are classified into a hierarchy of groups and subgroups based on similarities and differences.
 - b. Identify characteristics of kingdoms including monerans, protists, fungi, plants and animals.
 - c. Differentiate among major divisions of the plant and animal kingdoms (vascular/non-vascular; vertebrate/invertebrate).
 - d. Compare the structures and functions of viruses and bacteria relating their impact on other living organisms.
 - e. Identify evidence of change in species using fossils, DNA sequences, anatomical and physiological similarities, and embryology.

- f. Analyze the results of natural selection in speciation, diversity, adaptation, behavior and extinction.
- 7. Investigate the interdependence and interactions that occur within an ecosystem. (L, P, E)
 - a. Analyze the flow of energy and matter through various cycles including carbon, oxygen, nitrogen and water cycles.
 - b. Interpret interactions among organisms in an ecosystem (producer/consumer/decomposer, predator/prey, symbiotic relationships and competitive relationships).
 - c. Compare variations, tolerances, and adaptations of plants and animals in major biomes.
 - d. Investigate and explain the transfer of energy in an ecosystem including food chains, food webs, and food pyramids.
 - e. Examine long and short-term changes to the environment as a result of natural events and human actions.

MISSISSIPPI Chemistry I
Competencies and Objectives

1. Explain how the properties of matter relate to structure and changes in structure. (P)
 - a. **Demonstrate the proper use** and care **of scientific equipment.**
 - b. Observe and practice safe procedures in classroom and laboratory.
 - c. Define chemistry and matter.
 - d. Apply the language of chemistry appropriately including terms such as element, atom, compound, and molecule.
 - e. Classify a material as element, compound, solution or heterogeneous mixture.
 - f. Relate symbols to names of common chemical elements.
 - g. Write the symbol or formula for monatomic and polyatomic ions.
2. Solve numerical chemistry problems using the International System of Measurement (SI) units, mathematical expressions, and factor labeling. (P)
 - a. Choose the most appropriate SI unit of mass, length or volume of an object.
 - b. Define the common SI prefixes used in chemistry and interconvert, using the factor-label method (dimensional analysis) to obtain the desired unit in solving problems.
 - c. Apply the definition of mass, length, volume, time, density, temperature and pressure.
 - d. **Use scientific notation in chemical calculations.**
 - e. Round values to the proper significant digits.
3. Develop a visual conceptualization of atomic structure based on theory and a knowledge of fundamental particles. (P)
 - a. Identify various theories of the atom, including Rutherford, Bohr, and electron cloud theories by matching the theory to its description.
 - b. Identify the three fundamental particles of an atom when given the charge, mass, and location of the particle.
 - c. Determine the number of protons, electrons, or neutrons in an element when given the atomic number and the atomic mass of the element, or vice versa.
 - d. Write the electron configurations of elements.
 - e. Draw the electron-dot (Lewis) structure of elements.
 - f. Predict the charge of an ion based on the element's valence electrons.
4. Analyze patterns and trends in organization of elements in the periodic table. (P)
 - a. Identify an element as a metal, nonmetal, metalloid, or noble gas.
 - b. Locate elements by name and group number (family) or period (series).
 - c. Compare elements in terms of atomic radius, ionization energy, or electronegativity using their positions on the periodic table.
 - d. Predict the charge of monoatomic ions on the basis of position (group number).
5. Compare the properties of compounds according to their type of bonding. (P, L, E)
 - a. Describe what determines covalent, ionic, and metallic bonds.
 - b. Relate bond type between elements on the basis of electronegativity differences.
 - c. Relate bond type to the position of elements on the Periodic table, electron configuration, and properties of the compound formed.
 - d. Draw Lewis electron dot structures and determine the geometric structure of simple molecules.
 - e. Identify simple molecules as polar or non-polar on the basis of molecular shape and bond polarity.
 - f. Relate bond and molecular polarity to intermolecular forces.
6. Write names and formulas of covalent and ionic compounds. (P)
 - a. Write chemical formulas of ionic compounds using monatomic and polyatomic ions.
 - b. Write chemical formulas of molecular compounds using prefixes.
 - c. Write names of compounds from their formulas.
 - d. Given the formula of a compound, identify oxidation states of the elements.
 - e. Write the names and formulas of common acids and bases.

