Alignment Guide: North Carolina

PREACT | THE ACT

ACT Assessments Aligned to North Carolina Standards

ACT®

About ACT

ACT is transforming college and career readiness pathways so that everyone can discover and fulfill their potential. Grounded in more than 65 years of research, ACT's learning resources, assessments, research, and work-ready credentials are trusted by students, job seekers, educators, schools, government agencies, and employers in the US and around the world to help people achieve their education and career goals at every stage of life. Visit us at www.act.org.

COMMITMENT TO FAIR TESTING

ACT endorses and is committed to complying with the *Standards for Educational and Psychological Testing* (AERA, APA, & NCME, 2014). ACT also endorses the *Code of Fair Testing Practices in Education* (Joint Committee on Testing Practices, 2004), which is a statement of the obligations to test takers of those who develop, administer, or use educational tests and test data in the following four areas: developing and selecting appropriate tests, administering and scoring tests, reporting and interpreting test results, and informing test takers. ACT endorses and is committed to complying with the *Code of Professional Responsibilities in Educational Measurement* (NCME Ad Hoc Committee on the Development of a Code of Ethics, 1995), which is a statement of professional responsibilities for those involved with various aspects of assessments, including development, marketing, interpretation, and use.

Contents

College and Career Readiness

Grounded in over 60 years of research, ACT is a trusted leader in college and career readiness solutions. Each year, ACT serves millions of students, job seekers, schools, government agencies, and employers in the United States and around the world with learning resources, assessments, research, and credentials designed to help everyone succeed from elementary school through career.

The path to college and career success starts early. That is why ACT offers a continuum of sequential progress-monitoring learning tools and assessments that prepare students for a lifetime of success, in the classroom and beyond.

PreACT® 8/9: Prepares students for the important transition to high school by helping identify whether they are on track for college and career success. PreACT 8/9 includes multiple-choice items in the areas of English, reading, mathematics, and science and can serve as a strong diagnostic tool, helping to identify student strengths and weaknesses at a critical juncture.

PreACT® 9 Secure: Measures student readiness by focusing on the standards and content most relevant at grade 9. Data can be used to identify strengths and weaknesses and provide instructionally actionable information to students, families, and educators. PreACT 9 Secure includes multiple-choice items in English, mathematics, reading, and science subject tests.

PreACT®: Provides students a practice experience for the ACT that empowers them, their parents, and educators with valuable insights early in the college preparation process. PreACT includes multiple-choice items in the areas of English, reading, mathematics, and science. Test items are made available as a learning resource after testing.

PreACT® Secure: Offers the opportunity for states and districts to provide a higher-stakes version of the PreACT. Offered online, PreACT Secure contains multiple-choice test items in the areas of English,

reading, mathematics, and science that are secured and not released after testing.

The ACT® test: Measures what students need to know to be ready for entry-level college-credit courses, providing critical feedback with extensive score reporting. The test is available via national weekend test administrations (online and paper-and-pencil format) or through weekday school-based test administrations (online and paper-and-pencil formats). The ACT includes multiple-choice items in the areas of English, reading, mathematics, and the optional science test. The optional writing test assesses a student's ability to compose an effective argumentative essay.

ACT® Online Prep (AOP), Powered by MasteryPrep: An engaging, interactive online test prep program that can be delivered in the classroom setting. All content is aligned to ACT College and Career Readiness Standards and multiple state standards, ensuring relevance and rigor. Instructors can identify skill gaps and personalize instruction with diagnostics and two full-length practice tests. Detailed reports offer skill metrics, performance insights, and data-driven recommendations. Interactive microvideos and contextual learning paths simulate a conversation—not a lecture—keeping students engaged while mastering critical ACT skills. Five-minute warmup exercises reinforce essential skills and build student confidence through scaffolded learning and easy-to-follow explanations.

ACT® WorkKeys® Assessments: Helps individuals demonstrate their job readiness while enabling communities, educators, and employers to build a skilled workforce in a rapidly changing environment. Individuals who successfully complete the WorkKeys assessments in Applied Math, Graphic Literacy, and Workplace Documents are eligible to earn the ACT® WorkKeys® National Career Readiness Certificate® (NCRC™), a valuable credential for students and job candidates seeking to verify foundational workplace skills. The other WorkKeys assessments include Applied Technology, Business Writing, Workplace Observation, Fit, and Talent. WorkKeys is available in online and paper-and-pencil formats.

ACT® WorkKeys® Curriculum: Offers individuals convenient, personalized courses to build the essential career-relevant skills needed

for learning, personal development, and effective job performance. WorkKeys-aligned courses prepare individuals to take the WorkKeys assessments (including the NCRC-aligned assessments) and take their workforce development even further.

Executive Summary

At the core of the ACT integrated system of college and career readiness tools are its PreACT assessments and the ACT test. The system of ACT assessments is designed, using a deep evidence base, to measure student academic achievement, growth, and progress toward college readiness in English language arts (ELA)/literacy, mathematics, and science.

The alignment analysis presented in this report establishes how PreACT and the ACT, designed to measure student achievement in high school, are linked to North Carolina's academic standards in English/language arts (ELA), mathematics, and science. Before summarizing the alignment results (Section VI: Alignment Summary), the guide offers a detailed view into the many points of linkage, indicating how PreACT and the ACT are fundamentally aligned with North Carolina's rigorous academic standards (Section IV: Alignment Crosswalks).

To help interpret the alignment, key design and content features of PreACT and the ACT are discussed in Section III: Content and Reporting Category Descriptions of the report. Tables show the ELA, mathematics, and science reporting categories and the granular knowledge and skill targets in these categories that make up PreACT and the ACT content frameworks.

Overall, the alignment analysis indicates that PreACT and the ACT are well aligned to North Carolina's academic standards in these grades. Of North Carolina's standards analyzed for alignment, across domains and strands, 96% were found to link directly or partially with one or more items on PreACT and the ACT.

Summary of Alignment

The following offers a high-level summary of the alignment analysis results. For the full list of standards that were not found to be assessed in whole or in part by the ACT suite of tests, refer to Section VI:

Alignment Summary, and to the comprehensive, standard-level data in the tables in Section IV: Alignment Crosswalk.

We define alignment matches (i.e., the number of aligned standards in that category) as follows:

- **Very strong:** Equal to or greater than 90%
- **Strong:** 75%–89%
- **Moderate:** 50%–74%
- **Weak:** Less than 50%

Our team found the following results:

PreACT Alignment with North Carolina Standards

North Carolina Content Area	PreACT	Alignment Level
ELA	English, Reading	Strong (86%)
Mathematics	Math	Very Strong (98%)
Science*	Science	Very Strong (100%)

*Science Alignment was determined using a modified methodology. See Section VI: Alignment Summary for more information.

The ACT Alignment with North Carolina Standards

North Carolina Content Area	The ACT	Alignment Level
ELA	English, Reading	Strong (86%)
Mathematics	Math	Very Strong (98%)
Science	Science	Very Strong (100%)

I. Introduction

Assessments are only useful if those who could benefit from the information can access, interpret, and use the information to improve teaching and learning. Improving assessment literacy for all who interpret and make use of educational testing data is no small task.

Assessment literacy is an important part of equitable education systems. The National Academy of Education, in its vision for next-generation accountability assessments, calls for expanding assessment literacy in scope and application:

First, we need to ensure that the right people quickly gain access to and use testing data. Second, we need to ensure that teachers, administrators, parents and caregivers, and students are educated in how to interpret and use assessments to further teaching and learning and create equitable educational opportunities. For teachers, this may result in professional development and in-service opportunities. Like all aspects of education, parents and caregivers need to be seen as integral partners in using assessments to further learning. Finally, it is critical that policy makers and media outlets are provided with a framework and context to understand, interpret, and report results.

This Guide

This guide is intended to support assessment literacy by offering information about the content of ACT assessments and their alignment to North Carolina academic standards. It also includes ideas for how to use the information in teaching and planning activities.

This document presents the result of an analysis conducted with the goal of identifying all points of content linkage between North Carolina's academic standards and PreACT and the ACT.

The analysis of alignment between the ACT and North Carolina's standards and PreACT and the ACT was conducted with the following sections of the North Carolina Academic Standards:

- North Carolina Standard Course of Study, English Language Arts, Grades 9–10 and Grades 11–12 (adopted 2017)
- North Carolina Standard Course of Study, Math 1–3 (adopted 2017)
- North Carolina Standard Course of Study K–12 (adopted 2023) (Biology, Chemistry, Earth and Environmental Science, Physical Science, and Physics)

Throughout, this document uses the term *alignment* to describe the linkage between ACT assessments and state standards. This is an informational alignment and is intended to support educators and other stakeholders.

The methodology used to create this document differs from an independent alignment study. In that type of study, test forms are reviewed in order to judge the strength of alignment according to a number of different criteria.

What is in this guide?

This document has the following elements:

- **Overview of ACT assessments:** Basic information about the knowledge and skills assessed by PreACT and the ACT, the test reporting categories, and the process of alignment to your state standards
- **ACT assessment content and reporting category descriptions:** Descriptions of the content and structure of each subject test (English, reading, mathematics, and science), plus test blueprints. Tables that list and describe the reporting categories, subcategories, and skills for PreACT and the ACT are included after the content descriptions.
- **Standards-to-assessment alignment:** Information in the form of a table, referred to as a crosswalk, showing which domains of PreACT and the ACT (reporting categories and subcategories) are correlated to each standard
- **Educator tips:** Ideas for how the alignment information can be applied to inform curriculum development and effective communication about ACT products and scores

- **Alignment summary:** An executive summary as well as more detailed summary of the alignment results

Who is this guide for?

This guide was developed for a variety of users:

- **District and school leaders:** These users can apply the information, including alignment tables, to help make decisions about curriculum and to inform design and development of professional learning.
- **Classroom teachers:** These users can reference the resources provided to inform design and delivery of daily lessons as well as design of classroom-based assessments.
- **Educators and state stakeholders:** These users will be able to apply the information to support effective communication with students, their families, and the community. The information will help educators describe how a student's performance on an ACT assessment is tied to curriculum based on the state's standards.

ACT Assessment Design

Underlying the ACT assessments is the belief that students' preparation for college and the workplace is best assessed by measuring, as directly as possible, the skills learned in high school that are required for success in college-level courses. The required academic skills can be assessed most directly by reproducing, as faithfully as possible, the complexity of the work students do in the classroom. Therefore, ACT assessments are designed to determine how skillfully students solve problems, grasp implied meanings, draw inferences, evaluate ideas, and make judgments in subject areas important to success in college.

The ACT focuses on the general content areas of college and high school curricula and on the expectations for these curricula represented in state standards. The PreACT assessments are vertically aligned to the ACT test domain, with questions tailored to students in grades 8/9 and 9–10. This alignment is reflected through their shared content framework, which allows for the same reporting structure to be

used across assessments. The tests also report scores on a shared score scale, as discussed in Section II: Overview of ACT Assessments.

Although PreACT and the ACT were not designed to measure any single state's set of educational standards, the assessments have has several features that account for its strong alignment with rigorous academic standards across different states; eight states currently use the ACT + Writing for federal accountability under the Every Student Succeeds Act (ESSA).

The PreACT and the ACT test assessments require students to apply critical thinking skills when comprehending complex texts, analyze data displays showing the results of scientific experiments, produce effective argumentative writing, and solve sophisticated mathematics problems.

Specifically, a number of features of PreACT and the ACT indicate a strong content alignment with North Carolina's standards, as outlined here.

English Language Arts

- The ACT and PreACT assessments measure mutually supportive reading, English language, and writing skills with rich passage-based tasks that report several scores directly linked with North Carolina's clusters of reading, writing, and language standards.
- The assessments utilize authentic literary and informational texts on a mixture of engaging and diverse topics from the humanities, social sciences, and natural sciences. Students demonstrate critical reading and social studies process skills in North Carolina's ELA standards by integrating information presented in different test types and formats.
- Writing and language skills are measured on PreACT and the ACT with essay-based analysis and revision tasks.

Mathematics

- Items focus on what students can do with the mathematics they have learned, and they encompass not only mathematical content

but also mathematical practices. Students receive a score for the Modeling Mathematics Practice reporting category.
- The test includes fair and authentic items set in real-world contexts where students can demonstrate mathematical practices to achieve viable and reasonable solutions to problems.
- A mix of items allows students to demonstrate mathematical fluency, conceptual understanding, mathematical modeling, and the ability to solve problems across a variety of mathematics topics, cognitive levels, and difficulty levels.
- Items emphasize quantitative reasoning and application over extensive computation or memorization of complex formulas.
- Items are included that are best solved with and without a calculator, allowing students to choose their preferred solution path and to use tools with which they are comfortable.

Science

- ACT science tests are purposefully designed to measure student performance at the intersection between transferable science and engineering practices and crosscutting concepts with rich science content. Students engage in three-dimensional sensemaking of the scientific scenarios involved.
- All questions on PreACT and the ACT science tests are based on authentic scientific scenarios built around important scientific concepts and are designed to mirror the experiences of students and working scientists engaging in real-world science.
- The science knowledge, skills, and practices that are assessed on PreACT and the ACT science tests elicit evidence of students' knowledge and skills in both science and engineering practices and crosscutting concepts in science that are common to all high school science courses and the science disciplinary core ideas (content knowledge) that are course-specific.

Alignment Methodology

The alignment analyses documented in this guide were performed by groups of senior ACT subject matter experts in English language arts/literacy, mathematics, and science who have years of experience

aligning assessments to state-level college and career readiness standards. These experts also design and develop annual forms of ACT assessments, and they have deep knowledge of the task models, test items, passages, and all aspects involved in constructing forms according to the test blueprint.

To conduct the alignment analyses for each subject area and assessment, groups of the subject matter experts worked individually and then reconciled results using the following procedure:

1. North Carolina standards for the grade or grade range appropriate for the particular ACT assessment were reviewed, and global decisions were made about standards that would be included in the alignment (e.g., Speaking and Listening standards were omitted from ELA because of the test design).
2. Each North Carolina standard statement was analyzed to determine if the expectation was assessed by one or more corresponding PreACT or ACT assessment items on a recent PreACT or ACT test form.
3. For standards judged to have a meaningful link, the reviewers determined which corresponding PreACT or ACT reporting/content category includes the aligned item type. In many cases, multiple items from different ACT reporting/content categories were aligned. Using deep knowledge of the PreACT and the ACT test content, the reviewers indicated which corresponding PreACT or ACT content skill areas include the aligned items (skill areas are used in the ACT content framework to organize families of test items within a test reporting category).
4. If necessary, subject matter experts from each subject area performed a reconciliation process to discuss and resolve discrepancies.
5. The final consensus was recorded in the alignment tables.

Interpreting Results

In addition to a summary of the alignment results in Section VI: Alignment Summary, the full set of alignment tables is provided in Section IV: Alignment Crosswalks. These tables provide the view of alignment from the state standards as a crosswalk to PreACT and the

ACT content reporting categories and detailed skill areas. Tables are provided for ELA, mathematics, and science.

To interpret the alignment tables contained in this document, it's useful to review the ACT reporting category tables provided in Section III: Content and Reporting Category Descriptions.

ACT Reporting Categories and State Standards

Among the various scores reported for students who take ACT assessments are scores that detail student performance in the various content reporting categories of each subject test. Because these categories are important parts of the assessment content framework, it's helpful for stakeholders to know how they align with state standards.

When an alignment linkage is indicated in the table, this means that one or more ACT assessment items were identified in the designated test reporting category and skill area as requiring the knowledge or skill in the indicated standard. A student taking the test has a reasonable likelihood of encountering these items given the domain sampling design of the ACT blueprint. Students receive test scores in each score reporting category, and these scores reflect student learning of the knowledge and skills in the aligned state standards.

For example, in the following North Carolina High School Mathematics standard, NC.M1. A-REI.3, ACT mathematics items in two skill areas were found that link to the standard. One of the skill areas is in the Algebra test reporting category, and the other skill areas is in the Integrating Essential Skills test reporting category. Scores in these two reporting categories partly reflect student proficiency with the aligned standard.

EXAMPLE 1: North Carolina Mathematics Standards, Math 1

Standard Category and Number	Standard	The ACT Mathematics Reporting Categories and Skill Areas
NC.M1. A-REI.3	Solve linear equations and inequalities in one variable.	Algebra: Linear Expressions, Equations, and Inequalities Integrating Essential Skills: Writing and Solving Simple Equations and Inequalities

In the following North Carolina High School Science standard, PS.Chm.1.1, the standard clearly involves constructing and using a model for explanation that requires data as supporting evidence in a scientific argument. It therefore aligns with Interpretation of Data (IOD) and Evaluating Scientific Arguments and Models with Evidence (EMI). It does not clearly indicate that a scientific experiment is needed, so there is no direct alignment to Scientific Investigation (SIN). An ACT science test might include an experiment related to this learning objective, and it would be appropriate given the larger goals of three-dimensional scientific sense making in the standards; however, it would not directly align to the objective as written.

EXAMPLE 2: North Carolina Science Standards, High School

Standard Category and Number	Standard	The ACT Science Reporting Categories and Skill Areas
PS.Chm.1.1	Use models to explain how the scientific understanding of atomic structure has evolved.	Interpretation of Data: Locating and Understanding Inferring and Translating Evaluating Scientific Arguments and Models with Evidence: Inferences and Results—Evaluating and Extending Models—Understanding and Comparing Models—Evaluating and Extending

Alignment Decisions

Alignment decisions inherently involve subjective judgments, and differences in opinion are common even among educational experts. ACT has attempted to provide the information in this report through a process that is rigorous and transparent, in accordance with the professional standards to which the organization is committed. We believe that this information is an accurate indication of the links between the ACT system of assessments and North Carolina academic standards.

.

II. Overview of ACT Assessments

Examining the ACT assessments for alignment with state standards requires an understanding of what is on the PreACT and the ACT tests. The following provides a holistic overview of the assessments and then describes the content domains in detail, including test reporting categories and the granular knowledge and skills that are assessed in each domain.

Overview of PreACT

Purpose

The primary purpose of PreACT is to measure a student's level of achievement in core academic areas taught in high school and is intended to be taken in grade 10. Users apply test data, test scores, and interpretations for many different purposes:

- **College and career planning:** Students and educators use results to monitor progress towards college and career readiness.
- **Preparation and prediction:** Performance on PreACT is used to predict performance on the ACT and ACT WorkKeys assessments
- **Educational measurement:** Test results help to identify academic strengths as well as gaps and areas for improvement.

Subjects

PreACT contains subject tests in the following content areas:

- English
- Reading
- Mathematics
- Science (optional)

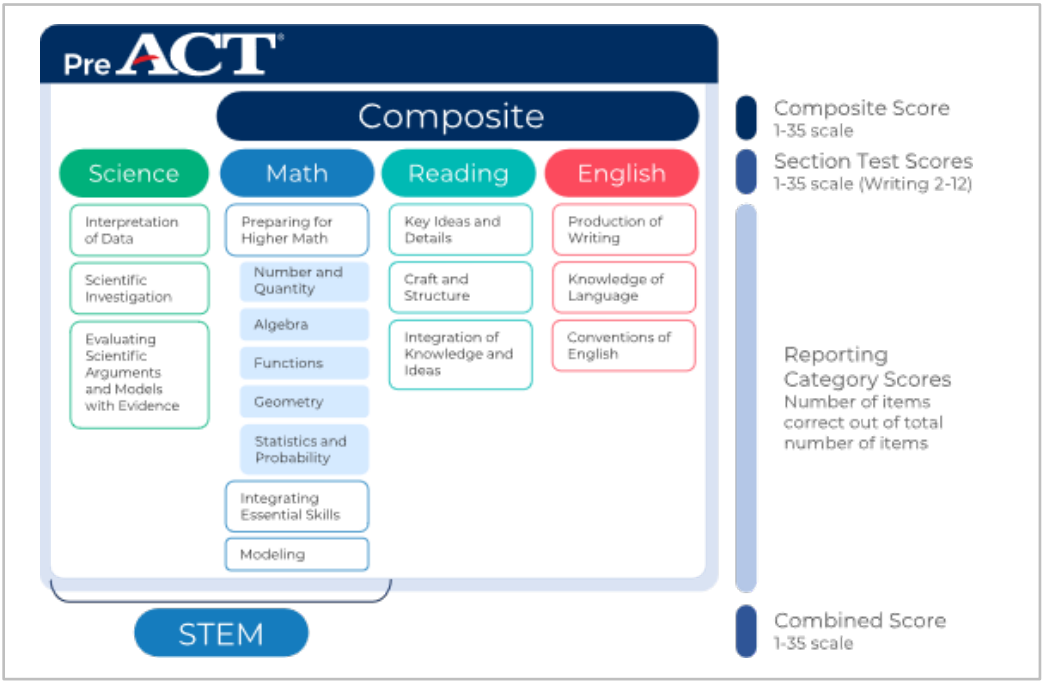
The English, reading, and mathematics tests consist of multiple-choice items and are administered together as a battery. The science test consists of multiple-choice items and is optional.

Scores

PreACT provides a variety of scores, as described below and shown in the diagram that follows:

- **Composite and subject scores:** Students receive a Composite score; overall subject scores for English, mathematics, and reading; and scores in multiple reporting categories for each of the subject tests. Each subject test score is reported on a scale that ranges from 1 to 35.
    - The PreACT score scale is linked to the ACT and PreACT 8/9 scores using common-item, pre-equating Item Response Theory (IRT) procedures. Therefore, corresponding test scores can be compared directly between PreACT and the ACT (e.g., PreACT English to ACT English).
- **Science, technology, engineering, and math (STEM) score:** This combines math and science scores.
- **PreACT reporting category scores:** These provide granular information about student performance in a number of designated categories on each subject test.

Scores Reported on PreACT



Overview of the ACT

Purpose

The primary purpose of the ACT is to measure a student's level of achievement in core academic areas taught in high school. Users apply the ACT test data, test scores, and interpretations for many different purposes:

- **College and career planning:** Students use their results to plan for further education and explore careers based on their own skills, interests, and aspirations.
- **Educational strategy:** High schools use ACT data in academic advising and counseling, evaluation studies, accreditation documentation, and public relations.
- **Educational measurement:** States use the ACT as part of their statewide assessments to measure students' educational achievement and to monitor educational improvement and achievement gaps over time.
- **Admission and placement:** Postsecondary institutions use ACT results for admission and course placement decisions.
- **Qualifications:** Many private, state, and national agencies that provide scholarships, loans, and other types of financial assistance to students tie such assistance to students' academic qualifications, which are partly measured by ACT test scores.