7. Interpret chemical change in terms of chemical reactions. (P)
 - a. Write an equation in sentence form (word equation) when given a chemical equation.
 - b. Balance a simple chemical equation by inspection when given the formulas or names of all reactants and products.
 - c. Classify simple equations as to type: single displacement, double displacement, synthesis and decomposition.
 - d. Complete chemical equations when given reactants for reactions, such as synthesis, decomposition, single displacement, and double displacement.
 - e. Given a list of solubility rules, predict if a precipitate is formed upon mixing solutions of known chemicals in a double displacement reaction.
 - f. Use the activity series to predict single displacement reactions and write equations of these reactions.
 - g. Predict products of simple synthesis and decomposition reactions.
 - h. Identify redox reactions by recognizing the species that are oxidized and reduced.
8. Explore the relationship between mass and quantity through various stoichiometric relationships. (P)
 - a. Calculate the formula/molecular mass of compounds.
 - b. Define the mole as a quantity of matter.
 - c. Interconvert among mass, mole, and number of particles.
 - d. Determine the empirical formula from the percentage composition and the molecular formula from the empirical formula and molar mass, or vice-versa.
 - e. Solve stoichiometry problems.
 - f. Identify the limiting reagent through stoichiometric calculations.
9. Apply understanding of the interactions of matter and energy. (P)
 - a. Demonstrate understanding by performing calculations relating enthalpy change, temperature change, mass, and specific heat.
 - b. Calculate the energy required to change state using mass and heat of vaporization or heat of fusion.
 - c. Classify chemical reactions as endothermic or exothermic.
10. Analyze the nature and behavior of gaseous, liquid, and solid substances using Kinetic Molecular Theory. (P)
 - a. Describe a gas, liquid or solid in terms of Kinetic Molecular Theory.
 - b. Describe the relationship among volume, temperature, pressure, and moles using ideal gas laws.
 - c. Calculate the partial pressure of a gas in a mixture.
11. Describe and explain the solution process. (P)
 - a. Describe solutions in terms of solute and solvent; electrolyte or non-electrolyte; soluble or insoluble; unsaturated, saturated or supersaturated; miscible or immiscible.
 - b. Express the concentration of a solution as percent by mass, molarity, molality, and mole fraction, given appropriate data.
 - c. Explore the factors that affect solubility.
 - d. Describe how to make a solution of given molarity in terms of mass needed, or vice-versa.
 - e. Describe how to dilute a solution in terms of molarity and volume.
12. Analyze the factors that affect equilibrium with an emphasis on visualizing its dynamic nature at the macroscopic and molecular levels. (P)
 - a. Describe a reversible reaction in terms of a dynamic equilibrium process.
 - b. Using LeChatelier's principle, predict the effect upon a reaction at equilibrium of changing the temperature, concentrations of a reactant or a product, pressure, or adding a catalyst.
13. Visualize and explain acid-base interactions applying concepts of chemical bonding and solutions. (P, L)
 - a. Compare properties of acids and bases, including how they affect indicators and the relative pH of the solution.
 - b. Classify species in aqueous solutions according to Arrhenius and Bronsted definitions, respectively.
 - c. Predict the product of an aqueous neutralization reaction.
 - d. Calculate the pH or pOH from the hydrogen or hydroxide ion concentrations of solutions and vice versa.
 - e. Describe the role of indicators in experimental prediction of pH.

MISSISSIPPI Physics I
Competencies and Objectives

1. Apply fundamental mathematics used in physical concepts. (P)
 - a. Utilize fundamental SI base and derived units.
 - b. Demonstrate proper use of scientific notation and significant figures in calculations and measurements.
 - c. Create, extend and record relationships from tables and graphs.
 - d. Manipulate equations to solve problems.
2. Investigate the kinematics of physical bodies. (P)
 - a. Identify terminology associated with kinematics and the history of the ideas associated with motion.
 - b. Differentiate between vector and scalar quantities.
 - c. Observe, measure, record and graph experimental results involving bodies in motion.
 - d. Interpret displacement, velocity, and acceleration graphs.
 - e. Solve problems involving kinematic relationships.
3. Investigate physical dynamics. (E, P)
 - a. Solve vector problems mathematically and graphically.
 - b. Distinguish between weight and mass.
 - c. Explain physical dynamics in terms of Newton's Three Laws of Motion.
 - d. Solve problems using Newton's Three Laws of Motion.
 - e. Apply the principles of impulse and conservation of momentum to interpret Newton's Third Law of Motion.
 - f. Explain the effects of the Law of Universal Gravitation and calculate the force between two masses.
 - g. Explore the principles and applications for solving problems in two-dimensional motion.
 - h. Apply concepts of centripetal force and torque in solving circular motion problems.
4. Explore the concepts and relationships among work, power, and energy. (P)
 - a. Identify terminology associated with work, power and energy.
 - b. Apply the Law of Conservation of Energy.
 - c. Utilize the Work-Energy Theorem to solve problems.
5. Describe the characteristics and properties of mechanical waves. (P)
 - a. Describe the types, characteristics and behavior of mechanical waves.
 - b. Explain conceptually and/or mathematically the Doppler Effect.
6. Investigate the principles related to electromagnetic radiation. (P)
 - a. Determine the relationship between frequency and wavelength using the constancy of the speed of light.
 - b. Compare the various components of the electromagnetic spectrum.
 - c. Describe the characteristics of lenses and mirrors conceptually, mathematically and/or pictorially.
7. Measure and calculate the properties of static and current electricity. (P)
 - a. Identify terminology and units associated with electricity.
 - b. Describe the characteristics of an electric field.
 - c. Describe, measure and/or calculate the properties of stationary and moving electric charges (using Coulomb's Law and Ohm's Law).
 - d. Determine current, voltage, and resistance involved in series and parallel circuits.