Subjects

The ACT contains subject tests in the following content areas:

- English
- Reading
- Mathematics
- Science (optional)
- Writing (optional)

The English, reading, and mathematics tests consist of multiple-choice items and are administered together as a battery. The science test consists of multiple-choice items and is optional for national testing but

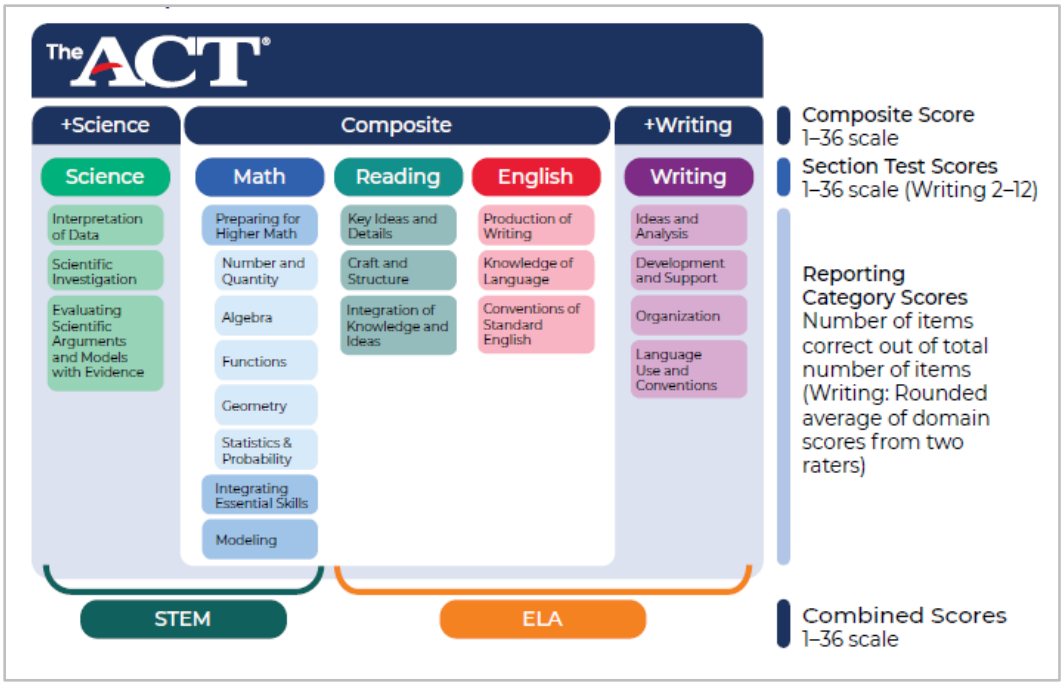
is a required part of school day testing. Students who opt to take the writing test complete a timed essay-writing task.

Scores

The ACT provides a variety of scores, as described below and shown in the diagram that follows:

- **Composite and subject scores:** Students receive a Composite score; overall subject scores for English, mathematics, reading, science, and writing (optional); and scores in multiple reporting categories for each of the subject tests. Apart from the writing test, each subject test score is reported on a scale that ranges from 1 to 36. The writing score is reported on a 2–12 scale.
    - The ACT score scale is linked to the PreACT and PreACT 8/9 scores using common-item, pre-equating Item Response Theory (IRT) procedures. Therefore, corresponding test scores can be compared directly between the PreACT and the ACT (e.g., PreACT English to ACT English).
- **Science, technology, engineering, and math (STEM) score:** This combines mathematics and science scores, if the science test was taken.
- **ELA score:** This combines English, reading, and writing scores (only reported for students who take the writing test).
- **ACT reporting category scores:** These provide granular information about student performance in a number of designated categories on each subject test.

Scores Reported on the ACT



III. Content and Reporting Category Descriptions

ENGLISH LANGUAGE ARTS (ELA)

PreACT English Content Description

- **Item tally and time:** The PreACT English test has 48 items (36 scored items and 12 non-scored field-test items) and a 35-minute time limit.
- **Concept:** The test puts the student in the position of a writer who makes decisions to revise and edit a text.
- **Knowledge and skills tested:** The test measures knowledge areas and related skills reflected in the reporting categories for this test:
    - *Production of Writing:* Students apply their understanding of the rhetorical purpose and focus of a piece of writing to develop a topic effectively. They use various strategies to achieve logical organization, topical unity, and cohesion.
    - *Knowledge of Language:* Students demonstrate effective language use by ensuring precision and concision in word choice and maintaining consistency in style and tone.
    - *Conventions of Standard English:* Students apply their understanding of the conventions of standard English grammar, usage, and mechanics to revise and edit text.
- **Format and item types:** The test consists of multiple passages, each accompanied by a sequence of multiple-choice items.
    - Different passage types—informational, narrative, and argumentative—are used to provide a variety of rhetorical situations.
    - Students must use the rich context of the passage to make editorial choices, demonstrating their understanding of writing strategies and conventions.

  - Texts are chosen not only for their appropriateness in assessing writing and language skills but also to reflect students' interests and experiences.

- **Not tested:** Spelling and the rote recall of grammar rules are not tested.

PreACT English Test Blueprint

Four scores are reported for the PreACT English test: a total test score based on all 36 scored items, and the three reporting category scores. The reporting categories constitute a specific number of items and percentage of the test, as shown in the table below.

Reporting Category	Number of Items	Percentage of Test
Production of Writing	12–14	33–39%
Knowledge of Language	5–7	14–19%
Conventions of Standard English	15–17	42–47%

The ACT English Content Description

- **Item tally and time:** The ACT English test has 50 items (40 scored items and 10 non-scored field-test items) and a 35-minute time limit.
- **Concept:** The test puts the student in the position of a writer who makes decisions to revise and edit a text.
- **Knowledge and skills tested:** The test measures knowledge areas and related skills reflected in the reporting categories for this test (further described in a table below):

  - *Production of Writing:* Students apply their understanding of the rhetorical purpose and focus of a piece of writing to develop a topic effectively. They use various strategies to achieve logical organization, topical unity, and cohesion.
  - *Knowledge of Language:* Students demonstrate effective language use by ensuring precision and concision in word choice and maintaining consistency in style and tone.

  - *Conventions of Standard English:* Students apply their understanding of the conventions of standard English grammar, usage, and mechanics to revise and edit text.

- **Format and item types:** The test consists of multiple passages, or essays, each accompanied by a sequence of multiple-choice test items.

  - Different passage types—informational, narrative, and argumentative—are used to provide a variety of rhetorical situations.
  - Students must use the rich context of the passage to make editorial choices, demonstrating their understanding of writing strategies and conventions.
  - Passages are chosen not only for their appropriateness in assessing writing and language skills but also to reflect students' interests and experiences.

- **Knowledge and skills not tested:** Spelling and the rote recall of grammar rules are not tested.

The ACT English Test Blueprint

Four scores are reported for the ACT English test: a total test score based on all 40 scored items, and the three reporting category scores. The reporting categories constitute a specific number of items and percentage of the test, as shown in the table below.

Reporting Category	Number of Items	Percentage of Test
Production of Writing	15-17	38-43%
Knowledge of Language	7-9	18-23%
Conventions of Standard English	15-17	38-43%

PreACT and the ACT English Reporting Category Descriptions

Reporting Category	Skill Area	Description/Examples
Production of Writing	**Topic Development: Purpose and Focus:** Involves the ability to make content and stylistic choices that provide support for a text's rhetorical purpose.	Determine if a text's purpose is supported by organizational structure and content. Revise text to enhance the focus and cohesion.
	Organization, Unity, and Cohesion: Involves the ability to support a text's purpose by progressing from point to point logically and smoothly.	Order sentences and paragraphs and use transitions to enhance overall purpose, unity, and logical cohesion. Frame texts effectively with transitions, introductions, and conclusions.
Knowledge of Language	**Expressing Ideas Clearly:** Involves the ability to be precise and concise by using vocabulary skillfully and by avoiding wordiness and redundancy.	Use general academic and domain-specific language precisely and eliminate redundancy and wordiness when the meaning of the sentence or paragraph must be considered.
	Style: Involves the ability to maintain stylistic consistency appropriate for the communication task and to use language purposefully.	Maintain a consistent style and tone and use words, phrases, and sentences purposefully, considering their effect on the whole text.
Conventions of Standard English	**Sentence Structure and Formation:** Involves the ability to ensure the grammatical soundness of a variety of sentences.	Recognize and correct subtle structural errors in sophisticated sentence structure and complex contexts, including when the meaning of multiple sentences or paragraphs must be considered.
	Usage Conventions: Involves the knowledge of and ability to apply rules of standard English usage.	Recognize and correct usage errors in structurally sophisticated sentences, including when relevant elements are separated by intervening text.

Reporting Category	Skill Area	Description/Examples
	Punctuation Conventions: Involves the knowledge and ability to apply the rules of standard English punctuation.	Recognize and correct punctuation errors in sophisticated sentence structures and complex contexts, including using punctuation to reduce ambiguity of sentences and paragraphs.

PreACT Reading Content Description

- **Item tally and time:** The PreACT reading test has 33 items (25 scored items and 8 non-scored field-test items) and a 40-minute time limit.
- **Concept:** The test measures a student's ability to read closely, reason about texts using evidence, and integrate information from multiple sources.
- **Knowledge and skills tested:** The test measures knowledge areas and related skills reflected in the reporting categories for this test:
    - *Key Ideas and Details:* Students read texts closely to determine central ideas and themes; summarize information and ideas accurately; and read closely to understand relationships and draw logical inferences and conclusions, including understanding sequential, comparative, and cause-effect relationships.
    - *Craft and Structure:* Students determine word and phrase meanings, analyze an author's word choice rhetorically, analyze text structure, understand authorial purpose and perspective, and analyze characters' points of view. They interpret authorial decisions rhetorically and differentiate between various perspectives and sources of information.
    - *Integration of Knowledge and Ideas:* Students understand authors' claims, evaluate reasoning and evidence, differentiate between facts and opinions, and use evidence to make connections between different texts that are related by topic.
- **Format and item types:** The test consists of passages, or pairs of passages, each accompanied by a sequence of multiple-choice items.

  - Passages in the reading test include both literary narratives and informational texts from the humanities, natural sciences, and social sciences.

- **Knowledge and skills not tested:** Rote recall of facts from outside the passage or rules of formal logic are not tested. Nor does the test include items about vocabulary that can be answered without referring to the passage context.

PreACT Reading Test Blueprint

Four scores are reported for the PreACT reading test: a total test score based on all 25 scored items, and the three reporting category scores. The reporting categories constitute a specific number of items and percentage of the test, as shown below.

Reporting Category	Number of Items	Percentage of Test
Key Ideas and Details	12–14	48–56%
Craft and Structure	7–9	28–36%
Integration of Knowledge and Ideas	3–5	12–20%

The ACT Reading Content Description

- **Item tally and time:** The ACT reading test has 36 items (27 scored items and 9 non-scored field-test items) and a 40-minute time limit.
- **Concept:** The test measures a student's ability to read closely, reason about texts using evidence, and integrate information from multiple sources.
- **Knowledge and skills tested:** The test measures knowledge areas and related skills reflected in the reporting categories for this test:

  - *Key Ideas and Details:* Students read texts closely to determine central ideas and themes; summarize information and ideas accurately; and read closely to understand relationships and draw logical inferences and conclusions, including understanding sequential, comparative, and cause-effect relationships.

- *Craft and Structure:* Students determine word and phrase meanings, analyze an author's word choice rhetorically, analyze text structure, understand authorial purpose and perspective, and analyze characters' points of view. They interpret authorial decisions rhetorically and differentiate between various perspectives and sources of information.
- *Integration of Knowledge and Ideas:* Students understand authors' claims, evaluate reasoning and evidence, and differentiate between facts and opinions. They use evidence to make connections between different texts that are related by topic or between a text and a related graphic.

- **Format and item types:** The test consists of passages, or pairs of passages, accompanied by a sequence of multiple-choice test items.
  - Passages in the reading test include both literary narratives and informational texts from the humanities, natural sciences, and social sciences. Some informational passages may include a graphic (e.g., table, chart, graph) related to the text.
- **Not tested:** Rote recall of facts from outside the passage or rules of formal logic are not tested—nor does the test include items about vocabulary that can be answered without referring to the passage context.

The ACT Reading Test Blueprint

Four scores are reported for the ACT reading test: a total test score based on all 27 scored items, and the three reporting category scores. The reporting categories constitute a specific number of items and percentage of the test, as shown below.

Reporting Category	Number of Items	Percentage of Test
Key Ideas and Details	12–14	44–52%
Craft and Structure	7–9	26–33%
Integration of Knowledge and Ideas	5–7	19–26%

PreACT and the ACT Reading Reporting Category Descriptions

Reporting Category	Skill Area	Description/Examples
Key Ideas and Details	**Close Reading:** Involves the ability to attend carefully to what a text says and draw well-supported conclusions from a text.	Analyze more challenging, complex, and highly complex texts to determine what the text says explicitly as well as draw conclusions based on textual support.
	Relationships: Involves the ability to identify and understand relationships between individuals, events, themes, and ideas in a text.	Identify and infer sequences, comparative relationships, and cause-effect relationships developed across a text.
	Central Ideas, Themes, Summaries: Involves the ability to synthesize information in a text in order to identify central ideas or themes, differentiate key ideas from ideas of lesser importance, and summarize text concisely.	Determine a central idea or theme of a more challenging, complex, or highly complex text and summarize ideas and information developed across a text.
Craft and Structure	**Word Meanings and Word Choice:** Involves the ability to determine the meaning of words and phrases, including academic and domain-specific words, multiple-meaning words, and figurative language, based on the context of a text.	Determine the meaning, including figurative, connotative, and technical meanings, of words and phrases as they are used in more challenging, complex, and highly complex texts.
	Text Structure: Involves the ability to analyze the rhetorical aspects of a text in order to understand how an author's choices create effects on the reader.	Analyze rhetorical devices and the structure of more challenging, complex, and highly complex texts.
	Purpose and Point of View: Involves the ability to understand and analyze a text's rhetorical situation, including the author's intent, perspective, and use of rhetorical techniques.	Analyze stated and implied purposes in texts; analyze point of view and narrative techniques in narrative texts; analyze rhetorical techniques as well as authorial bias.

Reporting Category	Skill Area	Description/Examples
Integration of Knowledge and Ideas	**Arguments:** Involves the ability to understand and analyze arguments in a text, including claims, counterclaims, and supporting evidence.	Analyze the use of persuasive elements and development of an argument in more challenging, complex, and highly complex texts, assessing whether the evidence provided is relevant, sound, and sufficient.
	Synthesis of Multiple Texts: Involves the ability to make connections between, and integrate information across, two or more texts.	Analyze how different literary, thematic, and structural elements inform both shared and distinct ideas when comparing more challenging, complex, and highly complex texts; synthesize information across texts to build new knowledge and insights.
	Visual and Quantitative Information: Involves the ability to understand and analyze visual information including tables, charts, graphs, and figures alongside text. *(***Note:** *This skill area is not tested on the PreACT reading test.)*	Analyze visual information to draw conclusions and determine how this information relates to more challenging, complex, and highly complex texts.

MATHEMATICS

PreACT Mathematics Content Description

- **Item tally and time:** The PreACT mathematics test has 36 items (32 scored) and a 45-minute time limit.
- **Concept:** The test measures the whole of a student's mathematical development of topics typically taught up to the beginning of Grade 12 in US schools, with emphasis placed on topics typically taught from Grade 8 through the first 2 years of high school. It focuses on the prerequisite knowledge and skills important for success in college mathematics courses and career training programs.
- **Knowledge and skills tested:** The test measures knowledge areas and related skills reflected in the reporting categories for this test (further described in a table below):
    - *Preparing for Higher Mathematics:* Students apply the more recent mathematics they are learning. This reporting category is divided into the following five subcategories:
        - *Number and Quantity:* Students demonstrate knowledge of real and complex number systems. They understand and reason with numerical quantities in many forms, including integer and rational exponents, and vectors and matrices.
        - *Algebra:* Students manipulate algebraic expressions. They solve, graph, and create equations and inequalities of different types, including but not limited to linear, polynomial, radical, and exponential. They find solutions to systems of equations, and extend their knowledge to applications.
        - *Functions:* Students apply their knowledge of function definition, notation, representation, and application. Function types include but are not limited to linear, radical, piecewise, polynomial and logarithmic. Students manipulate and translate functions, as well as find and apply important features of graphs.
        - *Geometry:* Students define and apply knowledge of shapes and solids, such as congruence and similarity relationships or surface area and volume measurements. They understand

composition of objects and solve for missing values in triangles, circles, and other figures, including using trigonometric ratios and equations of circles.
- *Statistics and Probability:* Students describe center and spread of distributions, apply and analyze data collection methods, understand and model relationships in bivariate data, and calculate probabilities.

- ***Integrating Essential Skills:*** Students put together understandings and skills to solve problems of moderate to high complexity. Topics include rate and percentage; proportional reasoning; area, surface area, and volume; quantities and units; expressing numbers in diverse ways; using expressions to represent quantities and equations to capture relationships; rational exponents; the basics of functions; and function notation.
- ***Modeling:*** Students use mathematics to represent, through a model, an analysis of an actual, empirical situation. The Modeling reporting category represents all items that involve producing, interpreting, understanding, evaluating, and improving models. Each modeling item is also counted in the other appropriate reporting categories above. Thus, the Modeling reporting category is an overall measure of how well a student uses modeling skills across mathematical topics.

- **Format and item type:** All test items are multiple choice and are self-contained. The items measure the following reporting categories:

  - Preparing for Higher Mathematics
  - Integrating Essential Skills
  - Modeling

- **Knowledge and skills not tested:** Knowledge of basic formulas and computational skills are assumed as background for the problems, but recall of complex formulas and extensive computation are not required. A calculator is encouraged but not required.

PreACT Mathematics Test Blueprint

Nine scores are reported for the PreACT mathematics test: a total test score based on all 32 scored items, and eight reporting category scores, which include the subcategories for Preparing for Higher Mathematics. The reporting categories constitute a specific number of scored items and percentage of the test, as shown in the table below.

Reporting Category	Number of Items	Percentage of Test
Preparing for Higher Mathematics	25	78%
Number and Quantity	3–4	9–13%
Algebra	5–7	16–22%
Functions	5–7	16–22%
Geometry	5–7	16–22%
Statistics and Probability	3–4	9–13%
Integrating Essential Skills	7	22%
Modeling	≥7	≥22%

Items for Modeling are included in the item counts in Preparing for Higher Mathematics and Integrating Essential Skills.

In addition, the overall mathematics test score, along with the science score, is used to determine the STEM score.

The ACT Mathematics Content Description

- **Item tally and time:** The ACT mathematics test has 45 items (41 scored items and 4 non-scored field-test items) and a 50-minute time limit.
- **Concept:** The test measures the whole of a student's mathematical development of topics typically taught up to the beginning of grade 12 in US schools. It focuses on the prerequisite knowledge and skills important for success in college mathematics courses and career training programs.
- **Knowledge and skills tested:** The test measures knowledge areas and related skills reflected in the reporting categories for this test (further described in a chart below):

- *Preparing for Higher Mathematics:* Students apply the more recent mathematics they are learning. This reporting category is divided into the following five subcategories:

  - *Number and Quantity:* Students demonstrate knowledge of real and complex number systems. They understand and reason with numerical quantities in many forms, including integer and rational exponents, and vectors and matrices.
  - *Algebra:* Students solve, graph, and model multiple types of expressions. They employ many kinds of equations, including but not limited to linear, polynomial, radical, and exponential relationships. They find solutions to systems of equations, even when represented by simple matrices, and apply their knowledge to applications.
  - *Functions:* Students apply their knowledge of function definition, notation, representation, and application. Items may include but are not limited to linear, radical, piecewise, polynomial, and logarithmic functions. Students manipulate and translate functions, as well as find and apply important features of graphs.
  - *Geometry:* Students define and apply knowledge of shapes and solids, such as congruence and similarity relationships or surface area and volume measurements. They understand composition of objects and solve for missing values in triangles, circles, and other figures, including using trigonometric ratios and equations of conic sections.
  - *Statistics and Probability:* Students describe center and spread of distributions, apply and analyze data collection methods, understand and model relationships in bivariate data, and calculate probabilities.

- *Integrating Essential Skills:* Students put together understandings and skills to solve problems of moderate to high complexity. Topics include rate and percentage; proportional reasoning; area, surface area, and volume; quantities and units; expressing numbers in diverse ways; using expressions to represent quantities and equations to capture relationships;

rational exponents; the basics of functions; function notation; and data analysis.
    - *Modeling:* Students use mathematics to represent, through a model, an analysis of an actual, empirical situation. The Modeling reporting category represents all items that involve producing, interpreting, understanding, evaluating, and improving models. Each modeling item is also counted in the other appropriate reporting categories above. Thus, the Modeling reporting category is an overall measure of how well a student uses modeling skills across mathematical topics.

- **Format and item type:** All test items are multiple-choice and are self-contained. The items measure the following reporting categories:
    - Preparing for Higher Mathematics
    - Integrating Essential Skills
    - Modeling
- **Not tested:** Knowledge of basic formulas and computational skills are assumed as background for the problems, but recall of complex formulas and extensive computation are not required. A calculator is encouraged but not required.

The ACT Mathematics Test Blueprint

Nine scores are reported for the ACT mathematics test—a total test score based on all 41 scored items, and eight reporting category scores, which include the subcategories for Preparing for Higher Mathematics. The reporting categories constitute a specific number of items and percentage of the test, as shown in the table below.

Reporting Category	Number of Items	Percentage of Test
Preparing for Higher Mathematics	33	80%
Number and Quantity	4–5	10–12%
Algebra	7–8	17–20%
Functions	7–8	17–20%

Geometry	7–8	17–20%
Statistics and Probability	5–6	12–15%
Integrating Essential Skills	8	20%
Modeling	≥ 8	≥ 20%

In addition, the overall mathematics test score, along with the science score, is used to determine the STEM score.

The PreACT and ACT Reporting Category Descriptions

Reporting Category	Skill Area	Description/Examples
Preparing for Higher Mathematics: Number and Quantity	Rational and Irrational Numbers	Use and apply the properties of rational and irrational numbers.
	Properties of Exponents	Use and apply the properties of integer and rational exponents. Understand the relationship between rational exponents and radicals.
	Vectors and Matrices	Model situations, solve problems, and perform operations involving vectors and matrices.
	Complex Numbers	Perform operations and solve equations involving complex numbers.
	Quantities and Units	Reason quantitatively and use units to solve problems.
Preparing for Higher Mathematics: Algebra	Linear Expressions, Equations, and Inequalities	Model situations, solve problems, and perform operations involving linear expressions, equations, and inequalities.
	Quadratic Expressions, Equations, and Inequalities	Model situations, solve problems, and perform operations involving quadratic expressions, equations, and inequalities.

Reporting Category	Skill Area	Description/Examples
	Rational and Radical Expressions and Equations	Model situations, solve problems, and perform operations involving rational and radical expressions and equations.
	Polynomial Expressions and Equations	Model situations, solve problems, and perform operations involving polynomial expressions and equations.
	Systems of Equations and Inequalities	Solve, graph, and model situations with systems of equations and inequalities.
	Representation of Expressions and Equations	Rewrite expressions and equations in equivalent forms.
Preparing for Higher Mathematics: Functions	Properties of Functions	Evaluate, create, and describe the properties of functions. Convert between different representations of functions.
	Function Composition, Transformation, and Inverse Functions	Compose and transform functions, find their inverses, and state the domain and range of a function composition.
	Sequences and Series	Model situations, solve problems, and perform operations involving sequences and series.
	Trigonometric Functions	Model situations, solve problems, and perform operations using trigonometric functions and identities.
	Exponential and Logarithmic Functions	Model situations, solve problems, and perform operations involving exponential and logarithmic functions.

Reporting Category	Skill Area	Description/Examples
Preparing for Higher Mathematics: Geometry	Transformations	Model situations, solve problems, and perform operations involving transformations of geometric figures in a plane.
	Proof, Reasoning, and Constructions	Use logical arguments to prove theorems about geometric figures, and construct various geometric figures.
	Similarity, Right Triangles, and Trigonometry	Use properties of similarity and congruence to solve problems. Define trigonometric ratios in terms of right triangles, and apply these ratios to general triangles.
	Coordinate Geometry	Model situations and solve problems with geometric figures in the coordinate plane.
	Conic Sections	Model situations and solve problems involving conic sections.
	Properties of Circles	Solve problems using properties and features of circles, including inscribed angles, central angles, radii, chords, secants, and tangents.
	Geometric Measurement and Modeling	Apply geometric concepts in modeling situations.
Preparing for Higher Mathematics: Statistics and Probability	Univariate Data Analysis	Solve problems involving the comparison and interpretation of the center, shape, and spread of univariate datasets, including normally distributed datasets.

Reporting Category	Skill Area	Description/Examples
	Bivariate Data Analysis	Summarize, represent, and interpret datasets with two categorical or two quantitative variables. Determine whether an association exists between two variables.
	Introduction to Formal Inferential Statistics	Use sample data and margin of error to estimate population parameters. Use simulation or other methods to reject or fail to reject claims about population parameters.
	Rules of Probability	Use rules of probability to compute probabilities and expected values.
	Counting, Permutations, and Combinations	Use counting principles, combinations, and permutations to compute probabilities of compound events and solve problems.
Integrating Essential Skills	Properties of Real Numbers	Use and apply the properties of real numbers.
	Computation and Problem Solving with Real Numbers	Evaluate expressions and solve problems involving real numbers.
	Ratio, Proportion, and Percent	Use ratios, proportions, and percents in problem- solving situations.
	Writing Algebraic Expressions	Model situations and perform operations with linear and polynomial expressions.
	Writing and Solving Simple Equations and Inequalities	Write one- and two-variable linear equations, and use these equations to answer questions.

Reporting Category	Skill Area	Description/Examples
	Measurement Units and Unit Conversion	Model situations, solve problems, and perform operations involving measurement units and scale models.
	Properties of Lines, Angles, and Shapes	Use the properties of lines, angles, two-dimensional shapes, and three-dimensional shapes to describe situations and solve problems.
	Perimeter, Circumference, and Area	Calculate the perimeter, circumference, and area of polygons and circles.
	Surface Area and Volume	Calculate surface area and volume of solids including prisms, cylinders, cones, and spheres.
	The Coordinate Plane	Solve problems involving the graphing of points and polygons in the coordinate plane.
	Pythagorean Theorem	Use the Pythagorean theorem to solve problems and to find distances.
	Scatterplots	Analyze scatterplots and, where appropriate, draw informal lines of best fit and represent them symbolically.
	Data Summaries and Displays	Describe the distribution of a quantitative dataset by its shape and measures of center and spread. Present data in displays such as line plots, histograms, box plots, and bar charts.
	Informal Inferential Statistics	Estimate a population parameter with sample data.

Reporting Category	Skill Area	Description/Examples
	Basic Probability	Compute probabilities for simple events and for compound events where the sample space can be listed.
Modeling	Producing	Produce a model for a given real-world or mathematical context.
	Interpreting	Interpret the parameters of a model in terms of the situation.
	Understanding	Show understanding by determining conditions under which a model works or does not work.
	Evaluating	Choose the best model for a situation or decide if a model is appropriate for a given situation.
	Improving	Improve a model by adjusting its parameters.

SCIENCE

The PreACT Science Content Description

- **Item tally and time:** The ACT science test has 36 items (30 scored) and a 40-minute time limit.
- **Concept:** The test measures science and engineering knowledge, practices, and skills that are highly correlated with college success. The correlations are based on both decades of empirical research and the responses of post-secondary educators on the ACT National Curriculum Survey.
- **Knowledge and skills tested:** The test measures knowledge areas and related skills reflected in the reporting categories for this test (further described in a table below):
    - *Interpretation of Data:* Students locate, translate, infer, and extend from and evaluate data and information in scientific graphs, tables, and diagrams of varying complexity. This reporting category is divided into the following three subcategories:
        - Locating and Understanding
        - Inferring and Translating
        - Extending and Re-evaluating
    - *Scientific Investigation:* Students understand the tools, procedures, and designs of scientific experiments and compare, extend, and modify those experiments. This reporting category is divided into the following three subcategories:
        - Locating and Comparing
        - Designing and Implementing
        - Extending and Improving
    - *Evaluating Scientific Arguments and Models with Evidence:* Students evaluate the validity of scientific claims based on evidence and formulate conclusions and predictions based on that information using a claim, evidence, or reasoning model of

scientific argument. This reporting category is divided into the following three subcategories:

- Inferences and Results: Evaluating and Extending
- Models— Understanding and Comparing
- Models— Evaluating and Extending

- **Format and item type:** Science and engineering knowledge, skills, and practices are applied to rich scientific passages that are written in one of three formats: Data Representation, Research Summaries, or Conflicting Viewpoints. Each passage is accompanied by a set of multiple-choice items. Interaction with each passage format requires students to engage in scientific sense-making around the following:
  - Experimental procedures and phenomena (Research Summaries)
  - Data presentations (Data Representation)
  - Scientific models and explanations (Conflicting Viewpoints)

The PreACT Science Test Blueprint

Four scores are reported for the ACT science test: a total test score based on all 30 scored items and the three reporting category scores. The reporting categories constitute a specific number of items and percentage of the test, as shown below.

Reporting Category	Number of Items	Percentage of Test
Interpretation of Data	6-12	20–40%
Scientific Investigation	5-12	17–40%
Evaluating Scientific Arguments and Models with Evidence	6–12	20–40%

In addition, the overall science test score is combined with the overall mathematics score to determine the STEM score.

Topics from all major disciplines (biology, chemistry, physics, and Earth and space science) are used on the test to elicit evidence of how students apply science practices. Some items will require specific

content knowledge to successfully complete the task; however, these tasks always involve the use of a science practice as well. Consequently, no science scores are reported in relation to the major science disciplines.

The ACT Science Content Description

- **Item tally and time:** The ACT science test has 40 items (34 scored and 6 non-scored, field-test items) and a 40-minute time limit.
- **Concept:** The test measures science and engineering knowledge, practices, and skills that are highly correlated with college success. The correlations are based on both decades of empirical research and the responses of post-secondary educators on the ACT National Curriculum Survey.
- **Knowledge and skills tested:** The test measures knowledge areas and related skills reflected in the reporting categories for this test (further described in a table below):
    - *Interpretation of Data:* Students locate, translate, infer, and extend from and evaluate data and information in scientific graphs, tables, and diagrams of varying complexity. This reporting category is divided into the following three subcategories:
        - Locating and Understanding
        - Inferring and Translating
        - Extending and Re-evaluating
    - *Scientific Investigation:* Students understand the tools, procedures, and designs of scientific experiments and compare, extend, and modify those experiments. Students also identify goals, constraints, and potential tradeoffs in engineering and design thinking contexts. This reporting category is divided into the following three subcategories:
        - Locating and Comparing
        - Designing and Implementing
        - Extending and Improving

- *Evaluating Scientific Arguments and Models with Evidence:* Students evaluate the validity of scientific claims based on evidence and formulate conclusions and predictions based on that information using a claim, evidence, or reasoning model of scientific argument. Students evaluate tradeoffs, success criteria, and constraints in engineering and design thinking contexts. This reporting category is divided into the following three subcategories:

  - Inferences and Results: Evaluating and Extending
  - Models— Understanding and Comparing
  - Models— Evaluating and Extending

- **Format and item type:** Science and engineering knowledge, skills, and practices are applied to rich scientific passages that are written in one of three formats: Data Representation, Research Summaries, or Conflicting Viewpoints. Each passage is accompanied by multiple-choice items. Interaction with each passage format requires students to engage in scientific sense-making around the following:

  - Experimental procedures and phenomena (Research Summaries)
  - Data presentations (Data Representation)
  - Scientific models and explanations (Conflicting Viewpoints)

The ACT Science Test Blueprint

Four scores are reported for the ACT science test: a total test score based on all 34 scored items, and the three reporting category scores. The reporting categories constitute a specific number of items and percentage of the test, as shown below.

Reporting Category	Number of Items	Percentage of Test
Interpretation of Data	13-17	38–50%
Scientific Investigation	6-11	18–32%
Evaluating Scientific Arguments and Models with Evidence	8–13	24–38%

In addition, the overall science test score is combined with the overall mathematics score to determine the STEM score.

Topics from all major disciplines (biology, chemistry, physics, and Earth and space science) are used on the test to elicit evidence of how students apply science practices. Some items will require specific content knowledge to successfully complete the task; however, these tasks always involve the use of a science practice as well. Consequently, no science scores are reported in relation to the major science disciplines.

The ACT Science Reporting Category Descriptions

Reporting Category	Skill Area	Description/Examples
Interpretation of Data	Locating and Understanding	Locate one or more pieces of data and understand features of graphics and tables, such as units, legends, and axes.
	Inferring and Translating	Use data from one or more graphs and/or tables to identify trends, make inferences and comparisons, or translate into other graphic formats.
	Extending and Re-evaluating	Make predictions based on trends in data.
Scientific Investigation	Locating and Comparing	Locate, compare, and contrast information about one or more scientific investigations or experiments.
	Designing and Implementing	Understand and evaluate aspects of experimental design such as methods, tools, variables, and controls, as well as constraints, goals, and potential tradeoffs in engineering and design thinking scenarios

Reporting Category	Skill Area	Description/Examples
	Extending and Implementing	Make predictions about future experiments or experimental conditions and determine additional methods to improve or evaluate investigations.
Evaluating Scientific Arguments and Models with Evidence	Inferences and Results: Evaluating and Extending	Evaluate and formulate hypotheses, predictions, and conclusions based on experimental results and other scientific data and knowledge as well as success criteria, constraints, and tradeoffs in engineering and design thinking scenarios.
	Models—Understanding and Comparing	Locate and compare information within a theoretical model or across competing models. (Note: These skills are only used with conflicting viewpoints passages.)
	Models—Evaluating and Extending	Evaluate and formulate predictions and hypotheses based on the examination of competing theoretical models. (Note: These skills are only used with conflicting viewpoints passages.

IV. Alignment Crosswalks

CROSSWALK:
North Carolina English Language Arts (ELA) Standards to ACT Assessments

Table 1: North Carolina English Language Arts (ELA) Standards, Grades 9–10 (adopted 2017) Aligned to PreACT

North Carolina Standards Categories and Numbers	Standard	PreACT English Reporting Categories and Skill Areas	PreACT Reading Reporting Categories and Skill Areas
Reading Standards for Literature (RL)			
Key Ideas and Evidence			
RL.9-10.1	Cite strong and thorough textual evidence to support analysis of what the text says explicitly as well as inferences drawn from the text.		**Key Ideas and Details:** Close Reading
RL.9-10.2	Determine a theme of a text and analyze in detail its development over the course of the text, including how it emerges and is shaped and refined by specific details; provide an objective summary of the text.		**Key Ideas and Details:** Central Ideas, Themes, Summaries **Craft and Structure:** Text Structure
RL.9-10.3	Analyze how complex characters develop over the course of a text, interact with other characters, and advance the plot or develop the theme.		**Key Ideas and Details:** Relationships Central Ideas, Themes, Summaries **Craft and Structure:** Text Structure
Craft and Structure			
RL.9-10.4	Determine the meaning of words and phrases as they are used in the text; analyze the cumulative impact of specific word choices on meaning and tone.		**Craft and Structure:** Word Meanings and Word Choice Text Structure
RL.9-10.5	Analyze how an author's choices concerning how to structure a text, order events within it, and manipulate time create effects such as mystery, tension, or surprise.		**Key Ideas and Details:** Relationships **Craft and Structure:** Text Structure
RL.9-10.6	Analyze a particular perspective or cultural experience reflected in a work of literature from outside the United States, drawing on a wide reading of world literature.		**Craft and Structure:** Purpose and Point of View

North Carolina Standards Categories and Numbers	Standard	PreACT English Reporting Categories and Skill Areas	PreACT Reading Reporting Categories and Skill Areas
Integration of Ideas and Analysis			
RL.9-10.7	Analyze the representation of a subject or a key scene in two different artistic mediums, including what is emphasized or absent in each treatment.		
RL.9-10.8	(Not applicable to literature)		
RL.9-10.9	Analyze how an author adopts or adapts source material in a specific work.		Integration of Knowledge and Ideas: Synthesis of Multiple Texts
Range of Reading and Level of Complexity			
RL.9.10	By the end of grade 9, read and understand literature within the 9-10 text complexity band proficiently and independently for sustained periods of time. Connect prior knowledge and experiences to text.		All reporting categories
RL.10.10	By the end of grade 10, read and understand literature at the high end of the 9-10 text complexity band proficiently and independently for sustained periods of time. Connect prior knowledge and experiences to text.		All reporting categories
Reading Standards for Informational Text (RI)			
Key Ideas and Evidence			
RI.9-10.1	Cite strong and thorough textual evidence to support analysis of what the text says explicitly as well as inferences drawn from the text.		Key Ideas and Details: Close Reading
RI.9-10.2	Determine a central idea of a text and analyze its development over the course of the text, including how it emerges and is shaped and refined by specific details; provide an objective summary of the text.		Key Ideas and Details: Central Ideas, Themes, Summaries Craft and Structure: Text Structure
RI.9-10.3	Analyze how the author unfolds an analysis or series of ideas or events including the order in which the points are made, how they are introduced and developed, and the connections that are drawn between them.		Key Ideas and Details: Relationships Craft and Structure: Text Structure
Craft and Structure			

North Carolina Standards Categories and Numbers	Standard	PreACT English Reporting Categories and Skill Areas	PreACT Reading Reporting Categories and Skill Areas
RI.9-10.4	Determine the meaning of words and phrases as they are used in a text; analyze the cumulative impact of specific word choices on meaning and tone.		**Craft and Structure:** Word Meanings and Word Choice Text Structure
RI.9-10.5	Analyze how an author's ideas or claims are developed and refined by particular sentences, paragraphs, or larger portions of a text.		**Craft and Structure:** Text Structure **Integration of Knowledge and Ideas:** Arguments
RI.9-10.6	Determine an author's point of view or purpose in a text and analyze how an author uses rhetoric to advance that point of view or purpose.		**Craft and Structure:** Purpose and Point of View Text Structure **Integration of Knowledge and Ideas:** Arguments
Integration of Ideas and Analysis			
RI.9-10.7	Analyze various accounts of a subject told in different mediums, determining which details are emphasized in each account.		
RI.9-10.8	Delineate and evaluate the argument and specific claims in a text, assessing whether the reasoning is valid and the evidence is relevant and sufficient; identify false statements and fallacious reasoning.		**Integration of Knowledge and Ideas:** Arguments
RI.9-10.9	Analyze influential documents of historical and literary significance, including how they address related themes and concepts.		**Integration of Knowledge and Ideas:** Synthesis of Multiple Texts
Range of Reading and Level of Complexity			
RI.9.10	By the end of grade 9, read and understand informational texts within the 9-10 text complexity band proficiently and independently for sustained periods of time. Connect prior knowledge and experiences to text.		**All reporting categories**
RI.10.10	By the end of grade 10, read and understand informational texts at the high end of the 9-10 text complexity band proficiently and independently for sustained periods of time. Connect prior knowledge and experiences to text.		**All reporting categories**
Language (L)			

North Carolina Standards Categories and Numbers	Standard	PreACT English Reporting Categories and Skill Areas	PreACT Reading Reporting Categories and Skill Areas
Conventions of Standard English			
L.9-10.1	Demonstrate command of the conventions of standard English grammar and usage when writing or speaking; demonstrate proficiency within the 9-12 grammar continuum. (See Language Standards – Grammar Continuum page 7.)	**Conventions of Standard English:** Sentence Structure and Formation Usage Conventions	
L.9-10.2	Demonstrate command of the conventions of standard English capitalization, punctuation, and spelling when writing; demonstrate proficiency within the 9-12 conventions continuum. (See Language Standards – Conventions Continuum page 10.)	**Conventions of Standard English:** Punctuation Conventions	
Knowledge of Language			
L.9-10.3	Apply knowledge of language to understand how language functions in different contexts, to make effective choices for meaning or style, and to comprehend more fully when reading or listening.	**Knowledge of Language:** Expressing Ideas Clearly Style **Production of Writing:** Topic Development—Purpose and Focus **Conventions of Standard English:** Sentence Structure and Formation	**Craft and Structure:** Word Meanings and Word Choice Text Structure
a.	Write and edit work so that it conforms to the guidelines in a style manual appropriate for the discipline and writing type.	**Knowledge of Language:** Style	
b.	Use parallel structure.	**Conventions of Standard English:** Sentence Structure and Formation	
Vocabulary Acquisition and Use			
L.9-10.4	Determine and/or clarify the meaning of unknown and multiple-meaning words and phrases based on grades 9–10 reading and content, choosing flexibly from a range of strategies: context clues, word parts, word relationships, and reference materials.	**Production of Writing:** Topic Development—Purpose and Focus **Knowledge of Language:** Expressing Ideas Clearly **Conventions of Standard English:** Usage Conventions	**Craft and Structure:** Word Meanings and Word Choice Text Structure

North Carolina Standards Categories and Numbers	Standard	PreACT English Reporting Categories and Skill Areas	PreACT Reading Reporting Categories and Skill Areas
L.9-10.5	Demonstrate understanding of figurative language and nuances in word meanings.	**Production of Writing:** Topic Development—Purpose and Focus **Knowledge of Language:** Expressing Ideas Clearly **Conventions of Standard English:** Usage Conventions	**Craft and Structure:** Word Meanings and Word Choice Text Structure
a.	Interpret figures of speech in context and analyze their role in the text based on grades 9-10 reading and content.	**Production of Writing:** Topic Development—Purpose and Focus	**Craft and Structure:** Word Meanings and Word Choice Text Structure
b.	Analyze nuances in the meaning of words with similar denotations.	**Knowledge of Language:** Expressing Ideas Clearly **Conventions of Standard English:** Usage Conventions	**Craft and Structure:** Word Meanings and Word Choice
L.9-10.6	Acquire and use accurately general academic and domain-specific words and phrases, sufficient for reading, writing, speaking, and listening at the college and career readiness level; demonstrate independence in developing vocabulary knowledge when considering a word or phrase important to comprehension or expression.	**Production of Writing:** Topic Development—Purpose and Focus **Knowledge of Language:** Expressing Ideas Clearly Style **Conventions of Standard English:** Usage Conventions	**Craft and Structure:** Word Meanings and Word Choice Text Structure
Writing Standards (W)			
Text Types, Purposes, and Publishing			
W.9-10.1	Write arguments to support claims in an analysis of substantive topics or texts, using valid reasoning and relevant and sufficient evidence.	**All reporting categories**	
a.	Organize information and ideas around a topic to plan and prepare to write.		
b.	Introduce precise claim(s), distinguish the claim(s) from alternate or opposing claims, and create an organization that establishes clear relationships among claim(s), counterclaims, reasons, and evidence.	**Production of Writing:** Topic Development—Purpose and Focus Organization, Unity, and Cohesion	

North Carolina Standards Categories and Numbers	Standard	PreACT English Reporting Categories and Skill Areas	PreACT Reading Reporting Categories and Skill Areas
c.	Develop claim(s) and counterclaims fairly, supplying evidence for each while pointing out the strengths and limitations of both in a manner that anticipates the audience's knowledge level and concerns.	**Production of Writing:** Topic Development—Purpose and Focus Organization, Unity, and Cohesion	
d.	Use words, phrases, and clauses to link the major sections of the text, create cohesion, and clarify the relationships between claim(s) and reasons, between reasons and evidence, and between claim(s) and counterclaims.	**Production of Writing:** Topic Development—Purpose and Focus Organization, Unity, and Cohesion **Knowledge of Language:** Expressing Ideas Clearly	
e.	Establish and maintain a formal style and objective tone while attending to the norms and conventions of the discipline in which they are writing.	**Knowledge of Language:** Expressing Ideas Clearly Style	
f.	Provide a concluding statement or section that follows from and supports the argument presented.	**Production of Writing:** Organization, Unity, and Cohesion	
g.	Develop and strengthen writing as needed by revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience.	**All reporting categories**	
W.9-10.2	Write informative/explanatory texts to examine and convey complex ideas, concepts, and information clearly and accurately through the effective selection, organization, and analysis of content.	**All reporting categories**	
a.	Organize information and ideas around a topic to plan and prepare to write.		
b.	Introduce a topic; organize complex ideas, concepts, and information to make important connections and distinctions; include formatting, graphics, and multimedia when useful to aiding comprehension.	**Production of Writing:** Topic Development—Purpose and Focus Organization, Unity, and Cohesion	
c.	Develop the topic thoroughly by selecting the most significant and relevant facts, extended definitions, concrete details, quotations, or other information and examples appropriate to the audience's knowledge of the topic.	**Production of Writing:** Topic Development—Purpose and Focus	

North Carolina Standards Categories and Numbers	Standard	PreACT English Reporting Categories and Skill Areas	PreACT Reading Reporting Categories and Skill Areas
d.	Use appropriate and varied transitions to link the major sections of the text, create cohesion, and clarify the relationships among complex ideas and concepts.	**Production of Writing:** Organization, Unity, and Cohesion	
e.	Use precise language and domain-specific vocabulary to manage the complexity of the topic.	**Production of Writing:** Topic Development—Purpose and Focus **Knowledge of Language:** Expressing Ideas Clearly	
f.	Establish and maintain a formal style and objective tone while attending to the norms and conventions of the discipline in which they are writing.	**Knowledge of Language:** Expressing Ideas Clearly Style	
g.	Provide a concluding statement or section that follows from and supports the information or explanation presented.	**Production of Writing:** Organization, Unity, and Cohesion	
h.	Develop and strengthen writing as needed by revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience.	**All reporting categories**	
W.9-10.3	Write narratives to develop real or imagined experiences or events using effective technique, well-chosen details, and well-structured event sequences.	**All reporting categories**	
a.	Organize information and ideas around a topic to plan and prepare to write.		
b.	Engage and orient the reader by setting out a problem, situation, or observation, establishing one or multiple point(s) of view, and introducing a narrator and/or characters; create a smooth progression of experiences or events.	**Production of Writing:** Topic Development—Purpose and Focus Organization, Unity, and Cohesion	
c.	Use narrative techniques, such as dialogue, pacing, description, reflection, and multiple plot lines, to develop experiences, events, and/or characters.	**Production of Writing:** Topic Development—Purpose and Focus	
d.	Use a variety of techniques to sequence events so that they build on one another to create a coherent whole.	**Production of Writing:** Organization, Unity, and Cohesion	

North Carolina Standards Categories and Numbers	Standard	PreACT English Reporting Categories and Skill Areas	PreACT Reading Reporting Categories and Skill Areas
e.	Use precise words and phrases, telling details, and sensory language to convey a vivid picture of the experiences, events, setting, and/or characters.	**Production of Writing:** Topic Development—Purpose and Focus **Knowledge of Language:** Expressing Ideas Clearly Style	
f.	Provide a conclusion that follows from and reflects on what is experienced, observed, or resolved over the course of the narrative.	**Production of Writing:** Organization, Unity, and Cohesion	
g.	Develop and strengthen writing as needed by revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience.	**All reporting categories**	
Research			
W.9-10.4	Use digital tools and resources to produce, publish, and update individual or shared writing products, taking advantage of technology's capacity to link to other information and to display information flexibly and dynamically.		
W.9-10.5	Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation.		
W.9-10.6	Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the usefulness of each source in answering the research question; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and following a standard format for citation.		