Section C: **ACT's College Readiness Standards Included in Mississippi's Grades 7–12 Curriculum Framework**

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 the ACT Standards were derived, ACT's Standards contain specific descriptions of proficiency and content, including descriptions of the complexity of the test material. The ACT 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 Standards that are highlighted are those that are included in Mississippi's Competencies and Objectives. ACT Standards not highlighted are those statements that include specific content, complexity, and/or proficiency level descriptions that were not described in Mississippi's Competencies and Objectives.

Because Mississippi educators are the experts on the Mississippi Curriculum Framework, 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., <i>then, this time</i>)	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., <i>first, afterward, in response</i>) 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., <i>therefore, however, in addition</i>) 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	<p>Use conjunctions or punctuation to join simple clauses</p> <p>Revise shifts in verb tense between simple clauses in a sentence or between simple adjoining sentences</p>	<p>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</p>	<p>Delete commas that create basic sense problems (e.g., between verb and direct object)</p>
16–19	<p>Determine the need for punctuation and conjunctions to avoid awkward-sounding sentence fragments and fused sentences</p> <p>Decide the appropriate verb tense and voice by considering the meaning of the entire sentence</p>	<p>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</p> <p>Recognize and use the appropriate word in frequently confused pairs such as <i>there</i> and <i>their</i>, <i>past</i> and <i>passed</i>, and <i>led</i> and <i>lead</i></p>	<p>Provide appropriate punctuation in straightforward situations (e.g., items in a series)</p> <p>Delete commas that disturb the sentence flow (e.g., between modifier and modified element)</p>
20–23	<p>Recognize and correct marked disturbances of sentence flow and structure (e.g., participial phrase fragments, missing or incorrect relative pronouns, dangling or misplaced modifiers)</p>	<p>Use idiomatically appropriate prepositions, especially in combination with verbs (e.g., <i>long for</i>, <i>appeal to</i>)</p> <p>Ensure that a verb agrees with its subject when there is some text between the two</p>	<p>Use commas to set off simple parenthetical phrases</p> <p>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)</p>
24–27	<p>Revise to avoid faulty placement of phrases and faulty coordination and subordination of clauses in sentences with subtle structural problems</p> <p>Maintain consistent verb tense and pronoun person on the basis of the preceding clause or sentence</p>	<p>Ensure that a pronoun agrees with its antecedent when the two occur in separate clauses or sentences</p> <p>Identify the correct past and past participle forms of irregular and infrequently used verbs and form present-perfect verbs by using <i>have</i> rather than <i>of</i></p>	<p>Use punctuation to set off complex parenthetical phrases</p> <p>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 <i>and</i>)</p> <p>Use apostrophes to indicate simple possessive nouns</p> <p>Recognize inappropriate uses of colons and semicolons</p>
28–32	<p>Use sentence-combining techniques, effectively avoiding problematic comma splices, run-on sentences, and sentence fragments, especially in sentences containing compound subjects or verbs</p> <p>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</p>	<p>Correctly use reflexive pronouns, the possessive pronouns <i>its</i> and <i>your</i>, and the relative pronouns <i>who</i> and <i>whom</i></p> <p>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)</p>	<p>Use commas to set off a nonessential/nonrestrictive appositive or clause</p> <p>Deal with multiple punctuation problems (e.g., compound sentences containing unnecessary commas and phrases that may or may not be parenthetical)</p> <p>Use an apostrophe to show possession, especially with irregular plural nouns</p> <p>Use a semicolon to indicate a relationship between closely related independent clauses</p>
33–36	<p>Work comfortably with long sentences and complex clausal relationships within sentences, avoiding weak conjunctions between independent clauses and maintaining parallel structure between clauses</p>	<p>Provide idiomatically and contextually appropriate prepositions following verbs in situations involving sophisticated language or ideas</p> <p>Ensure that a verb agrees with its subject when a phrase or clause between the two suggests a different number for the verb</p>	<p>Use a colon to introduce an example or an elaboration</p>