Table 2: North Carolina English Language Arts (ELA) Standards, Grades 11–12 (adopted 2017) Aligned to the ACT

North Carolina Standards Categories and Numbers	Standard	The ACT English Reporting Categories and Skill Areas	The ACT Reading Reporting Categories and Skill Areas
Reading Standards for Literature (RL)			
Key Ideas and Evidence			
RL.11-12.1	Cite strong and thorough textual evidence to support analysis of what the text says explicitly as well as inferences drawn from the text, including determining where the text leaves matters uncertain.		**Key Ideas and Details:** Close Reading
RL.11-12.2	Determine two or more themes of a text and analyze their development over the course of the text, including how they interact and build on one another to produce a complex account; provide an objective summary of the text. development.		**Key Ideas and Details:** Central Ideas, Themes, Summaries **Craft and Structure:** Text Structure
RL.11-12.3	Analyze the impact of the author's choices regarding how to develop and relate elements of a story or drama.		**Key Ideas and Details:** Relationships **Craft and Structure:** Text Structure
Craft and Structure			
RL.11-12.4	Determine the meaning of words and phrases as they are used in the text; analyze the impact of specific word choices on meaning and tone, including words with multiple meanings or language that is particularly engaging.		**Craft and Structure:** Word Meanings and Word Choice Text Structure
RL.11-12.5	Analyze how an author's choices concerning how to construct specific parts of a text contribute to its overall structure and meaning as well as its effect on the reader.		**Craft and Structure:** Text Structure
RL.11-12.6	Analyze a case in which grasping perspective requires distinguishing what is directly stated in a text from what is really meant.		**Craft and Structure:** Word Meanings and Word Choice Text Structure Purpose and Point of View
Integration of Ideas and Analysis			
RL.11-12.7	Analyze multiple interpretations of a story, drama, or poem (e.g., recorded or live production of a play or recorded novel or poetry), evaluating how each version interprets the source text.		
RL.11-12.8	(Not applicable to literature)		

North Carolina Standards Categories and Numbers	Standard	The ACT English Reporting Categories and Skill Areas	The ACT Reading Reporting Categories and Skill Areas
RL.11-12.9	Analyze how two or more texts from the same period treat similar themes or topics and compare the approaches the authors take.		Integration of Knowledge and Ideas: Synthesis of Multiple Texts
Range of Reading and Level of Complexity			
RL.11.10	By the end of grade 11, read and understand literature within the 11–12 text complexity band proficiently and independently for sustained periods of time. Connect prior knowledge and experiences to text.		All reporting categories
RL.12.10	By the end of grade 12, read and comprehend literature, including stories, dramas, and poems, at the high end of the grades 11–CCR text complexity band independently and proficiently, building background knowledge and activating prior knowledge in order to make personal, societal, and ethical connections that deepen understanding of complex text.		All reporting categories
Reading Standards for Informational Text (RI)			
Key Ideas and Evidence			
RI.11-12.1	Cite strong and thorough textual evidence to support analysis of what the text says explicitly as well as inferences drawn from the text, including determining where the text leaves matters uncertain.		Key Ideas and Details: Close Reading
RI.11-12.2	Determine two or more central ideas of a text and analyze their development over the course of the text, including how they interact and build on one another to provide a complex analysis; provide an objective summary of the text.		Key Ideas and Details: Central Ideas, Themes, Summaries Craft and Structure: Text Structure
RI.11-12.3	Analyze a complex set of ideas or sequence of events and explain how specific individuals, ideas, or events interact and develop over the course of the text.		Key Ideas and Details: Relationships Craft and Structure: Text Structure
Craft and Structure			
RI.11-12.4	Determine the meaning of words and phrases as they are used in a text; analyze how an author uses and refines the meaning of a key term or terms over the course of a text.		Craft and Structure: Word Meanings and Word Choice Text Structure
RI.11-12.5	Analyze and evaluate the effectiveness of the structure an author uses in his or her exposition or argument, including whether the structure makes points clear, convincing, and engaging.		Craft and Structure: Text Structure

North Carolina Standards Categories and Numbers	Standard	The ACT English Reporting Categories and Skill Areas	The ACT Reading Reporting Categories and Skill Areas
RI.11-12.6	Determine an author's point of view or purpose in a text in which the rhetoric is particularly effective, analyzing how style and content contribute to the power, and/or persuasiveness of the text.		**Craft and Structure:** Purpose and Point of View Word Meanings and Word Choice **Integration of Knowledge and Ideas:** Arguments
Integration of Ideas and Analysis			
RI.11-12.7	Integrate and evaluate multiple sources of information presented in different media or formats, including visually and quantitatively, as well as in words in order to address a question or solve a problem.		**Integration of Knowledge and Ideas:** Visual and Quantitative Information
RI.11-12.8	Delineate and evaluate the reasoning in influential U.S. and/or British texts, including the premises, purposes, and arguments in works of public advocacy.		**Integration of Knowledge and Ideas:** Arguments
RI.11-12.9	Analyze foundational U.S. and/or British documents of historical and literary significance for their themes, purposes, and rhetorical features.		
Range of Reading and Level of Complexity			
RL.11.10	By the end of grade 11, read and understand informational texts within the 11–12 text complexity band proficiently and independently for sustained periods of time. Connect prior knowledge and experiences to text.		All reporting categories
RL.12.10	By the end of grade 12, read and understand informational texts at the high end of the 11–12 text complexity band proficiently and independently for sustained periods of time. Connect prior knowledge and experiences to text.		All reporting categories
Language (L)			
Conventions of Standard English			
L.11-12.1	Demonstrate command of the conventions of standard English grammar and usage when writing or speaking; demonstrate proficiency within the 9-12 grammar continuum.	**Conventions of Standard English:** Sentence Structure and Formation Usage Conventions	
L.11-12.2	Demonstrate command of the conventions of standard English capitalization, punctuation, and spelling when writing; demonstrate proficiency within the 9-12 conventions continuum.	**Conventions of Standard English:** Punctuation Conventions	
Knowledge of Language			

North Carolina Standards Categories and Numbers	Standard	The ACT English Reporting Categories and Skill Areas	The ACT Reading Reporting Categories and Skill Areas
L.11-12.3	Apply knowledge of language to understand how language functions in different contexts, to make effective choices for meaning or style, and to comprehend more fully when reading or listening.	**Knowledge of Language:** Expressing Ideas Clearly Style **Production of Writing:** Topic Development—Purpose and Focus **Conventions of Standard English:** Sentence Structure and Formation	**Craft and Structure:** Word Meanings and Word Choice Text Structure
a.	Vary syntax for effect, consulting references for guidance as needed; apply an understanding of syntax to the study of complex texts when reading.	**Conventions of Standard English:** Sentence Structure and Formation **Knowledge of Language:** Style	**Craft and Structure:** Word Meanings and Word Choice Text Structure
Vocabulary Acquisition and Use			
L.11-12.4	Determine and/or clarify the meaning of unknown and multiple-meaning words and phrases based on grades 11–12 reading and content, choosing flexibly from a range of strategies: context clues, word parts, word relationships, and reference materials.	**Production of Writing:** Topic Development—Purpose and Focus **Knowledge of Language:** Expressing Ideas Clearly **Conventions of Standard English:** Usage Conventions	**Craft and Structure:** Word Meanings and Word Choice Text Structure
L.11-12.5	Demonstrate understanding of figurative language and nuances in word meanings.	**Production of Writing:** Topic Development—Purpose and Focus **Knowledge of Language:** Expressing Ideas Clearly **Conventions of Standard English:** Usage Conventions	**Craft and Structure:** Word Meanings and Word Choice Text Structure
a.	Interpret figures of speech in context and analyze their role in the text based on grades 11-12 reading and content.	**Production of Writing:** Topic Development—Purpose and Focus	**Craft and Structure:** Word Meanings and Word Choice Text Structure
b.	Analyze nuances in the meaning of words with similar denotations.	**Knowledge of Language:** Expressing Ideas Clearly **Conventions of Standard English:** Usage Conventions	**Craft and Structure:** Word Meanings and Word Choice

North Carolina Standards Categories and Numbers	Standard	The ACT English Reporting Categories and Skill Areas	The ACT Reading Reporting Categories and Skill Areas
L.11-12.6	Acquire and use accurately general academic and domain-specific words and phrases, sufficient for reading, writing, speaking, and listening at the college and career readiness level; demonstrate independence in developing vocabulary knowledge when considering a word or phrase important to comprehension or expression.	**Production of Writing:** Topic Development—Purpose and Focus **Knowledge of Language:** Expressing Ideas Clearly Style **Conventions of Standard English:** Usage Conventions	**Craft and Structure:** Word Meanings and Word Choice Text Structure
Writing Standards (W)			
Text Types, Purposes, and Publishing			
W.11-12.1	Write arguments to support claims in an analysis of substantive topics or texts, using valid reasoning and relevant and sufficient evidence.	**All reporting categories**	
a.	Organize information and ideas around a topic to plan and prepare to write.		
b.	Introduce precise, knowledgeable claim(s), establish the significance of the claim(s), distinguish the claim(s) from alternate or opposing claims, and create an organization that logically sequences claim(s), counterclaims, reasons, and evidence.	**Production of Writing:** Topic Development—Purpose and Focus Organization, Unity, and Cohesion	
c.	Develop claim(s) and counterclaims fairly and thoroughly, supplying the most relevant evidence for each while pointing out the strengths and limitations of both in a manner that anticipates the audience's knowledge level, concerns, values, and possible biases.	**Production of Writing:** Topic Development—Purpose and Focus Organization, Unity, and Cohesion	
d.	Use words, phrases, and clauses as well as varied syntax to link the major sections of the text, create cohesion, and clarify the relationships between claim(s) and reasons, between reasons and evidence, and between claim(s) and counterclaims.	**Production of Writing:** Topic Development—Purpose and Focus Organization, Unity, and Cohesion **Knowledge of Language:** Expressing Ideas Clearly	
e.	Establish and maintain a formal style and objective tone while attending to the norms and conventions of the discipline in which they are writing.	**Knowledge of Language:** Expressing Ideas Clearly Style	
f.	Provide a concluding statement or section that follows from and supports the argument presented.	**Production of Writing:** Organization, Unity, and Cohesion	
g.	Develop and strengthen writing as needed by revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience.	**All reporting categories**	

North Carolina Standards Categories and Numbers	Standard	The ACT English Reporting Categories and Skill Areas	The ACT Reading Reporting Categories and Skill Areas
W.11-12.2	Write informative/explanatory texts to examine and convey complex ideas, concepts, and information clearly and accurately through the effective selection, organization, and analysis of content.	**Production of Writing:** Topic Development—Purpose and Focus Organization, Unity, and Cohesion **Knowledge of Language:** Expressing Ideas Clearly	
a.	Organize information and ideas around a topic to plan and prepare to write.		
b.	Introduce a topic; organize complex ideas, concepts, and information so that each new element builds on that which precedes it to create a unified whole; include formatting (e.g., headings), graphics (e.g., figures, tables), and multimedia to aid comprehension, if needed.	**Production of Writing:** Topic Development—Purpose and Focus Organization, Unity, and Cohesion	
c.	Develop the topic thoroughly by selecting the most significant and relevant facts, extended definitions, concrete details, quotations, or other information and examples appropriate to the audience's knowledge of the topic.	**Production of Writing:** Topic Development—Purpose and Focus	
d.	Use appropriate and varied transitions and syntax to link the major sections of the text, create cohesion, and clarify the relationships among complex ideas and concepts.	**Production of Writing:** Organization, Unity, and Cohesion	
e.	Use precise language, domain-specific vocabulary, and techniques such as metaphor, simile, and analogy to manage the complexity of the topic.	**Production of Writing:** Topic Development—Purpose and Focus **Knowledge of Language:** Expressing Ideas Clearly	
f.	Establish and maintain a formal style and objective tone while attending to the norms and conventions of the discipline in which they are writing.	**Knowledge of Language:** Expressing Ideas Clearly Style	
g.	Provide a concluding statement or section that follows from and supports the information or explanation presented.	**Production of Writing:** Organization, Unity, and Cohesion	
h.	Develop and strengthen writing as needed by revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience.	**All reporting categories**	
W.11-12.3	Write narratives to develop real or imagined experiences or events using effective technique, well-chosen details, and well-structured event sequences.	**All reporting categories**	
a.	Organize information and ideas around a topic to plan and prepare to write.		

North Carolina Standards Categories and Numbers	Standard	The ACT English Reporting Categories and Skill Areas	The ACT Reading Reporting Categories and Skill Areas
b.	Engage and orient the reader by setting out a problem, situation, or observation and its significance, establishing one or multiple point(s) of view, and introducing a narrator and/or characters; create a smooth progression of experiences or events.	**Production of Writing:** Topic Development—Purpose and Focus Organization, Unity, and Cohesion	
c.	Use narrative techniques, such as dialogue, pacing, description, reflection, and multiple plot lines, to develop experiences, events, and/or characters.	**Production of Writing:** Topic Development—Purpose and Focus	
d.	Use a variety of techniques to sequence events so that they build on one another to create a coherent whole and build toward a particular tone and outcome.	**Production of Writing:** Organization, Unity, and Cohesion	
e.	Use precise words and phrases, telling details, and sensory language to convey a vivid picture of the experiences, events, setting, and/or characters.	**Production of Writing:** Topic Development—Purpose and Focus **Knowledge of Language:** Expressing Ideas Clearly Style	
f.	Provide a conclusion that follows from and reflects on what is experienced, observed, or resolved over the course of the narrative.	**Production of Writing:** Organization, Unity, and Cohesion	
g.	Develop and strengthen writing as needed by revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience.	**All reporting categories**	
W.11-12.4	Use digital tools and resources to produce, publish, and update individual or shared writing products in response to ongoing feedback, including new arguments or information.		
Research			
W.11-12.5	Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation.		
W.11-12.6	Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the strengths and limitations of each source in terms of the task, purpose, and audience; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and overreliance on any one source and following a standard format for citation		

CROSSWALK:
North Carolina Mathematics Standards Aligned to ACT Assessments

Table 3: North Carolina Math Standards, Math 1–3 (adopted 2017) Aligned to PreACT and ACT

North Carolina Standards Categories and Numbers	North Carolina Mathematics Standards	PreACT and ACT Math Reporting Categories and Skill Areas
	Math 1	
	Standards for Mathematical Practice	
1	Make sense of problems and persevere in solving them.	**Modeling:** Producing Interpreting Understanding Evaluating
2	Reason abstractly and quantitatively.	**Modeling:** Producing Interpreting
3	Construct viable arguments and critique the reasoning of others.	**Modeling:** Producing Interpreting Understanding
4	Model with mathematics.	**Modeling:** Producing Interpreting Understanding Evaluating Improving
5	Use appropriate tools strategically.	**Modeling:** Producing Understanding Evaluating
6	Attend to precision.	**Modeling:** Interpreting Understanding
7	Look for and make use of structure.	**Modeling:** Producing Understanding Evaluating

North Carolina Standards Categories and Numbers	North Carolina Mathematics Standards	PreACT and ACT Math Reporting Categories and Skill Areas
	Math 1	
8	Look for and express regularity in repeated reasoning.	**Modeling:** Understanding Evaluating
	Number and Quantity	
NC.M1.N-RN	The Real Number System	
	Extend the properties of exponents to rational exponents.	
NC.M1.N-RN.2	Rewrite expressions involving radicals and rational exponents using the properties of exponents.	**Number and Quantity:** Properties of Exponents
	Algebra	
A-SSE	Seeing Structure in Expressions	
	Interpret the structure of expressions.	
NC.M1.A-SSE.1	Interpret expressions that represent a quantity in terms of its context.	**Algebra:** Linear Expressions, Equations, and Inequalities Quadratic Expressions, Equations, and Inequalities **Functions:** Exponential and Logarithmic Functions Properties of Functions
a.	Identify and interpret parts of a linear, exponential, or quadratic expression, including terms, factors, coefficients, and exponents.	**Algebra:** Linear Expressions, Equations, and Inequalities Quadratic Expressions, Equations, and Inequalities **Functions:** Exponential and Logarithmic Functions Properties of Functions
b.	Interpret a linear, exponential, or quadratic expression made of multiple parts as a combination of entities to give meaning to an expression.	**Algebra:** Linear Expressions, Equations, and Inequalities Quadratic Expressions, Equations, and Inequalities **Functions:** Exponential and Logarithmic Functions Properties of Functions
	Write expressions in equivalent forms to solve problems.	
NC.M1.A-SSE.3	Write an equivalent form of a quadratic expression $ax^2 + bx + c$, where a is an integer, by factoring to reveal the solutions of the equation or the zeros of the function the expression defines.	**Algebra:** Quadratic Expressions, Equations, and Inequalities Representation of Expressions and Equations
A-APR	Arithmetic with Polynomial Expressions	

North Carolina Standards Categories and Numbers	North Carolina Mathematics Standards	PreACT and ACT Math Reporting Categories and Skill Areas
	Math 1	
	Perform arithmetic operations on polynomials.	
NC.M1.A-APR.1	Build an understanding that operations with polynomials are comparable to operations with integers by adding and subtracting quadratic expressions and by adding, subtracting, and multiplying linear expressions	**Algebra:** Linear Expressions, Equations, and Inequalities Quadratic Expressions, Equations, and Inequalities Representation of Expressions and Equations **Integrating Essential Skills:** Writing Algebraic Expressions
	Understand the relationship between zeros and factors of polynomials.	
NC.M1.A-APR.3	Understand the relationships among the factors of a quadratic expression, the solutions of a quadratic equation, and the zeros of a quadratic function.	**Algebra:** Quadratic Expressions, Equations, and Inequalities **Functions:** Properties of Functions
A-CED	Creating Equations	
	Create equations that describe numbers or relationships.	
NC.M1.A-CED.1	Create equations and inequalities in one variable that represent linear, exponential, and quadratic relationships and use them to solve problems.	**Algebra:** Linear Expressions, Equations, and Inequalities Quadratic Expressions, Equations, and Inequalities Rational and Radical Expressions and Equations **Functions:** Exponential and Logarithmic Functions Integrating Essential Skills: Writing and Solving Simple Equations and Inequalities
NC.M1.A-CED.2	Create and graph equations in two variables to represent linear, exponential, and quadratic relationships between quantities.	**Algebra:** Linear Expressions, Equations, and Inequalities Quadratic Expressions, Equations, and Inequalities **Functions:** Properties of Functions Exponential and Logarithmic Functions **Integrating Essential Skills:** Writing and Solving Simple Equations and Inequalities

North Carolina Standards Categories and Numbers	North Carolina Mathematics Standards	PreACT and ACT Math Reporting Categories and Skill Areas
	Math 1	
NC.M1.A-CED.3	Create systems of linear equations and inequalities to model situations in context.	**Algebra:** Linear Expressions, Equations, and Inequalities Quadratic Expressions, Equations, and Inequalities **Functions:** Properties of Functions Exponential and Logarithmic Functions **Integrating Essential Skills:** Writing and Solving Simple Equations and Inequalities
NC.M1.A-CED.4	Solve for a quantity of interest in formulas used in science and mathematics using the same reasoning as in solving equations.	**Algebra:** Representation of Expressions and Equations
A-REI	**Reasoning with Equations and Inequalities**	
	Understand solving equations as a process of reasoning and explain the reasoning.	
NC.M1.A-REI.1	Justify a chosen solution method and each step of the solving process for linear and quadratic equations using mathematical reasoning.	**Algebra:** Linear Expressions, Equations, and Inequalities Quadratic Expressions, Equations, and Inequalities
	Solve equations and inequalities in one variable.	
NC.M1. A-REI.3	Solve linear equations and inequalities in one variable.	**Algebra:** Linear Expressions, Equations, and Inequalities **Integrating Essential Skills:** Writing and Solving Simple Equations and Inequalities
NC.M1.A-REI.4	Solve for the real solutions of quadratic equations in one variable by taking square roots and factoring.	**Algebra:** Quadratic Expressions, Equations, and Inequalities
	Solve systems of equations.	
NC.M1.A-REI.5	Explain why replacing one equation in a system of linear equations by the sum of that equation and a multiple of the other produces a system with the same solutions.	**Algebra:** Systems of Equations and Inequalities
NC.M1.A A-REI.6	Use tables, graphs, or algebraic methods (substitution and elimination) to find approximate or exact solutions to systems of linear equations and interpret solutions in terms of a context.	**Algebra:** Systems of Equations and Inequalities
	Represent and solve equations and inequalities graphically.	

North Carolina Standards Categories and Numbers	North Carolina Mathematics Standards	PreACT and ACT Math Reporting Categories and Skill Areas
	Math 1	
NC.M1.A-REI.10	Understand that the graph of a two variable equation represents the set of all solutions to the equation.	**Algebra:** Linear Expressions, Equations, and Inequalities Quadratic Expressions, Equations, and Inequalities **Functions:** Exponential and Logarithmic Functions
NC.M1.A-REI.11	Build an understanding of why the *x*-coordinates of the points where the graphs of two linear, exponential, and/or quadratic equations $y = f(x)$ and $y = g(x)$ intersect are the solutions of the equation $f(x) = g(x)$ and approximate solutions using graphing technology or successive approximations with a table of values.	**Algebra:** Systems of Equations and Inequalities
NC.M1.A-REI.12	Represent the solutions of a linear inequality or a system of linear inequalities graphically as a region of the plane.	**Algebra:** Systems of Equations and Inequalities
	Functions	
F-IF	Interpreting Functions	
	Understand the concept of a function, and use function notation.	
NC.M1.F-IF.1	Build an understanding that a function from one set (called the domain) to another set (called the range) assigns to each element of the domain exactly one element of the range by recognizing that: • if *f* is a function and *x* is an element of its domain, then $f(x)$ denotes the output of *f* corresponding to the input x. • the graph of *f* is the graph of the equation $y = f(x)$.	**Functions:** Properties of Functions
NC.M1.F-IF.2	Use function notation to evaluate linear, quadratic, and exponential functions for inputs in their domains, and interpret statements that use function notation in terms of a context.	**Functions:** Properties of Functions
NC.M1.F-IF.3	Recognize that recursively and explicitly defined sequences are functions whose domain is a subset of the integers, the terms of an arithmetic sequence are a subset of the range of a linear function, and the terms of a geometric sequence are a subset of the range of an exponential function.	**Functions:** Sequences and Series
	Interpret functions that arise in applications in terms of the context.	
NC.M1.F-IF.4	Interpret key features of graphs, tables, and verbal descriptions in context to describe functions that arise in applications relating two quantities, including: intercepts; intervals where the function is increasing, decreasing, positive, or negative; and maximums and minimums.	**Functions:** Properties of Functions

North Carolina Standards Categories and Numbers	North Carolina Mathematics Standards	PreACT and ACT Math Reporting Categories and Skill Areas
	Math 1	
NC.M1.F-IF.5	Interpret a function in terms of the context by relating its domain and range to its graph and, where applicable, to the quantitative relationship it describes.	**Functions:** Properties of Functions
NC.M1.F-IF.6	Calculate and interpret the average rate of change over a specified interval for a function presented numerically, graphically, and/or symbolically.	**Functions:** Properties of Functions
	Analyze functions using different representations.	
NC.M1.F-IF.7	Analyze linear, exponential, and quadratic functions by generating different representations, by hand in simple cases and using technology for more complicated cases, to show key features, including: domain and range; rate of change; intercepts; intervals where the function is increasing, decreasing, positive, or negative; maximums and minimums; and end behavior.	**Functions:** Properties of Functions
NC.M1.F-IF.8	Use equivalent expressions to reveal and explain different properties of a function.	**Algebra:** Representation of Expressions and Equations **Functions:** Properties of Functions
a.	Rewrite a quadratic function to reveal and explain different key features of the function.	**Algebra:** Quadratic Expressions, Equations, and Inequalities Representation of Expressions and Equations **Functions:** Properties of Functions
b.	Interpret and explain growth and decay rates for an exponential function.	**Functions:** Properties of Functions Exponential and Logarithmic Functions
NC.M1.F-IF.9	Compare key features of two functions (linear, quadratic, or exponential) each with a different representation (symbolically, graphically, numerically in tables, or by verbal descriptions).	**Functions:** Properties of Functions
F-BF	**Building Functions**	
	Build a function that models a relationship between two quantities.	

North Carolina Standards Categories and Numbers	North Carolina Mathematics Standards	PreACT and ACT Math Reporting Categories and Skill Areas
	Math 1	
NC.M1.F-BF.1	Write a function that describes a relationship between two quantities.	**Algebra:** Linear Expressions, Equations, and Inequalities **Functions:** Properties of Functions Function Composition, Transformation, and Inverse Functions Exponential and Logarithmic Functions **Integrating Essential Skills:** Writing and Solving Simple Equations and Inequalities
a.	Build linear and exponential functions, including arithmetic and geometric sequences, given a graph, a description of a relationship, or two ordered pairs (include reading these from a table).	**Algebra:** Linear Expressions, Equations, and Inequalities **Functions:** Properties of Functions Function Composition, Transformation, and Inverse Functions Exponential and Logarithmic Functions **Integrating Essential Skills:** Writing and Solving Simple Equations and Inequalities
b.	Build a function that models a relationship between two quantities by combining linear, exponential, or quadratic functions with addition and subtraction or two linear functions with multiplication.	**Functions:** Properties of Functions Function Composition, Transformation, and Inverse Functions
NC.M1.F-BF.2	Translate between explicit and recursive forms of arithmetic and geometric sequences and use both to model situations.	**Functions:** Sequences and Series
F-LE	**Linear, Quadratic, and Exponential Models**	
	Construct and compare linear, quadratic, and exponential models and solve problems.	
NC.M1.F-LE.1	Identify situations that can be modeled with linear and exponential functions, and justify the most appropriate model for a situation based on the rate of change over equal intervals.	**Algebra:** Linear Expressions, Equations, and Inequalities Functions: **Functions:** Properties of Functions Exponential and Logarithmic Functions
F-LE.3	Compare the end behavior of linear, exponential, and quadratic functions using graphs and tables to show that a quantity increasing exponentially eventually exceeds a quantity increasing linearly or quadratically.	**Functions:** Properties of Functions
	Interpret expressions for functions in terms of the situation they model.	

North Carolina Standards Categories and Numbers	North Carolina Mathematics Standards	PreACT and ACT Math Reporting Categories and Skill Areas
	Math 1	
NC.M1.F-LE.5	Interpret the parameters a and b in a linear function $f(x) = ax + b$ or an exponential function $g(x) = ab^x$ in terms of a context.	**Algebra:** Linear Expressions, Equations, and Inequalities **Functions:** Properties of Functions Exponential and Logarithmic Functions
	Geometry	
G-GPE	**Expressing Geometric Properties with Equations**	
	Use coordinates to prove simple geometric theorems algebraically.	
NC.M1.G-GPE.4	Use coordinates to solve geometric problems involving polygons algebraically. • Use coordinates to compute perimeters of polygons and areas of triangles and rectangles. • Use coordinates to verify algebraically that a given set of points produces a particular type of triangle or quadrilateral.	**Geometry:** Coordinate Geometry **Integrating Essential Skills:** The Coordinate Plane
NC.M1.G-GPE.5	Use coordinates to prove the slope criteria for parallel and perpendicular lines and use them to solve problems. • Determine if two lines are parallel, perpendicular, or neither. • Find the equation of a line parallel or perpendicular to a given line that passes through a given point.	**Geometry:** Coordinate Geometry
NC.M1.G-GPE.6	Use coordinates to find the midpoint or endpoint of a line segment.	**Geometry:** Coordinate Geometry
	Statistics and Probability	
S-ID	**Interpreting Categorical and Quantitative Data**	
	Summarize, represent, and interpret data on a single count or measurement variable.	
NC.M1.S-ID.1	Use technology to represent data with plots on the real number line (histograms, and box plots).	**Statistics and Probability:** Univariate Data Analysis **Integrating Essential Skills:** Data Summaries and Displays
NC.M1.S-ID.2	Use statistics appropriate to the shape of the data distribution to compare center (median, mean) and spread (interquartile range, standard deviation) of two or more different data sets. Interpret differences in shape, center, and spread in the context of the data sets.	**Statistics and Probability:** Univariate Data Analysis **Integrating Essential Skills:** Data Summaries and Displays
NC.M1.S-ID.3	Examine the effects of extreme data points (outliers) on shape, center, and/or spread.	**Statistics and Probability:** Univariate Data Analysis

North Carolina Standards Categories and Numbers	North Carolina Mathematics Standards	PreACT and ACT Math Reporting Categories and Skill Areas
	Math 1	
NC.M1.S-ID.6	Represent data on two quantitative variables on a scatter plot, and describe how the variables are related.	**Statistics and Probability:** Bivariate Data Analysis Scatterplots
a.	Fit a least squares regression line to linear data using technology. Use the fitted function to solve problems.	**Statistics and Probability:** Bivariate Data Analysis Scatterplots
b.	Assess the fit of a linear function by analyzing residuals.	**Statistics and Probability:** Bivariate Data Analysis Scatterplots
c.	Fit a function to exponential data using technology. Use the fitted function to solve problems.	**Statistics and Probability:** Bivariate Data Analysis Scatterplots
	Interpret linear models.	
NC.M1.S-ID.7	Interpret in context the rate of change and the intercept of a linear model. Use the linear model to interpolate and extrapolate predicted values. Assess the validity of a predicted value.	**Statistics and Probability:** Bivariate Data Analysis
NC.M1.S-ID.8	Analyze patterns and describe relationships between two variables in context. Using technology, determine the correlation coefficient of bivariate data and interpret it as a measure of the strength and direction of a linear relationship. Use a scatter plot, correlation coefficient, and a residual plot to determine the appropriateness of using a linear function to model a relationship between two variables.	**Statistics and Probability:** Bivariate Data Analysis
NC.M1.S-ID.9	Distinguish between association and causation.	

North Carolina Standards Categories and Numbers	North Carolina Mathematics Standards	PreACT and ACT Math Reporting Categories and Skill Areas
	Math 2	
	Standards for Mathematical Practice	
1	Make sense of problems and persevere in solving them.	**Modeling:** Producing Interpreting Understanding Evaluating
2	Reason abstractly and quantitatively.	**Modeling:** Producing Interpreting

North Carolina Standards Categories and Numbers	North Carolina Mathematics Standards	PreACT and ACT Math Reporting Categories and Skill Areas
	Math 2	
3	Construct viable arguments and critique the reasoning of others.	**Modeling:** Producing Interpreting Understanding
4	Model with mathematics.	**Modeling:** Producing Interpreting Understanding Evaluating Improving
5	Use appropriate tools strategically.	**Modeling:** Producing Understanding Evaluating
6	Attend to precision.	**Modeling:** Interpreting Understanding
7	Look for and make use of structure.	**Modeling:** Producing Understanding Evaluating
8	Look for and express regularity in repeated reasoning.	**Modeling:** Understanding Evaluating
	Number and Quantity	
N-RN	**The Real Number System**	
	Extend the properties of exponents to rational exponents.	
NC.M2.N-RN.1	Explain how expressions with rational exponents can be rewritten as radical expressions.	**Number and Quantity:** Properties of Exponents
NC.M2.N-RN.2	Rewrite expressions with radicals and rational exponents into equivalent expressions using the properties of exponents.	**Number and Quantity:** Properties of Exponents
	Use properties of rational and irrational numbers.	

North Carolina Standards Categories and Numbers	North Carolina Mathematics Standards	PreACT and ACT Math Reporting Categories and Skill Areas
	Math 2	
N-RN.3	Use the properties of rational and irrational numbers to explain why: • the sum or product of two rational numbers is rational; • the sum of a rational number and an irrational number is irrational; • the product of a nonzero rational number and an irrational number is irrational.	**Number and Quantity:** Rational and Irrational Numbers
N-CN	**The Complex Number System**	
	Defining complex numbers.	
NC.M2.N-CN.1	Know there is a complex number i such that $i^2 = -1$, and every complex number has the form $a + bi$ where a and b are real numbers.	**Number and Quantity:** Complex Numbers
	Algebra	
A-SSE	**Seeing Structure in Expressions**	
	Interpret the structure of expressions.	
NC.M2.A-SSE.1	Interpret expressions that represent a quantity in terms of its context.	**Algebra:** Quadratic Expressions, Equations, and Inequalities Rational and Radical Expressions and Equations **Geometry:** Similarity, Right Triangles, and Trigonometry
a.	Identify and interpret parts of a linear, exponential, or quadratic expression, including terms, factors, coefficients, and exponents. Identify and interpret parts of a quadratic, square root, inverse variation, or right triangle trigonometric expression, including terms, factors, coefficients, radicands, and exponents.	**Algebra:** Quadratic Expressions, Equations, and Inequalities Rational and Radical Expressions and Equations **Geometry:** Similarity, Right Triangles, and Trigonometry
b.	Interpret quadratic and square root expressions made of multiple parts as a combination of single entities to give meaning in terms of a context.	**Algebra:** Quadratic Expressions, Equations, and Inequalities Rational and Radical Expressions and Equations
NC.M2.A-SSE.3	Write an equivalent form of a quadratic expression by completing the square, where a is an integer of a quadratic expression, $ax^2 + bx + c$, to reveal the maximum or minimum value of the function the expression defines.	**Algebra:** Quadratic Expressions, Equations, and Inequalities Representation of Expressions and Equations **Functions:** Properties of Functions
A-APR	**Arithmetic with Polynomials and Rational Expressions**	
	Perform arithmetic operations on polynomials.	

North Carolina Standards Categories and Numbers	North Carolina Mathematics Standards	PreACT and ACT Math Reporting Categories and Skill Areas
	Math 2	
NC.M2.A-APR.1	Create equations and inequalities in one variable that represent quadratic, square root, inverse variation, and right triangle trigonometric relationships and use them to solve problems.	**Algebra:** Quadratic Expressions, Equations, and Inequalities Polynomial Expressions and Equations Representation of Expressions and Equations **Integrating Essential Skills:** Writing Algebraic Expressions
A-CED	**Creating Equations**	
	Create equations that describe numbers or relationships.	
NC.M2.A-CED.1	Create equations and inequalities in one variable that represent linear, exponential, and quadratic relationships and use them to solve problems.	**Algebra:** Quadratic Expressions, Equations, and Inequalities Rational and Radical Expressions and Equations **Functions:** Trigonometric Functions **Geometry:** Similarity, Right Triangles, and Trigonometry
NC.M2.A-CED.2	Create and graph equations in two variables to represent quadratic, square root and inverse variation relationships between quantities.	**Algebra:** Quadratic Expressions, Equations, and Inequalities Rational and Radical Expressions and Equations
NC.M2.A-CED.3	Create systems of linear, quadratic, square root, and inverse variation equations to model situations in context.	**Algebra:** Systems of Equations and Inequalities
A-REI	**Reasoning with Equations and Inequalities**	
	Understand solving equations as a process of reasoning and explain the reasoning.	
NC.M2.A-REI.1	Justify a chosen solution method and each step of the solving process for quadratic, square root and inverse variation equations using mathematical reasoning.	**Algebra:** Quadratic Expressions, Equations, and Inequalities Rational and Radical Expressions and Equations
NC.M2.A-REI.2	Solve and interpret one variable inverse variation and square root equations arising from a context, and explain how extraneous solutions may be produced.	**Algebra:** Rational and Radical Expressions and Equations
	Solve equations and inequalities in one variable.	
NC.M2.A-REI.4	Solve for the real solutions of quadratic equations in one variable by taking square roots and factoring.	**Algebra:** Quadratic Expressions, Equations, and Inequalities
a.	Understand that the quadratic formula is the generalization of solving $ax^2 + bx + c$ by using the process of completing the square.	**Algebra:** Quadratic Expressions, Equations, and Inequalities

North Carolina Standards Categories and Numbers	North Carolina Mathematics Standards	PreACT and ACT Math Reporting Categories and Skill Areas
	Math 2	
b.	Explain when quadratic equations will have non-real solutions and express complex solutions as $a \pm bi$ for real numbers a and b.	**Number and Quantity:** Complex Numbers **Algebra:** Quadratic Expressions, Equations, and Inequalities
	Solve systems of equations.	
NC.M2.A-REI.7	Use tables, graphs, and algebraic methods to approximate or find exact solutions of systems of linear and quadratic equations, and interpret the solutions in terms of a context.	**Algebra:** Systems of Equations and Inequalities
	Represent and solve equations and inequalities graphically.	
NC.M2.A-REI.11	Extend the understanding that the x-coordinates of the points where the graphs of two square root and/or inverse variation equations $y = f(x)$ and $y=g(x)$ intersect are the solutions of the equation $f(x) = g(x)$ and approximate solutions using graphing technology or successive approximations with a table of values.	**Algebra:** Systems of Equations and Inequalities
	Functions	
F-IF	Interpreting Functions	
	Understand the concept of a function and use function notation.	
NC.M2.F-IF.1	Extend the concept of a function to include geometric transformations in the plane by recognizing that: • the domain and range of a transformation function f are sets of points in the plane; • the image of a transformation is a function of its pre-image.	**Geometry:** Transformations
NC.M2.F-IF.2	Extend the use of function notation to express the image of a geometric figure in the plane resulting from a translation, rotation by multiples of 90 degrees about the origin, reflection across an axis, or dilation as a function of its pre-image.	**Geometry:** Transformations
	Interpret functions that arise in applications in terms of the context.	
NC.M2.F-IF.4	Interpret key features of graphs, tables, and verbal descriptions in context to describe functions that arise in applications relating two quantities, including: domain and range, rate of change, symmetries, and end behavior.	**Algebra:** Quadratic Expressions, Equations, and Inequalities Rational and Radical Expressions and Equations **Functions:** Properties of Functions
	Analyze functions using different representations.	

North Carolina Standards Categories and Numbers	North Carolina Mathematics Standards	PreACT and ACT Math Reporting Categories and Skill Areas
	Math 2	
NC.M2.F-IF.7	Analyze quadratic, square root, and inverse variation functions by generating different representations, by hand in simple cases and using technology for more complicated cases, to show key features, including: domain and range; intercepts; intervals where the function is increasing, decreasing, positive, or negative; rate of change; maximums and minimums; symmetries; and end behavior.	**Functions:** Properties of Functions
NC.M2.F-IF.8	Use equivalent expressions to reveal and explain different properties of a function by developing and using the process of completing the square to identify the zeros, extreme values, and symmetry in graphs and tables representing quadratic functions, and interpret these in terms of a context.	**Algebra:** Representation of Expressions and Equations **Functions:** Properties of Functions
NC.M2.F-IF.9	Compare key features of two functions (linear, quadratic, square root, or inverse variation functions) each with a different representation (symbolically, graphically, numerically in tables, or by verbal descriptions).	**Functions:** Properties of Functions
F-BF	**Building Functions**	
	Build a function that models a relationship between two quantities.	
NC.M2.F-BF.1	Write a function that describes a relationship between two quantities by building quadratic functions with real solution(s) and inverse variation functions given a graph, a description of a relationship, or ordered pairs (include reading these from a table).	**Algebra:** Quadratic Expressions, Equations, and Inequalities Rational and Radical Expressions and Equations **Functions:** Properties of Functions
	Build new functions from existing functions.	
NC.M2.F-BF.3	Understand the effects of the graphical and tabular representations of a linear, quadratic, square root, and inverse variation function f with $k \cdot f(x)$, $f(x) + k$, $f(x + k)$ for specific values of k (both positive and negative).	**Functions:** Function Composition, Transformation, and Inverse Functions
	Geometry	
G.CO	**Congruence**	
	Experiment with transformations in the plane.	
NC.M2.G-CO.2	Experiment with transformations in the plane. • Represent transformations in the plane. • Compare rigid motions that preserve distance and angle measure (translations, reflections, rotations) to transformations that do not preserve both distance and angle measure (e.g. stretches, dilations). • Understand that rigid motions produce congruent figures while dilations produce similar figures.	**Geometry:** Transformations

North Carolina Standards Categories and Numbers	North Carolina Mathematics Standards	PreACT and ACT Math Reporting Categories and Skill Areas
	Math 2	
NC.M2.G-CO.3	Given a triangle, quadrilateral, or regular polygon, describe any reflection or rotation symmetry i.e., actions that carry the figure onto itself. Identify center and angle(s) of rotation symmetry. Identify line(s) of reflection symmetry.	**Geometry:** Transformations
NC.M2.G-CO.4	Verify experimentally properties of rotations, reflections, and translations in terms of angles, circles, perpendicular lines, parallel lines, and line segments.	**Geometry:** Transformations
NC.M2.G-CO.5	Given a geometric figure and a rigid motion, find the image of the figure. Given a geometric figure and its image, specify a rigid motion or sequence of rigid motions that will transform the pre-image to its image.	**Geometry:** Transformations
	Understand congruence in terms of rigid motions.	
NC.M2.G-CO.6	Use geometric descriptions of rigid motions to transform figures and to predict the effect of a given rigid motion on a given figure; given two figures, use the definition of congruence in terms of rigid motions to decide if they are congruent.	**Geometry:** Transformations
NC.M2.G-CO.7	Use the properties of rigid motions to show that two triangles are congruent if and only if corresponding pairs of sides and corresponding pairs of angles are congruent.	**Geometry:** Transformations
NC.M2.G-CO.8	Use congruence in terms of rigid motion. Justify the ASA, SAS, and SSS criteria for triangle congruence. Use criteria for triangle congruence (ASA, SAS, SSS, HL) to determine whether two triangles are congruent.	**Geometry:** Transformations
	Prove geometric theorems.	
NC.M2.G-CO.9	Prove theorems about lines and angles and use them to prove relationships in geometric figures including: • Vertical angles are congruent. • When a transversal crosses parallel lines, alternate interior angles are congruent. • When a transversal crosses parallel lines, corresponding angles are congruent. • Points are on a perpendicular bisector of a line segment if and only if they are equidistant from the endpoints of the segment. • Use congruent triangles to justify why the bisector of an angle is equidistant from the sides of the angle.	**Geometry:** Proof, Reasoning, and Constructions