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	<p>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</p> <p>Show limited recognition of the complexity of the issue in the prompt</p>	<p>Maintain a focus on the general topic in the prompt through most of the essay</p>	<p>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</p> <p>Show little or no movement between general and specific ideas and examples</p>
5–6	<p>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</p> <p>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</p>	<p>Maintain a focus on the general topic in the prompt throughout the essay</p>	<p>Offer limited development of ideas using a few general examples; resort sometimes to merely repeating ideas</p> <p>Show little movement between general and specific ideas and examples</p>
7–8	<p>Show understanding of the persuasive purpose of the task by taking a position on the issue in the prompt</p> <p>Show some recognition of the complexity of the issue in the prompt by</p> <ul style="list-style-type: none"> acknowledging counterarguments to the writer’s position providing some response to counterarguments to the writer’s position 	<p>Maintain a focus on the general topic in the prompt throughout the essay and attempt a focus on the specific issue in the prompt</p> <p>Present a thesis that establishes focus on the topic</p>	<p>Develop ideas by using some specific reasons, details, and examples</p> <p>Show some movement between general and specific ideas and examples</p>
9–10	<p>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</p> <p>Show recognition of the complexity of the issue in the prompt by</p> <ul style="list-style-type: none"> partially evaluating implications and/or complications of the issue, and/or posing and partially responding to counter-arguments to the writer’s position 	<p>Maintain a focus on discussion of the specific topic and issue in the prompt throughout the essay</p> <p>Present a thesis that establishes a focus on the writer’s position on the issue</p>	<p>Develop most ideas fully, using some specific and relevant reasons, details, and examples</p> <p>Show clear movement between general and specific ideas and examples</p>
11–12	<p>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</p> <p>Show understanding of the complexity of the issue in the prompt by</p> <ul style="list-style-type: none"> 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 	<p>Maintain a clear focus on discussion of the specific topic and issue in the prompt throughout the essay</p> <p>Present a critical thesis that clearly establishes the focus on the writer’s position on the issue</p>	<p>Develop several ideas fully, using specific and relevant reasons, details, and examples</p> <p>Show effective movement between general and specific ideas and examples</p>

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

	Organizing Ideas	Using Language
3–4	<p>Provide a discernible organization with some logical grouping of ideas in parts of the essay</p> <p>Use a few simple and obvious transitions</p> <p>Present a discernible, though minimally developed, introduction and conclusion</p>	<p>Show limited control of language by</p> <ul style="list-style-type: none"> 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	<p>Provide a simple organization with logical grouping of ideas in parts of the essay</p> <p>Use some simple and obvious transitional words, though they may at times be inappropriate or misleading</p> <p>Present a discernible, though underdeveloped, introduction and conclusion</p>	<p>Show a basic control of language by</p> <ul style="list-style-type: none"> 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	<p>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</p> <p>Use some simple and obvious, but appropriate, transitional words and phrases</p> <p>Present a discernible introduction and conclusion with a little development</p>	<p>Show adequate use of language to communicate by</p> <ul style="list-style-type: none"> 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	<p>Provide unity and coherence throughout the essay, sometimes with a logical progression of ideas</p> <p>Use relevant, though at times simple and obvious, transitional words and phrases to convey logical relationships between ideas</p> <p>Present a somewhat developed introduction and conclusion</p>	<p>Show competent use of language to communicate ideas by</p> <ul style="list-style-type: none"> 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	<p>Provide unity and coherence throughout the essay, often with a logical progression of ideas</p> <p>Use relevant transitional words, phrases, and sentences to convey logical relationships between ideas</p> <p>Present a well-developed introduction and conclusion</p>	<p>Show effective use of language to clearly communicate ideas by</p> <ul style="list-style-type: none"> 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	<p>Perform one-operation computation with whole numbers and decimals</p> <p>Solve problems in one or two steps using whole numbers</p> <p>Perform common conversions (e.g., inches to feet or hours to minutes)</p>	<p>Calculate the average of a list of positive whole numbers</p> <p>Perform a single computation using information from a table or chart</p>	<p>Recognize equivalent fractions and fractions in lowest terms</p>	<p>Exhibit knowledge of basic expressions (e.g., identify an expression for a total as $b + g$)</p> <p>Solve equations in the form $x + a = b$, where a and b are whole numbers or decimals</p>
16–19	<p>Solve routine one-step arithmetic problems (using whole numbers, fractions, and decimals) such as single-step percent</p> <p>Solve some routine two-step arithmetic problems</p>	<p>Calculate the average of a list of numbers</p> <p>Calculate the average, given the number of data values and the sum of the data values</p> <p>Read tables and graphs</p> <p>Perform computations on data from tables and graphs</p> <p>Use the relationship between the probability of an event and the probability of its complement</p>	<p>Recognize one-digit factors of a number</p> <p>Identify a digit's place value</p>	<p>Substitute whole numbers for unknown quantities to evaluate expressions</p> <p>Solve one-step equations having integer or decimal answers</p> <p>Combine like terms (e.g., $2x + 5x$)</p>
20–23	<p>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</p>	<p>Calculate the missing data value, given the average and all data values but one</p> <p>Translate from one representation of data to another (e.g., a bar graph to a circle graph)</p> <p>Determine the probability of a simple event</p> <p>Exhibit knowledge of simple counting techniques</p>	<p>Exhibit knowledge of elementary number concepts including rounding, the ordering of decimals, pattern identification, absolute value, primes, and greatest common factor</p>	<p>Evaluate algebraic expressions by substituting integers for unknown quantities</p> <p>Add and subtract simple algebraic expressions</p> <p>Solve routine first-degree equations</p> <p>Perform straightforward word-to-symbol translations</p> <p>Multiply two binomials</p>
24–27	<p>Solve multistep arithmetic problems that involve planning or converting units of measure (e.g., feet per second to miles per hour)</p>	<p>Calculate the average, given the frequency counts of all the data values</p> <p>Manipulate data from tables and graphs</p> <p>Compute straightforward probabilities for common situations</p> <p>Use Venn diagrams in counting</p>	<p>Find and use the least common multiple</p> <p>Order fractions</p> <p>Work with numerical factors</p> <p>Work with scientific notation</p> <p>Work with squares and square roots of numbers</p> <p>Work problems involving positive integer exponents</p> <p>Work with cubes and cube roots of numbers</p> <p>Determine when an expression is undefined</p> <p>Exhibit some knowledge of the complex numbers</p>	<p>Solve real-world problems using first-degree equations</p> <p>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)</p> <p>Identify solutions to simple quadratic equations</p> <p>Add, subtract, and multiply polynomials</p> <p>Factor simple quadratics (e.g., the difference of squares and perfect square trinomials)</p> <p>Solve first-degree inequalities that do not require reversing the inequality sign</p>
28–32	<p>Solve word problems containing several rates, proportions, or percentages</p>	<p>Calculate or use a weighted average</p> <p>Interpret and use information from figures, tables, and graphs</p> <p>Apply counting techniques</p> <p>Compute a probability when the event and/or sample space are not given or obvious</p>	<p>Apply number properties involving prime factorization</p> <p>Apply number properties involving even/odd numbers and factors/multiples</p> <p>Apply number properties involving positive/negative numbers</p> <p>Apply rules of exponents</p> <p>Multiply two complex numbers</p>	<p>Manipulate expressions and equations</p> <p>Write expressions, equations, and inequalities for common algebra settings</p> <p>Solve linear inequalities that require reversing the inequality sign</p> <p>Solve absolute value equations</p> <p>Solve quadratic equations</p> <p>Find solutions to systems of linear equations</p>
33–36	<p>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)</p>	<p>Distinguish between mean, median, and mode for a list of numbers</p> <p>Analyze and draw conclusions based on information from figures, tables, and graphs</p> <p>Exhibit knowledge of conditional and joint probability</p>	<p>Draw conclusions based on number concepts, algebraic properties, and/or relationships between expressions and numbers</p> <p>Exhibit knowledge of logarithms and geometric sequences</p> <p>Apply properties of complex numbers</p>	<p>Write expressions that require planning and/or manipulating to accurately model a situation</p> <p>Write equations and inequalities that require planning, manipulating, and/or solving</p> <p>Solve simple absolute value inequalities</p>

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
<ul style="list-style-type: none"> • 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 	<ul style="list-style-type: none"> • 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 	<ul style="list-style-type: none"> • 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