North Carolina Standards Categories and Numbers	North Carolina Mathematics Standards	PreACT and ACT Math Reporting Categories and Skill Areas
	Math 2	
NC.M2.G-CO.10	Prove theorems about triangles and use them to prove relationships in geometric figures including: • The sum of the measures of the interior angles of a triangle is 180°. • An exterior angle of a triangle is equal to the sum of its remote interior angles. • The base angles of an isosceles triangle are congruent. • The segment joining the midpoints of two sides of a triangle is parallel to the third side and half the length.	**Geometry:** Proof, Reasoning, and Constructions
G-SRT	**Similarity, Right Triangles, and Trigonometry**	
	Understand similarity in terms of similarity transformations.	
NC.M2.G-SRT.1	Verify experimentally the properties of dilations with given center and scale factor:	**Geometry:** Transformations Similarity, Right Triangles, and Trigonometry
a.	When a line segment passes through the center of dilation, the line segment and its image lie on the same line. When a line segment does not pass through the center of dilation, the line segment and its image are parallel.	**Geometry:** Transformations Similarity, Right Triangles, and Trigonometry
b.	The length of the image of a line segment is equal to the length of the line segment multiplied by the scale factor.	**Geometry:** Transformations Similarity, Right Triangles, and Trigonometry
c.	The distance between the center of a dilation and any point on the image is equal to the scale factor multiplied by the distance between the dilation center and the corresponding point on the pre-image.	**Geometry:** Transformations Similarity, Right Triangles, and Trigonometry
d.	Dilations preserve angle measure.	**Geometry:** Transformations Similarity, Right Triangles, and Trigonometry
NC.M2.G-SRT.2	Understand similarity in terms of transformations.	**Geometry:** Transformations Similarity, Right Triangles, and Trigonometry **Integrating Essential Skills:** Properties of Lines, Angles, and Shapes
a.	Determine whether two figures are similar by specifying a sequence of transformations that will transform one figure into the other.	**Geometry:** Transformations Similarity, Right Triangles, and Trigonometry **Integrating Essential Skills:** Properties of Lines, Angles, and Shapes

North Carolina Standards Categories and Numbers	North Carolina Mathematics Standards	PreACT and ACT Math Reporting Categories and Skill Areas
	Math 2	
b.	Use the properties of dilations to show that two triangles are similar when all corresponding pairs of sides are proportional and all corresponding pairs of angles are congruent.	**Geometry:** Transformations Similarity, Right Triangles, and Trigonometry
NC.M2.G-SRT.3	Use the properties of similarity transformations to establish the AA criterion for two triangles to be similar.	**Geometry:** Transformations Similarity, Right Triangles, and Trigonometry
	Prove and apply theorems involving similarity.	
NC.M2.G-SRT.4	Use similarity to solve problems and to prove theorems about triangles. Use theorems about triangles to prove relationships in geometric figures. • A line parallel to one side of a triangle divides the other two sides proportionally and its converse. • The Pythagorean Theorem	**Geometry:** Proof, Reasoning, and Constructions Similarity, Right Triangles, and Trigonometry
	Define trigonometric ratios, and solve problems involving right triangles.	
NC.M2.G-SRT.6	Verify experimentally that the side ratios in similar right triangles are properties of the angle measures in the triangle, due to the preservation of angle measure in similarity. Use this discovery to develop definitions of the trigonometric ratios for acute angles.	**Geometry:** Similarity, Right Triangles, and Trigonometry
NC.M2.G-SRT.8	Use trigonometric ratios and the Pythagorean Theorem to solve problems involving right triangles in terms of a context.	**Geometry:** Similarity, Right Triangles, and Trigonometry **Integrating Essential Skills:** Pythagorean Theorem
NC.M2.G-SRT.12	Develop properties of special right triangles (45-45-90 and 30-60-90) and use them to solve problems.	**Geometry:** Similarity, Right Triangles, and Trigonometry **Integrating Essential Skills:** Pythagorean Theorem
	Statistics and Probability	
S-IC	Making Inferences and Justifying Conclusions	
	Understand and evaluate random processes underlying statistical experiments.	
NC.M2.S-IC.2	Use simulation to determine whether the experimental probability generated by sample data is consistent with the theoretical probability based on known information about the population.	**Statistics and Probability:** Introduction to Formal Inferential Statistics **Integrating Essential Skills:** Basic Probability

North Carolina Standards Categories and Numbers	North Carolina Mathematics Standards	PreACT and ACT Math Reporting Categories and Skill Areas
	Math 2	
S-CP	**Conditional Probability and the Rules of Probability**	
	Understand independence and conditional probability and use them to interpret data.	
NC.M2.S-CP.1	Describe events as subsets of the outcomes in a sample space using characteristics of the outcomes or as unions, intersections and complements of other events.	**Statistics and Probability:** Counting, Permutations, and Combinations
NC.M2.S-CP.3	Develop and understand independence and conditional probability.	**Statistics and Probability:** Rules of Probability
a.	Use a 2-way table to develop understanding of the conditional probability of A given B (written P(A|B)) as the likelihood that A will occur given that B has occurred. That is, P(A|B) is the fraction of event B's outcomes that also belong to event A.	**Statistics and Probability:** Rules of Probability
b.	Understand that event A is independent from event B if the probability of event A does not change in response to the occurrence of event B. That is P(A|B) = P(A).	**Statistics and Probability:** Rules of Probability
NC.M2.S-CP.4	Represent data on two categorical variables by constructing a two-way frequency table of data. Interpret the two-way table as a sample space to calculate conditional, joint and marginal probabilities. Use the table to decide if events are independent.	**Statistics and Probability:** Rules of Probability
NC.M2.S-CP.5	Recognize and explain the concepts of conditional probability and independence in everyday language and everyday situations.	**Statistics and Probability:** Rules of Probability
	Use the rules of probability to compute probabilities of compound events in a uniform probability model	
NC.M2.S-CP.6	Find the conditional probability of A given B as the fraction of B's outcomes that also belong to A, and interpret the answer in context.	**Statistics and Probability:** Rules of Probability
NC.M2.S-CP.7	Apply the Addition Rule, P(A or B) = P(A) + P(B) – P(A and B), and interpret the answer in context.	**Statistics and Probability:** Rules of Probability
NC.M2.S-CP.8	Apply the general Multiplication Rule P(A and B) = P(A)P(B|A) = P(B)P(A|B), and interpret the answer in context. Include the case where A and B are independent: P(A and B) = P(A) P(B).	**Statistics and Probability:** Rules of Probability

North Carolina Standards Categories and Numbers	North Carolina Mathematics Standards	PreACT and ACT Math Reporting Categories and Skill Areas
	Math 3	
	Standards for Mathematical Practice	
1	Make sense of problems and persevere in solving them.	**Modeling:** Producing Interpreting Understanding Evaluating
2	Reason abstractly and quantitatively.	**Modeling:** Producing Interpreting
3	Construct viable arguments and critique the reasoning of others.	**Modeling:** Producing Interpreting Understanding
4	Model with mathematics.	**Modeling:** Producing Interpreting Understanding Evaluating Improving
5	Use appropriate tools strategically.	**Modeling:** Producing Understanding Evaluating
6	Attend to precision.	**Modeling:** Interpreting Understanding
7	Look for and make use of structure.	**Modeling:** Producing Understanding Evaluating
8	Look for and express regularity in repeated reasoning.	**Modeling:** Understanding Evaluating
	Number and Quantity	
N-CN	**The Complex Number System**	
	Use complex numbers in polynomial identities and equations.	

North Carolina Standards Categories and Numbers	North Carolina Mathematics Standards	PreACT and ACT Math Reporting Categories and Skill Areas
	Math 3	
NC.M3.N-CN.9	Use the Fundamental Theorem of Algebra to determine the number and potential types of solutions for polynomial functions.	**Number and Quantity:** Complex Numbers **Algebra:** Polynomial Expressions and Equations **Functions:** Properties of Functions
	Algebra	
A-SSE	**Seeing Structure in Expressions**	
	Interpret the structure of expressions.	
NC.M3.A-SSE.1	Interpret expressions that represent a quantity in terms of its context.	**Algebra:** Linear Expressions, Equations, and Inequalities Rational and Radical Expressions and Equations Polynomial Expressions and Equations **Functions:** Properties of Functions Exponential and Logarithmic Functions
a.	Identify and interpret parts of a piecewise, absolute value, polynomial, exponential and rational expressions including terms, factors, coefficients, and exponents.	**Algebra:** Linear Expressions, Equations, and Inequalities Rational and Radical Expressions and Equations Polynomial Expressions and Equations **Functions:** Properties of Functions Exponential and Logarithmic Functions
b.	Interpret expressions composed of multiple parts by viewing one or more of their parts as a single entity to give meaning in terms of a context.	**Algebra:** Linear Expressions, Equations, and Inequalities Rational and Radical Expressions and Equations Polynomial Expressions and Equations **Functions:** Properties of Functions Exponential and Logarithmic Functions
NC.M3.A-SSE.2	Use the structure of an expression to identify ways to write equivalent expressions.	**Algebra:** Representation of Expressions and Equations
	Write expressions in equivalent forms to solve problems.	

North Carolina Standards Categories and Numbers	North Carolina Mathematics Standards	PreACT and ACT Math Reporting Categories and Skill Areas
	Math 3	
NC.M3.A-SSE.3	Write an equivalent form of an exponential expression by using the properties of exponents to transform expressions to reveal rates based on different intervals of the domain.	**Algebra:** Representation of Expressions and Equations **Functions:** Exponential and Logarithmic Functions
A-APR	**Arithmetic with Polynomials and Rational Expressions**	
	Understand the relationship between zeros and factors of polynomials	
NC.M3.A-APR.2	Understand and apply the Remainder Theorem.	**Algebra:** Polynomial Expressions and Equations
NC.M3.A-APR.3	Understand the relationship among factors of a polynomial expression, the solutions of a polynomial equation and the zeros of a polynomial function.	**Algebra:** Polynomial Expressions and Equations
	Rewrite rational expressions.	
NC.M3.A-APR.6	Rewrite simple rational expressions in different forms; write $a(x)/b(x)$ in the form $q(x) + r(x)/b(x)$, where $a(x)$, $b(x)$, $q(x)$ and $r(x)$ are polynomials with the degree of $r(x)$ less than the degree of $b(x)$.	**Algebra:** Rational and Radical Expressions and Equations Polynomial Expressions and Equations
NC.M3.A-APR.7	Understand the similarities between arithmetic with rational expressions and arithmetic with rational numbers.	**Algebra:** Rational and Radical Expressions and Equations
a.	Add and subtract two rational expressions, *a(x)* and *b(x),* where the denominators of both *a(x)* and *b(x)* are linear expressions.	**Algebra:** Rational and Radical Expressions and Equations
b.	Multiply and divide two rational expressions.	**Algebra:** Rational and Radical Expressions and Equations
A-CED	**Creating Equations**	
	Create equations that describe numbers or relationships.	
NC.M3.A-CED.1	Create equations and inequalities in one variable that represent absolute value, polynomial, exponential, and rational relationships and use them to solve problems algebraically and graphically.	**Algebra:** Linear Expressions, Equations, and Inequalities Rational and Radical Expressions and Equations Polynomial Expressions and Equations **Functions:** Exponential and Logarithmic Functions

North Carolina Standards Categories and Numbers	North Carolina Mathematics Standards	PreACT and ACT Math Reporting Categories and Skill Areas
	Math 3	
NC.M3.A-CED.2	Create and graph equations in two variables to represent absolute value, polynomial, exponential and rational relationships between quantities.	**Algebra:** Linear Expressions, Equations, and Inequalities Rational and Radical Expressions and Equations Polynomial Expressions and Equations **Functions:** Exponential and Logarithmic Functions
NC.M3.A-CED.3	Create systems of equations and/or inequalities to model situations in context.	**Algebra:** Systems of Equations and Inequalities
A-REI	**Reasoning with Equations and Inequalities**	
	Understand solving equations as a process of reasoning and explain the reasoning.	
NC.M3.A-REI.1	Justify a solution method for equations and explain each step of the solving process using mathematical reasoning.	**Algebra:** Linear Expressions, Equations, and Inequalities Rational and Radical Expressions and Equations Polynomial Expressions and Equations **Functions:** Exponential and Logarithmic Functions
NC.M2.A-REI.2	Solve and interpret one variable rational equations arising from a context, and explain how extraneous solutions may be produced.	**Algebra:** Rational and Radical Expressions and Equations
	Represent and solve equations and inequalities graphically.	
NC.M3.A-REI.11	Extend an understanding that the x-coordinates of the points where the graphs of two equations $y = f(x)$ and $y = g(x)$ intersect are the solutions of the equation $f(x) = g(x)$ and approximate solutions using a graphing technology or successive approximations with a table of values.	**Algebra:** Systems of Equations and Inequalities
	Functions	
F-IF	**Interpreting Functions**	
	Understand the concept of a function, and use function notation.	
NC.M3.F-IF.1	Extend the concept of a function by recognizing that trigonometric ratios are functions of angle measure.	**Geometry:** Trigonometric Functions Integrating Essential Skills: Similarity, Right Triangles, and Trigonometry
NC.M2.F-IF.2	Use function notation to evaluate piecewise defined functions for inputs in their domains, and interpret statements that use function notation in terms of a context.	**Functions:** Properties of Functions

North Carolina Standards Categories and Numbers	North Carolina Mathematics Standards	PreACT and ACT Math Reporting Categories and Skill Areas
	Math 3	
	Interpret functions that arise in applications in terms of the context.	
NC.M3.F-IF.4	Interpret key features of graphs, tables, and verbal descriptions in context to describe functions that arise in applications relating two quantities to include periodicity and discontinuities.	**Functions:** Properties of Functions
	Analyze functions using different representations.	
NC.M3.F-IF.7	Analyze piecewise, absolute value, polynomials, exponential, rational, and trigonometric functions (sine and cosine) using different representations to show key features of the graph, by hand in simple cases and using technology for more complicated cases, including: domain and range; intercepts; intervals where the function is increasing, decreasing, positive, or negative; rate of change; relative maximums and minimums; symmetries; end behavior; period; and discontinuities.	**Functions:** Properties of Functions
NC.M3.F-IF.9	Compare key features of two functions using different representations by comparing properties of two different functions, each with a different representation (symbolically, graphically, numerically in tables, or by verbal descriptions).	**Functions:** Properties of Functions
F-BF	**Building Functions**	
	Build a function that models a relationship between two quantities.	
NC.M3.F-BF.1	Write a function that describes a relationship between two quantities.	**Algebra:** Linear Expressions, Equations, and Inequalities Quadratic Expressions, Equations, and Inequalities Rational and Radical Expressions and Equations Polynomial Expressions and Equations **Functions:** Properties of Functions
a.	Build polynomial and exponential functions with real solution(s) given a graph, a description of a relationship, or ordered pairs (include reading these from a table).	**Algebra:** Polynomial Expressions and Equations **Functions:** Properties of Functions Exponential and Logarithmic Functions
b.	Build a new function, in terms of a context, by combining standard function types using arithmetic operations.	**Functions:** Properties of Functions Function Composition, Transformation, and Inverse Functions
	Build new functions from existing functions.	

North Carolina Standards Categories and Numbers	North Carolina Mathematics Standards	PreACT and ACT Math Reporting Categories and Skill Areas
	Math 3	
NC.M3.F-BF.3	Extend an understanding of the effects on the graphical and tabular representations of a function when replacing $f(x)$ with $k \cdot f(x)$, $f(x) + k$, $f(x + k)$ to include $f(k \cdot x)$ for specific values of k (both positive and negative).	**Functions:** Function Composition, Transformation, and Inverse Functions
NC.M3.F-BF.4	Find an inverse function.	**Functions:** Function Composition, Transformation, and Inverse Functions
a.	Understand the inverse relationship between exponential and logarithmic, quadratic and square root, and linear to linear functions and use this relationship to solve problems using tables, graphs, and equations.	**Functions:** Function Composition, Transformation, and Inverse Functions
b.	Determine if an inverse function exists by analyzing tables, graphs, and equations.	**Functions:** Function Composition, Transformation, and Inverse Functions
c.	If an inverse function exists for a linear, quadratic and/or exponential function, f, represent the inverse function, f^{-1}, with a table, graph, or equation and use it to solve problems in terms of a context.	**Functions:** Function Composition, Transformation, and Inverse Functions
F-LE	**Linear, Quadratic, and Exponential Models**	
	Construct and compare linear and exponential models and solve problems.	
NC.M3.F-LE.3	Compare the end behavior of functions using their rates of change over intervals of the same length to show that a quantity increasing exponentially eventually exceeds a quantity increasing as a polynomial function.	**Functions:** Exponential and Logarithmic Functions
NC.M3.F-LE.4	Use logarithms to express the solution to $ab^{ct} = d$ where a, b, c, and d are numbers and evaluate the logarithm using technology.	**Functions:** Exponential and Logarithmic Functions
F-TF	**Trigonometric Functions**	
	Extend the domain of trigonometric functions using the unit circle.	
NC.M3.F-TF.1	Understand radian measure of an angle as: • The ratio of the length of an arc on a circle subtended by the angle to its radius. • A dimensionless measure of length defined by the quotient of arc length and radius that is a real number. • The domain for trigonometric functions.	**Functions:** Trigonometric Functions
NC.M3.F-TF.2	Build an understanding of trigonometric functions by using tables, graphs and technology to represent the cosine and sine functions.	**Functions:** Trigonometric Functions
a.	Interpret the sine function as the relationship between the radian measure of an angle formed by the horizontal axis and a terminal ray on the unit circle and its y-coordinate.	**Functions:** Trigonometric Functions

North Carolina Standards Categories and Numbers	North Carolina Mathematics Standards	PreACT and ACT Math Reporting Categories and Skill Areas
	Math 3	
b.	Interpret the cosine function as the relationship between the radian measure of an angle formed by the horizontal axis and a terminal ray on the unit circle and its *x*-coordinate.	**Functions:** Trigonometric Functions
	Model periodic phenomena with trigonometric functions.	
NC.M3.F-TF.5	Use technology to investigate the parameters *a*, *b*, and *h* of a sine function, $f(x) = a \cdot \sin(b \cdot x) + h$, to represent periodic phenomena and interpret key features in terms of a context.	**Functions:** Trigonometric Functions
	Geometry	
G-CO	Congruence	
	Prove geometric theorems.	
NC.M3.G-CO.10	Verify experimentally properties of the centers of triangles (centroid, incenter, and circumcenter).	
NC.M3.G-CO.11	Prove theorems about parallelograms. • Opposite sides of a parallelogram are congruent. • Opposite angles of a parallelogram are congruent. • Diagonals of a parallelogram bisect each other. • If the diagonals of a parallelogram are congruent, then the parallelogram is a rectangle.	**Geometry:** Proof, Reasoning, and Constructions
NC.M3.G-CO.14	Apply properties, definitions, and theorems of two-dimensional figures to prove geometric theorems and solve problems.	**Geometry:** Proof, Reasoning, and Constructions
G-C	Circles	
	Understand and apply theorems about circles.	
NC.M3.G-C.2	Understand and apply theorems about circles. Understand and apply theorems about relationships with angles and circles, including central, inscribed and circumscribed angles. Understand and apply theorems about relationships with line segments and circles including, radii, diameter, secants, tangents and chords.	**Geometry:** Properties of Circles
NC.M3.G-C.5	Using similarity, demonstrate that the length of an arc, *s*, for a given central angle is proportional to the radius, *r*, of the circle. Define radian measure of the central angle as the ratio of the length of the arc to the radius of the circle, *s*/*r*. Find arc lengths and areas of sectors of circles.	**Geometry:** Properties of Circles **Integrating Essential Skills:** Perimeter, Circumference, and Area
G-GPE	Expressing Geometric Properties with Equations	
	Translate between the geometric description and the equation for a conic section.	

North Carolina Standards Categories and Numbers	North Carolina Mathematics Standards	PreACT and ACT Math Reporting Categories and Skill Areas
	Math 3	
NC.M3.G-GPE.1	Derive the equation of a circle of given center and radius using the Pythagorean Theorem; complete the square to find the center and radius of a circle given by an equation.	**Geometry:** Conic Sections
G-GMD	**Geometric Measurement and Dimension**	
	Explain volume formulas, and use them to solve problems.	
NC.M3.G-GMD.3	Use the volume formulas for prisms, cylinders, pyramids, cones, and spheres to solve problems.	**Geometry:** Geometric Measurement and Modeling **Integrating Essential Skills:** Surface Area and Volume of Prisms Properties of Lines, Angles, and Shapes
	Visualize relationships between two-dimensional and three-dimensional objects.	
NC.M3.G-GMD.4	Identify the shapes of two-dimensional cross-sections of three-dimensional objects, and identify three-dimensional objects generated by rotations of two-dimensional objects.	**Geometry:** Geometric Measurement and Modeling **Integrating Essential Skills:** Surface Area and Volume of Prisms Properties of Lines, Angles, and Shapes
G-MG	**Modeling with Geometry**	
	Apply geometric concepts in modeling situations.	
NC.M3.G-MG.1	Apply geometric concepts in modeling situations. • Use geometric and algebraic concepts to solve problems in modeling situations. • Use geometric shapes, their measures, and their properties, to model real-life objects. • Use geometric formulas and algebraic functions to model relationships. • Apply concepts of density based on area and volume. • Apply geometric concepts to solve design and optimization problems.	**Geometry:** Geometric Measurement and Modeling **Integrating Essential Skills:** Properties of Lines, Angles, and Shapes
	Statistics and Probability	
S-IC	**Making Inferences and Justifying Conclusions**	
	Understand and evaluate random processes underlying statistical experiments.	
NC.M3.S-IC.1	Understand the process of making inferences about a population based on a random sample from that population.	**Statistics and Probability:** Introduction to Formal Inferential Statistics

North Carolina Standards Categories and Numbers	North Carolina Mathematics Standards	PreACT and ACT Math Reporting Categories and Skill Areas
	Math 3	
	Make inferences and justify conclusions from sample surveys, experiments, and observational studies.	
NC.M3.S-IC.3	Recognize the purposes of and differences between sample surveys, experiments, and observational studies and understand how randomization should be used in each.	**Statistics and Probability:** Introduction to Formal Inferential Statistics
NC.M3.S-IC.4	Use simulation to understand how samples can be used to estimate a population mean or proportion and how to determine a margin of error for the estimate.	**Statistics and Probability:** Introduction to Formal Inferential Statistics **Integrating Essential Skills:** Informal Inferential Statistics
NC.M3.S-IC..5	Use simulation to determine whether observed differences between samples from two distinct populations indicate that the two populations are actually different in terms of a parameter of interest.	**Statistics and Probability:** Introduction to Formal Inferential Statistics **Integrating Essential Skills:** Informal Inferential Statistics
NC.M3.S-IC.6	Evaluate articles and websites that report data by identifying the source of the data, the design of the study, and the way the data are graphically displayed.	Not appropriate for large-scale, standardized testing

CROSSWALK:
North Carolina Science Standards Aligned to ACT Assessments

Table 4: North Carolina Science Standards, High School (adopted 2023) Aligned to PreACT and ACT

North Carolina Standards Categories and Numbers	North Carolina Science Standards, High School	PreACT and ACT Science Reporting Categories and Skill Areas
Biology		
LS.Bio.1	Analyze how the relationship between structure and function supports life processes within organisms.	
LS.Bio.1.1	Construct an explanation to illustrate relationships between structure and function of major macromolecules essential for life.	**Interpretation of Data:** Locating and Understanding Inferring and Translating **Evaluating Scientific Arguments and Models with Evidence:** Inferences and Results – Evaluating and Extending
LS.Bio.1.2	Carry out investigations to illustrate how enzymes act as catalysts for biochemical reactions and how environmental factors affect enzyme activity.	**Interpretation of Data:** Locating and Understanding Inferring and Translating **Scientific Investigation:** Locating and Comparing Designing and Implementing **Evaluating Scientific Arguments and Models with Evidence:** Inferences and Results – Evaluating and Extending
LS.Bio.1.3	Use models to explain how the structure of organelles determines its function and supports overall cell processes.	**Interpretation of Data:** Locating and Understanding Inferring and Translating **Evaluating Scientific Arguments and Models with Evidence:** Inferences and Results – Evaluating and Extending Models – Understanding and Comparing Models – Evaluating and Extending
LS.Bio.1.4	Construct explanations to compare prokaryotic and eukaryotic cells in terms of structures and degree of complexity.	**Interpretation of Data:** Locating and Understanding Inferring and Translating **Evaluating Scientific Arguments and Models with Evidence:** Inferences and Results – Evaluating and Extending

North Carolina Standards Categories and Numbers	North Carolina Science Standards, High School	PreACT and ACT Science Reporting Categories and Skill Areas
LS.Bio.1.5	Construct an explanation to summarize how DNA and RNA direct the synthesis of proteins.	**Interpretation of Data:** Locating and Understanding Inferring and Translating **Evaluating Scientific Arguments and Models with Evidence:** Inferences and Results – Evaluating and Extending
LS.Bio.2	Analyze the growth and development processes of organisms.	
LS.Bio.2.1	Use models to illustrate how cellular division results in the reproduction, growth, and repair of organisms.	**Interpretation of Data:** Locating and Understanding Inferring and Translating **Evaluating Scientific Arguments and Models with Evidence:** Inferences and Results – Evaluating and Extending Models – Understanding and Comparing Models – Evaluating and Extending
LS.Bio.2.2	Construct an explanation to illustrate that proteins regulate gene expression resulting in cellular differentiation, specialized cells with specific functions, and uncontrolled cell growth.	**Interpretation of Data:** Locating and Understanding Inferring and Translating **Evaluating Scientific Arguments and Models with Evidence:** Inferences and Results – Evaluating and Extending
LS.Bio.3	Analyze the relationship between biochemical processes and energy use.	
LS.Bio.3.1	Carry out investigations to explain how homeostasis is maintained through feedback mechanisms.	**Interpretation of Data:** Locating and Understanding Inferring and Translating **Scientific Investigation:** Locating and Comparing Designing and Implementing **Evaluating Scientific Arguments and Models with Evidence:** Inferences and Results – Evaluating and Extending
LS.Bio.3.2	Use models to illustrate how photosynthesis transforms light energy into chemical energy.	**Interpretation of Data:** Locating and Understanding Inferring and Translating **Evaluating Scientific Arguments and Models with Evidence:** Inferences and Results – Evaluating and Extending Models – Understanding and Comparing Models – Evaluating and Extending

North Carolina Standards Categories and Numbers	North Carolina Science Standards, High School	PreACT and ACT Science Reporting Categories and Skill Areas
LS.Bio.3.3	Use models to illustrate how cellular respiration [aerobic and anaerobic] transforms chemical energy into ATP.	**Interpretation of Data:** Locating and Understanding Inferring and Translating **Evaluating Scientific Arguments and Models with Evidence:** Inferences and Results – Evaluating and Extending Models – Understanding and Comparing Models – Evaluating and Extending
LS.Bio.4	Analyze the relationships between matter and energy within ecosystems.	
LS.Bio.4.1	Use models to illustrate how processes in organisms contribute to the flow of energy and the cycling of matter within an ecosystem.	**Interpretation of Data:** Locating and Understanding Inferring and Translating **Evaluating Scientific Arguments and Models with Evidence:** Inferences and Results – Evaluating and Extending Models – Understanding and Comparing Models – Evaluating and Extending
LS.Bio.4.2	Use models to explain the relationship between the flow of energy and cycling of matter among organisms in an ecosystem.	**Interpretation of Data:** Locating and Understanding Inferring and Translating **Evaluating Scientific Arguments and Models with Evidence:** Inferences and Results – Evaluating and Extending Models – Understanding and Comparing Models – Evaluating and Extending
LS.Bio.5	Understand ecosystem dynamics, functioning, and resilience.	
LS.Bio.5.1	Use mathematics and computational thinking to explain how interactions between organisms (predator/prey, competition) affect carrying capacity and maintain stability in an ecosystem.	**Interpretation of Data:** Locating and Understanding Inferring and Translating **Evaluating Scientific Arguments and Models with Evidence:** Inferences and Results – Evaluating and Extending

North Carolina Standards Categories and Numbers	North Carolina Science Standards, High School	PreACT and ACT Science Reporting Categories and Skill Areas
LS.Bio.5.2	Engage in argument from evidence to evaluate various solutions to reduce the impact of human activities on biodiversity and ecosystem health.	**Interpretation of Data:** Locating and Understanding Inferring and Translating **Scientific Investigation:** Locating and Comparing Designing and Implementing Extending and Implementing **Evaluating Scientific Arguments and Models with Evidence:** Inferences and Results – Evaluating and Extending
LS.Bio.6	Understand genetic mechanisms for variation.	
LS.Bio.6.1	Use models to explain how DNA is passed from parents to offspring through the processes of meiosis and fertilization in sexual reproduction.	**Interpretation of Data:** Locating and Understanding Inferring and Translating **Evaluating Scientific Arguments and Models with Evidence:** Inferences and Results – Evaluating and Extending Models – Understanding and Comparing Models – Evaluating and Extending
LS.Bio.6.2	Construct an explanation to summarize how inheritable genetic variations may result from: new genetic combinations in meiosis, mutations during replication, or mutations caused by environmental factors.	**Interpretation of Data:** Locating and Understanding Inferring and Translating **Evaluating Scientific Arguments and Models with Evidence:** Inferences and Results – Evaluating and Extending
LS.Bio.7	Understand types of inheritance and how the environment can influence traits.	
LS.Bio.7.2	Analyze and interpret data to explain how polygenic traits result in a wide range of phenotypes	**Interpretation of Data:** Locating and Understanding Inferring and Translating **Evaluating Scientific Arguments and Models with Evidence:** Inferences and Results – Evaluating and Extending
LS.Bio.7.3	Construct an explanation to summarize how traits result from interactions of genetic factors (multiple genes and/or alleles) and environmental factors.	**Interpretation of Data:** Locating and Understanding Inferring and Translating **Evaluating Scientific Arguments and Models with Evidence:** Inferences and Results – Evaluating and Extending
LS.Bio.8	Understand applications of genetics and biotechnology.	

North Carolina Standards Categories and Numbers	North Carolina Science Standards, High School	PreACT and ACT Science Reporting Categories and Skill Areas
LS.Bio.8.1	Analyze and interpret data to compare DNA samples.	**Interpretation of Data:** Locating and Understanding Inferring and Translating **Evaluating Scientific Arguments and Models with Evidence:** Inferences and Results – Evaluating and Extending
LS.Bio.8.2	Obtain and communicate information that summarizes the impact of biotechnology applications on the individual, society, and the environment, including agriculture and medicine.	**Interpretation of Data:** Locating and Understanding Inferring and Translating **Evaluating Scientific Arguments and Models with Evidence:** Inferences and Results – Evaluating and Extending
LS.Bio.9	Understand natural selection as a mechanism for biological evolution.	
LS.Bio.9.1	Analyze and interpret data to summarize how various factors such as geographic isolation, pesticide resistance, antibiotic resistance can influence natural selection.	**Interpretation of Data:** Locating and Understanding Inferring and Translating **Evaluating Scientific Arguments and Models with Evidence:** Inferences and Results – Evaluating and Extending
LS.Bio.9.2	Construct an explanation to illustrate how common ancestry and biological evolution are supported by multiple lines of empirical evidence.	**Interpretation of Data:** Locating and Understanding Inferring and Translating **Evaluating Scientific Arguments and Models with Evidence:** Inferences and Results – Evaluating and Extending
LS.Bio.9.3	Use models to illustrate the conditions required for natural selection, including the overproduction of offspring, inherited variation, and the struggle to survive.	**Interpretation of Data:** Locating and Understanding Inferring and Translating **Evaluating Scientific Arguments and Models with Evidence:** Inferences and Results – Evaluating and Extending Models – Understanding and Comparing Models – Evaluating and Extending
LS.Bio.9.4	Construct an explanation to explain how natural selection leads to adaptations within populations.	**Interpretation of Data:** Locating and Understanding Inferring and Translating Evaluating Scientific Arguments and Models with Evidence: Inferences and Results – Evaluating and Extending
LS.Bio.10	Analyze evolutionary relationships among organisms.	

North Carolina Standards Categories and Numbers	North Carolina Science Standards, High School	PreACT and ACT Science Reporting Categories and Skill Areas
LS.Bio.10.1	Construct explanations to illustrate how varying environmental conditions may result in: changes in the number of individuals of a species, the emergence of new species over time, or the extinction of other species.	**Interpretation of Data:** Locating and Understanding Inferring and Translating **Evaluating Scientific Arguments and Models with Evidence:** Inferences and Results – Evaluating and Extending
LS.Bio.10.2	Use models (including dichotomous keys, scientific nomenclature, cladograms, phylogenetic trees) to identify organisms and exemplify relationships.	**Interpretation of Data:** Locating and Understanding Inferring and Translating **Evaluating Scientific Arguments and Models with Evidence:** Inferences and Results – Evaluating and Extending Models – Understanding and Comparing Models – Evaluating and Extending
Chemistry		
PS.Chm.1	Analyze the structure of atoms and isotopes.	
PS.Chm.1.1	Use models to explain how the scientific understanding of atomic structure has evolved.	**Interpretation of Data:** Locating and Understanding Inferring and Translating **Evaluating Scientific Arguments and Models with Evidence:** Inferences and Results – Evaluating and Extending Models – Understanding and Comparing Models – Evaluating and Extending
PS.Chm.1.2	Use models to compare nuclear reactions including alpha decay, beta decay and gamma decay; nuclear fusion and nuclear fission.	**Interpretation of Data:** Locating and Understanding Inferring and Translating **Evaluating Scientific Arguments and Models with Evidence:** Inferences and Results – Evaluating and Extending Models – Understanding and Comparing Models – Evaluating and Extending
PS.Chm.1.3	Use models to explain how electrons are distributed in atoms.	**Interpretation of Data:** Locating and Understanding Inferring and Translating **Evaluating Scientific Arguments and Models with Evidence:** Inferences and Results – Evaluating and Extending Models – Understanding and Comparing Models – Evaluating and Extending

North Carolina Standards Categories and Numbers	North Carolina Science Standards, High School	PreACT and ACT Science Reporting Categories and Skill Areas
PS.Chm.2	Understand the physical and chemical properties of atoms based on their position in the Periodic Table.	
PS.Chm.2.1	Use the Periodic Table as a model to predict the relative properties of elements based on the pattern of valence electrons in the outermost energy levels of atoms.	**Interpretation of Data:** Locating and Understanding Inferring and Translating Extending and Reevaluating **Evaluating Scientific Arguments and Models with Evidence:** Inferences and Results – Evaluating and Extending Models – Understanding and Comparing Models – Evaluating and Extending
PS.Chm.2.2	Construct an explanation to infer the atomic size, reactivity, electronegativity, and ionization energy of an element based on its position in the Periodic Table.	**Interpretation of Data:** Locating and Understanding Inferring and Translating **Evaluating Scientific Arguments and Models with Evidence:** Inferences and Results – Evaluating and Extending
PS.Chm.3	Understand the bonding that occurs in simple compounds in terms of bond type, strength, and properties.	
PS.Chm.3.1	Analyze and interpret data to explain the mechanisms and properties of the two main types of intramolecular (ionic and covalent) bonds.	**Interpretation of Data:** Locating and Understanding Inferring and Translating **Evaluating Scientific Arguments and Models with Evidence:** Inferences and Results – Evaluating and Extending
PS.Chm.3.2	Construct an explanation to summarize the influences intermolecular forces have on the properties of chemical compounds.	**Interpretation of Data:** Locating and Understanding Inferring and Translating **Evaluating Scientific Arguments and Models with Evidence:** Inferences and Results – Evaluating and Extending
PS.Chm.3.3	Use models to predict chemical names and formulas including ionic (binary & ternary), acidic, and binary covalent compounds.	**Interpretation of Data:** Locating and Understanding Inferring and Translating **Evaluating Scientific Arguments and Models with Evidence:** Inferences and Results – Evaluating and Extending Models – Understanding and Comparing Models – Evaluating and Extending
PS.Chm.4	Analyze chemical reactions in terms of quantities, product formation, and energy.	

North Carolina Standards Categories and Numbers	North Carolina Science Standards, High School	PreACT and ACT Science Reporting Categories and Skill Areas
PS.Chm.4.1	Use models to explain the exothermic or endothermic nature of chemical changes.	**Interpretation of Data:** Locating and Understanding Inferring and Translating **Evaluating Scientific Arguments and Models with Evidence:** Inferences and Results – Evaluating and Extending Models – Understanding and Comparing Models – Evaluating and Extending
PS.Chm.4.2	Carry out investigations to predict the outcome of simple chemical reactions that obey the Law of Conservation of Mass.	**Interpretation of Data:** Locating and Understanding Inferring and Translating Extending and Reevaluating **Scientific Investigation:** Locating and Comparing Designing and Implementing **Evaluating Scientific Arguments and Models with Evidence:** Inferences and Results – Evaluating and Extending
PS.Chm.4.3	Use mathematics and computational thinking to analyze quantitatively the composition of a substance (empirical formula, molecular formula, percent composition, and mole conversions).	**Interpretation of Data:** Locating and Understanding Inferring and Translating **Evaluating Scientific Arguments and Models with Evidence:** Inferences and Results – Evaluating and Extending
PS.Chm.4.4	Use mathematics and computational thinking to apply the mole concept in the stoichiometric relationships inherent in chemical reactions.	**Interpretation of Data:** Locating and Understanding Inferring and Translating **Evaluating Scientific Arguments and Models with Evidence:** Inferences and Results – Evaluating and Extending
PS.Chm.5	Understand the factors affecting rate of reaction and chemical equilibrium.	
PS.Chm.5.1	Carry out investigations to explain the effects of temperature, surface area, stirring, the concentration of reactants, and the presence of catalysts on the rate of chemical reactions according to Collision Theory.	**Interpretation of Data:** Locating and Understanding Inferring and Translating **Scientific Investigation:** Locating and Comparing Designing and Implementing **Evaluating Scientific Arguments and Models with Evidence:** Inferences and Results – Evaluating and Extending

North Carolina Standards Categories and Numbers	North Carolina Science Standards, High School	PreACT and ACT Science Reporting Categories and Skill Areas
PS.Chm.5.2	Analyze and interpret data to predict how stressors on a reaction (concentration, temperature, pressure) would shift equilibrium.	**Interpretation of Data:** Locating and Understanding Inferring and Translating Extending and Reevaluating **Evaluating Scientific Arguments and Models with Evidence:** Inferences and Results – Evaluating and Extending
PS.Chm.6	Understand solutions and the solution process.	
PS.Chm.6.1	Carry out investigations to summarize the factors that affect the formation and properties of solutions.	**Interpretation of Data:** Locating and Understanding Inferring and Translating **Scientific Investigation:** Locating and Comparing Designing and Implementing **Evaluating Scientific Arguments and Models with Evidence:** Inferences and Results – Evaluating and Extending
PS.Chm.6.2	Use models to explain the quantitative nature of a solution (molarity, dilution, titration).	**Interpretation of Data:** Locating and Understanding Inferring and Translating **Evaluating Scientific Arguments and Models with Evidence:** Inferences and Results – Evaluating and Extending Models – Understanding and Comparing Models – Evaluating and Extending
PS.Chm.6.3	Carry out investigations to compare properties and behaviors (qualitative and quantitative) of acids and bases.	**Interpretation of Data:** Locating and Understanding Inferring and Translating **Scientific Investigation:** Locating and Comparing Designing and Implementing **Evaluating Scientific Arguments and Models with Evidence:** Inferences and Results – Evaluating and Extending
PS.Chm.7	Understand the relationship among pressure, temperature, volume, and phase.	

North Carolina Standards Categories and Numbers	North Carolina Science Standards, High School	PreACT and ACT Science Reporting Categories and Skill Areas
PS.Chm.7.1	Use models to explain how changes in energy affect the arrangement and movement of the particles in solids, liquids, and gases, as well as the relative strengths of their intermolecular forces.	**Interpretation of Data:** Locating and Understanding Inferring and Translating **Evaluating Scientific Arguments and Models with Evidence:** Inferences and Results – Evaluating and Extending Models – Understanding and Comparing Models – Evaluating and Extending
PS.Chm.7.2	Use mathematics and computational thinking to execute simple calorimetric calculations based on the Law of Conservation of Energy.	**Interpretation of Data:** Locating and Understanding Inferring and Translating **Evaluating Scientific Arguments and Models with Evidence:** Inferences and Results – Evaluating and Extending
PS.Chm.7.3	Use mathematics and computational thinking to explain the relationships among pressure, temperature, volume, and quantity of gas, both qualitatively and quantitatively.	**Interpretation of Data:** Locating and Understanding Inferring and Translating **Evaluating Scientific Arguments and Models with Evidence:** Inferences and Results – Evaluating and Extending
Earth and Environmental Science		
ESS.EES.1	Explain how Earth's position relative to the sun influences conditions on Earth.	
ESS.EES.1.1	Use models to illustrate the formation of the solar system.	**Interpretation of Data:** Locating and Understanding Inferring and Translating **Evaluating Scientific Arguments and Models with Evidence:** Inferences and Results – Evaluating and Extending Models – Understanding and Comparing Models – Evaluating and Extending
ESS.EES.1.2	Use mathematics and computational thinking to analyze Earth's motion through space.	**Interpretation of Data:** Locating and Understanding Inferring and Translating **Evaluating Scientific Arguments and Models with Evidence:** Inferences and Results – Evaluating and Extending

North Carolina Standards Categories and Numbers	North Carolina Science Standards, High School	PreACT and ACT Science Reporting Categories and Skill Areas
ESS.EES.1.3	Use models to illustrate how the sun produces energy.	**Interpretation of Data:** Locating and Understanding Inferring and Translating **Evaluating Scientific Arguments and Models with Evidence:** Inferences and Results – Evaluating and Extending Models – Understanding and Comparing Models – Evaluating and Extending
ESS.EES.1.4	Construct an explanation to infer how incoming solar radiation interacts with Earth systems to support life.	**Interpretation of Data:** Locating and Understanding Inferring and Translating **Evaluating Scientific Arguments and Models with Evidence:** Inferences and Results – Evaluating and Extending
ESS.EES.2	Analyze how the geosphere is shaped by plate tectonics and the rock cycle.	
ESS.EES.2.1	Use models to explain how mantle convection powers plate tectonics.	**Interpretation of Data:** Locating and Understanding Inferring and Translating **Evaluating Scientific Arguments and Models with Evidence:** Inferences and Results – Evaluating and Extending Models – Understanding and Comparing Models – Evaluating and Extending
ESS.EES.2.2	Analyze and interpret data to predict locations of volcanoes and earthquakes based on plate boundaries.	**Interpretation of Data:** Locating and Understanding Inferring and Translating Extending and Reevaluating **Evaluating Scientific Arguments and Models with Evidence:** Inferences and Results – Evaluating and Extending
ESS.EES.2.3	Use models to explain how plate tectonics influence topography.	**Interpretation of Data:** Locating and Understanding Inferring and Translating **Evaluating Scientific Arguments and Models with Evidence:** Inferences and Results – Evaluating and Extending Models – Understanding and Comparing Models – Evaluating and Extending

North Carolina Standards Categories and Numbers	North Carolina Science Standards, High School	PreACT and ACT Science Reporting Categories and Skill Areas
ESS.EES.2.4	Carry out investigations to explain how the rock cycle and rates of weathering, erosion, and soil formation influence Earth's systems.	**Interpretation of Data:** Locating and Understanding Inferring and Translating **Scientific Investigation:** Locating and Comparing Designing and Implementing **Evaluating Scientific Arguments and Models with Evidence:** Inferences and Results – Evaluating and Extending
ESS.EES.3	Analyze how the interactions between the hydrosphere and atmosphere transfer energy and influence climate.	
ESS.EES.3.1	Carry out investigations to explain the properties of water.	**Interpretation of Data:** Locating and Understanding Inferring and Translating **Scientific Investigation:** Locating and Comparing Designing and Implementing **Evaluating Scientific Arguments and Models with Evidence:** Inferences and Results – Evaluating and Extending
ESS.EES.3.2	Use models to explain how water is an agent of energy transfer.	**Interpretation of Data:** Locating and Understanding Inferring and Translating **Evaluating Scientific Arguments and Models with Evidence:** Inferences and Results – Evaluating and Extending Models – Understanding and Comparing Models – Evaluating and Extending
ESS.EES.3.3	Analyze and interpret data to explain how major greenhouse gases influence climate.	**Interpretation of Data:** Locating and Understanding Inferring and Translating **Evaluating Scientific Arguments and Models with Evidence:** Inferences and Results – Evaluating and Extending
ESS.EES.3.4	Analyze and interpret data to attribute how atmospheric composition and surface conditions influence heat retention in the troposphere.	**Interpretation of Data:** Locating and Understanding Inferring and Translating **Evaluating Scientific Arguments and Models with Evidence:** Inferences and Results – Evaluating and Extending

North Carolina Standards Categories and Numbers	North Carolina Science Standards, High School	PreACT and ACT Science Reporting Categories and Skill Areas
ESS.EES.3.5	Construct an explanation to conclude that heat exchange between the ocean and atmosphere results in local, regional, global weather phenomena, and climate patterns.	**Interpretation of Data:** Locating and Understanding Inferring and Translating **Evaluating Scientific Arguments and Models with Evidence:** Inferences and Results – Evaluating and Extending
ESS.EES.4	Analyze the connections between the biosphere and other Earth systems (geosphere, hydrosphere, atmosphere).	
ESS.EES.4.1	Use models to explain how abiotic/biotic interactions shape various ecosystems.	**Interpretation of Data:** Locating and Understanding Inferring and Translating **Evaluating Scientific Arguments and Models with Evidence:** Inferences and Results – Evaluating and Extending Models – Understanding and Comparing Models – Evaluating and Extending
ESS.EES.4.2	Analyze and interpret data to explain how carbon cycling influences various ecosystems.	**Interpretation of Data:** Locating and Understanding Inferring and Translating **Evaluating Scientific Arguments and Models with Evidence:** Inferences and Results – Evaluating and Extending
ESS.EES.4.3	Analyze and interpret data to explain past climate trends.	**Interpretation of Data:** Locating and Understanding Inferring and Translating **Evaluating Scientific Arguments and Models with Evidence:** Inferences and Results – Evaluating and Extending
ESS.EES.4.4	Construct an explanation to predict how potential future changes in abiotic factors could impact biodiversity and species distribution.	**Interpretation of Data:** Locating and Understanding Inferring and Translating Extending and Reevaluating **Evaluating Scientific Arguments and Models with Evidence:** Inferences and Results – Evaluating and Extending
ESS.EES.4.5	Obtain, evaluate and communicate information to explain how biodiversity impacts ecosystem resilience.	**Interpretation of Data:** Locating and Understanding Inferring and Translating **Evaluating Scientific Arguments and Models with Evidence:** Inferences and Results – Evaluating and Extending
ESS.EES.5	Evaluate how human consumption patterns impact Earth's systems.	

North Carolina Standards Categories and Numbers	North Carolina Science Standards, High School	PreACT and ACT Science Reporting Categories and Skill Areas
ESS.EES.5.1	Analyze and interpret data to explain the impacts of land use on Earth's systems.	**Interpretation of Data:** Locating and Understanding Inferring and Translating **Evaluating Scientific Arguments and Models with Evidence:** Inferences and Results – Evaluating and Extending
ESS.EES.5.2	Analyze and interpret data to evaluate how human use of ground and surface waters impacts water quality and availability in river basins, wetlands, estuaries, and aquifers.	**Interpretation of Data:** Locating and Understanding Inferring and Translating **Evaluating Scientific Arguments and Models with Evidence:** Inferences and Results – Evaluating and Extending
ESS.EES.5.3	Construct an argument to evaluate the ways that human activities influence atmospheric composition.	**Interpretation of Data:** Locating and Understanding Inferring and Translating **Evaluating Scientific Arguments and Models with Evidence:** Inferences and Results – Evaluating and Extending
ESS.EES.5.4	Construct an argument to evaluate the benefits and trade-offs of using non-renewable or renewable energy sources for electricity production and transportation fuels.	**Interpretation of Data:** Locating and Understanding Inferring and Translating **Scientific Investigation:** Locating and Comparing Designing and Implementing **Evaluating Scientific Arguments and Models with Evidence:** Inferences and Results – Evaluating and Extending
ESS.EES.5.5	Construct an argument to evaluate potential solutions that will ensure sustainable consumption of Earth's resources.	**Interpretation of Data:** Locating and Understanding Inferring and Translating **Scientific Investigation:** Locating and Comparing Designing and Implementing **Evaluating Scientific Arguments and Models with Evidence:** Inferences and Results – Evaluating and Extending

North Carolina Standards Categories and Numbers	North Carolina Science Standards, High School	PreACT and ACT Science Reporting Categories and Skill Areas
ESS.EES.5.6	Construct an argument to evaluate a range of solutions to mitigate impacts of human activities on Earth's systems.	**Interpretation of Data:** Locating and Understanding Inferring and Translating **Scientific Investigation:** Locating and Comparing Designing and Implementing **Evaluating Scientific Arguments and Models with Evidence:** Inferences and Results – Evaluating and Extending
ESS.EES.6	Analyze how Earth's systems impact humans and the biosphere.	
ESS.EES.6.1	Analyze and interpret data to infer how use of natural resources impacts ecosystems and human populations, including human health.	**Interpretation of Data:** Locating and Understanding Inferring and Translating **Evaluating Scientific Arguments and Models with Evidence:** Inferences and Results – Evaluating and Extending
ESS.EES.6.2	Construct an argument to infer how some natural hazards (such as flooding and wildfires) are increasing in frequency and intensity due to human activities.	**Interpretation of Data:** Locating and Understanding Inferring and Translating **Evaluating Scientific Arguments and Models with Evidence:** Inferences and Results – Evaluating and Extending
ESS.EES.6.3	Construct an argument to explain how natural hazards and other environmental problems may impact some human populations more than others.	**Interpretation of Data:** Locating and Understanding Inferring and Translating **Evaluating Scientific Arguments and Models with Evidence:** Inferences and Results – Evaluating and Extending
Physical Science		
PS.PSc.1	Understand types, properties, and structure of matter.	
PS.PSc.1.1	Construct an explanation to classify matter as a pure substance or mixture; homogeneous or heterogeneous; element or compound; solution, colloid or suspension.	**Interpretation of Data:** Locating and Understanding Inferring and Translating **Evaluating Scientific Arguments and Models with Evidence:** Inferences and Results – Evaluating and Extending

North Carolina Standards Categories and Numbers	North Carolina Science Standards, High School	PreACT and ACT Science Reporting Categories and Skill Areas
PS.PSc.1.2	Use models to compare the phases of matter and the physical changes they undergo	**Interpretation of Data:** Locating and Understanding Inferring and Translating **Evaluating Scientific Arguments and Models with Evidence:** Inferences and Results – Evaluating and Extending Models – Understanding and Comparing Models – Evaluating and Extending
PS.PSc.1.3	Carry out investigations to compare physical and chemical properties of matter.	**Interpretation of Data:** Locating and Understanding Inferring and Translating **Scientific Investigation:** Locating and Comparing Designing and Implementing **Evaluating Scientific Arguments and Models with Evidence:** Inferences and Results – Evaluating and Extending
PS.PSc.1.4	Use models to interpret the data presented in Bohr diagrams and electron dot diagrams for neutral atoms of elements 1 through 18.	**Interpretation of Data:** Locating and Understanding Inferring and Translating **Evaluating Scientific Arguments and Models with Evidence:** Inferences and Results – Evaluating and Extending Models – Understanding and Comparing Models – Evaluating and Extending
PS.PSc.1.5	Use models to compare representations of atoms, ions, and isotopes.	**Interpretation of Data:** Locating and Understanding Inferring and Translating **Evaluating Scientific Arguments and Models with Evidence:** Inferences and Results – Evaluating and Extending Models – Understanding and Comparing Models – Evaluating and Extending
PS.PSc.1.6	Use the Periodic Table as a model to predict the relative properties (metallic/nonmetallic character, ionic charge, and reactivity) and arrangement of elements based on the pattern of valence electrons in the outermost energy levels of atoms.	**Interpretation of Data:** Locating and Understanding Inferring and Translating Extending and Reevaluating **Evaluating Scientific Arguments and Models with Evidence:** Inferences and Results – Evaluating and Extending Models – Understanding and Comparing Models – Evaluating and Extending

North Carolina Standards Categories and Numbers	North Carolina Science Standards, High School	PreACT and ACT Science Reporting Categories and Skill Areas
PS.PSc.2	Analyze interactions of matter within a chemical system.	
PS.PSc.2.1	Construct an explanation to classify the type of chemical bond that occurs (covalent, ionic, or metallic) in a given substance.	**Interpretation of Data:** Locating and Understanding Inferring and Translating **Evaluating Scientific Arguments and Models with Evidence:** Inferences and Results – Evaluating and Extending
PS.PSc.2.2	Use models to apply International Union of Pure and Applied Chemistry (IUPAC) conventions to name and write formulas for simple compounds.	**Interpretation of Data:** Locating and Understanding Inferring and Translating **Evaluating Scientific Arguments and Models with Evidence:** Inferences and Results – Evaluating and Extending Models – Understanding and Comparing Models – Evaluating and Extending
PS.PSc.2.3	Use mathematics and computational thinking to execute the balancing of chemical equations to illustrate the Law of Conservation of Mass.	**Interpretation of Data:** Locating and Understanding Inferring and Translating **Evaluating Scientific Arguments and Models with Evidence:** Inferences and Results – Evaluating and Extending
PS.PSc.2.4	Obtain, evaluate, and communicate information to classify a chemical reaction as synthesis, decomposition, combustion, single replacement, or double replacement reaction.	**Interpretation of Data:** Locating and Understanding Inferring and Translating **Evaluating Scientific Arguments and Models with Evidence:** Inferences and Results – Evaluating and Extending
PS.PSc.2.5	Construct an explanation to compare the composition and properties of acids and bases.	**Interpretation of Data:** Locating and Understanding Inferring and Translating **Evaluating Scientific Arguments and Models with Evidence:** Inferences and Results – Evaluating and Extending
PS.PSc.2.6	Use models to explain the interactions of acids and bases in the process of neutralization.	**Interpretation of Data:** Locating and Understanding Inferring and Translating **Evaluating Scientific Arguments and Models with Evidence:** Inferences and Results – Evaluating and Extending Models – Understanding and Comparing Models – Evaluating and Extending
PS.PSc.3	Understand the role of the nucleus in radiation and radioactivity.	

North Carolina Standards Categories and Numbers	North Carolina Science Standards, High School	PreACT and ACT Science Reporting Categories and Skill Areas
PS.PSc.3.1	Use models to compare nuclear reactions including alpha decay, beta decay, and gamma decay; nuclear fusion and nuclear fission.	**Interpretation of Data:** Locating and Understanding Inferring and Translating **Evaluating Scientific Arguments and Models with Evidence:** Inferences and Results – Evaluating and Extending Models – Understanding and Comparing Models – Evaluating and Extending
PS.PSc.3.2	Use mathematics and computational thinking to execute simple half-life calculations based on the radioactive decay of unstable nuclei.	**Interpretation of Data:** Locating and Understanding Inferring and Translating Evaluating Scientific Arguments and Models with Evidence: Inferences and Results – Evaluating and Extending
PS.PSc.3.3	Obtain, evaluate, and communicate information to explain the application of nuclear reactions to radioactive dating, medicine, and energy production.	**Interpretation of Data:** Locating and Understanding Inferring and Translating **Evaluating Scientific Arguments and Models with Evidence:** Inferences and Results – Evaluating and Extending
PS.PSc.4	Analyze motion in terms of speed, velocity, acceleration, and momentum.	
PS.PSc.4.1	Analyze and interpret data to explain the motion of an object moving with a constant velocity or that is accelerating.	**Interpretation of Data:** Locating and Understanding Inferring and Translating **Evaluating Scientific Arguments and Models with Evidence:** Inferences and Results – Evaluating and Extending
PS.PSc.4.2	Analyze and interpret data to explain the relationship between impulse and an object's change in momentum.	**Interpretation of Data:** Locating and Understanding Inferring and Translating **Evaluating Scientific Arguments and Models with Evidence:** Inferences and Results – Evaluating and Extending
PS.PSc.5	Understand the relationship between forces and motion.	
PS.PSc.5.1	Use mathematics and computational thinking to compare the weight and mass of an object.	**Interpretation of Data:** Locating and Understanding Inferring and Translating **Evaluating Scientific Arguments and Models with Evidence:** Inferences and Results – Evaluating and Extending

North Carolina Standards Categories and Numbers	North Carolina Science Standards, High School	PreACT and ACT Science Reporting Categories and Skill Areas
PS.PSc.5.2	Use models to explain the velocity of an object in freefall.	**Interpretation of Data:** Locating and Understanding Inferring and Translating **Evaluating Scientific Arguments and Models with Evidence:** Inferences and Results – Evaluating and Extending Models – Understanding and Comparing Models – Evaluating and Extending
PS.PSc.5.3	Construct an explanation to infer the effects of forces (specifically applied force and friction) on objects.	**Interpretation of Data:** Locating and Understanding Inferring and Translating **Evaluating Scientific Arguments and Models with Evidence:** Inferences and Results – Evaluating and Extending
PS.PSc.5.4	Use models to explain the relationship between an object's motion and the interaction of forces acting on it according to Newton's Three Laws of Motion.	**Interpretation of Data:** Locating and Understanding Inferring and Translating **Evaluating Scientific Arguments and Models with Evidence:** Inferences and Results – Evaluating and Extending Models – Understanding and Comparing Models – Evaluating and Extending
PS.PSc.6	Understand electricity and magnetism and their relationship.	
PS.PSc.6.1	Carry out investigations to explain static and current electricity.	**Interpretation of Data:** Locating and Understanding Inferring and Translating **Scientific Investigation:** Locating and Comparing Designing and Implementing **Evaluating Scientific Arguments and Models with Evidence:** Inferences and Results – Evaluating and Extending
PS.PSc.6.2	Construct an explanation to compare simple series and parallel circuits in terms of Ohm's Law.	**Interpretation of Data:** Locating and Understanding Inferring and Translating **Evaluating Scientific Arguments and Models with Evidence:** Inferences and Results – Evaluating and Extending

North Carolina Standards Categories and Numbers	North Carolina Science Standards, High School	PreACT and ACT Science Reporting Categories and Skill Areas
PS.PSc.6.3	Obtain, evaluate, and communicate information to explain how current is affected by changes in composition, length, temperature, and diameter of wire.	**Interpretation of Data:** Locating and Understanding Inferring and Translating **Evaluating Scientific Arguments and Models with Evidence:** Inferences and Results – Evaluating and Extending
PS.PSc.6.4	Use models to explain magnetism in terms of domains, interactions of poles, and magnetic fields.	**Interpretation of Data:** Locating and Understanding Inferring and Translating **Evaluating Scientific Arguments and Models with Evidence:** Inferences and Results – Evaluating and Extending Models – Understanding and Comparing Models – Evaluating and Extending
PS.PSc.7	Analyze energy transfers and transformations within a mechanical system.	
PS.PSc.7.1	Use models to explain thermal energy and its transfer.	**Interpretation of Data:** Locating and Understanding Inferring and Translating **Evaluating Scientific Arguments and Models with Evidence:** Inferences and Results – Evaluating and Extending Models – Understanding and Comparing Models – Evaluating and Extending
PS.PSc.7.2	Use mathematics and computational thinking to explain the Law of Conservation of Energy in a mechanical system in terms of kinetic and potential energy.	**Interpretation of Data:** Locating and Understanding Inferring and Translating **Evaluating Scientific Arguments and Models with Evidence:** Inferences and Results – Evaluating and Extending
PS.PSc.7.3	Use mathematics and computational thinking to explain work in terms of the relationship among the applied force to an object, the resulting displacement of the object, and the energy transferred to an object.	**Interpretation of Data:** Locating and Understanding Inferring and Translating **Evaluating Scientific Arguments and Models with Evidence:** Inferences and Results – Evaluating and Extending
PS.PSc.7.4	Construct an explanation to infer the relationship between work and power, both quantitatively and qualitatively.	**Interpretation of Data:** Locating and Understanding Inferring and Translating **Evaluating Scientific Arguments and Models with Evidence:** Inferences and Results – Evaluating and Extending
PS.PSc.8	Analyze the nature of waves and their applications.	

North Carolina Standards Categories and Numbers	North Carolina Science Standards, High School	PreACT and ACT Science Reporting Categories and Skill Areas
PS.PSc.8.1	Carry out investigations to explain the quantitative and qualitative relationships among wave frequency, wave velocity, wavelength, and wave energy.	**Interpretation of Data:** Locating and Understanding Inferring and Translating **Scientific Investigation:** Locating and Comparing Designing and Implementing **Evaluating Scientific Arguments and Models with Evidence:** Inferences and Results – Evaluating and Extending
PS.PSc.8.2	Use models to compare the characteristics of mechanical and electromagnetic waves.	**Interpretation of Data:** Locating and Understanding Inferring and Translating **Evaluating Scientific Arguments and Models with Evidence:** Inferences and Results – Evaluating and Extending Models – Understanding and Comparing Models – Evaluating and Extending
PS.PSc.8.3	Use models to explain the wave interactions of reflection, refraction, diffraction, and interference.	**Interpretation of Data:** Locating and Understanding Inferring and Translating **Evaluating Scientific Arguments and Models with Evidence:** Inferences and Results – Evaluating and Extending Models – Understanding and Comparing Models – Evaluating and Extending
PS.PSc.8.4	Obtain, evaluate, and communicate information to explain how instruments that transmit and detect waves are used in everyday life.	**Interpretation of Data:** Locating and Understanding Inferring and Translating **Evaluating Scientific Arguments and Models with Evidence:** Inferences and Results – Evaluating and Extending
Physics		
PS.Phy.1	Analyze the motion of objects using time, distance, displacement, speed, velocity, and acceleration.	
PS.Phy.1.1	Use models (graphs, equations, diagrams) to infer motion in one Dimension.	**Interpretation of Data:** Locating and Understanding Inferring and Translating **Evaluating Scientific Arguments and Models with Evidence:** Inferences and Results – Evaluating and Extending Models – Understanding and Comparing Models – Evaluating and Extending

North Carolina Standards Categories and Numbers	North Carolina Science Standards, High School	PreACT and ACT Science Reporting Categories and Skill Areas
PS.Phy.1.2	Use models (graphs, equations, diagrams) to infer motion in two dimensions.	**Interpretation of Data:** Locating and Understanding Inferring and Translating **Evaluating Scientific Arguments and Models with Evidence:** Inferences and Results – Evaluating and Extending Models – Understanding and Comparing Models – Evaluating and Extending
PS.Phy.2	Analyze systems of forces and their interaction with matter.	
PS.Phy.2.1	Use free body models to qualitatively and quantitatively analyze systems of forces in one dimension and two dimensions.	**Interpretation of Data:** Locating and Understanding Inferring and Translating **Evaluating Scientific Arguments and Models with Evidence:** Inferences and Results – Evaluating and Extending Models – Understanding and Comparing Models – Evaluating and Extending
PS.Phy.2.2	Carry out investigations to explain the interactions of forces on an object according to Newton's Laws of Motion.	**Interpretation of Data:** Locating and Understanding Inferring and Translating **Scientific Investigation:** Locating and Comparing Designing and Implementing **Evaluating Scientific Arguments and Models with Evidence:** Inferences and Results – Evaluating and Extending
PS.Phy.2.3	Use models to qualitatively and quantitatively analyze basic forces related to movement of an object in a circular path (centripetal force).	**Interpretation of Data:** Locating and Understanding Inferring and Translating **Evaluating Scientific Arguments and Models with Evidence:** Inferences and Results – Evaluating and Extending Models – Understanding and Comparing Models – Evaluating and Extending
PS.Phy.2.4	Use models to qualitatively and quantitatively explain the relationship among the force of gravity, the distance between two objects, and the mass of the objects, according to the Law of Universal Gravitation.	**Interpretation of Data:** Locating and Understanding Inferring and Translating **Evaluating Scientific Arguments and Models with Evidence:** Inferences and Results – Evaluating and Extending Models – Understanding and Comparing Models – Evaluating and Extending

North Carolina Standards Categories and Numbers	North Carolina Science Standards, High School	PreACT and ACT Science Reporting Categories and Skill Areas
PS.Phy.2.5	Analyze and interpret data to explain the effect of elastic force on objects (Hooke's Law).	**Interpretation of Data:** Locating and Understanding Inferring and Translating **Evaluating Scientific Arguments and Models with Evidence:** Inferences and Results – Evaluating and Extending
PS.Phy.3	Analyze the motion of objects based on the principles of conservation of momentum and impulse in one dimension.	
PS.Phy.3.1	Use models to analyze inelastic and elastic collisions in terms of the conservation of momentum in one dimension.	**Interpretation of Data:** Locating and Understanding Inferring and Translating **Evaluating Scientific Arguments and Models with Evidence:** Inferences and Results – Evaluating and Extending Models – Understanding and Comparing Models – Evaluating and Extending
PS.Phy.3.2	Use mathematics and computational thinking to analyze the relationship among impulse, momentum, and Newton's 3rd law.	**Interpretation of Data:** Locating and Understanding Inferring and Translating **Evaluating Scientific Arguments and Models with Evidence:** Inferences and Results – Evaluating and Extending
PS.Phy.4	Explain charge interactions in electrostatic systems and in electric circuits.	
PS.Phy.4.1	Use models to qualitatively and quantitatively explain the fundamental properties and interactions (Coulomb's Law) of charged objects along with the conservation of charge.	**Interpretation of Data:** Locating and Understanding Inferring and Translating **Evaluating Scientific Arguments and Models with Evidence:** Inferences and Results – Evaluating and Extending Models – Understanding and Comparing Models – Evaluating and Extending
PS.Phy.4.2	Use models to explain the mechanisms for producing electrostatically charged objects, including charging by friction, conduction, and induction.	**Interpretation of Data:** Locating and Understanding Inferring and Translating **Evaluating Scientific Arguments and Models with Evidence:** Inferences and Results – Evaluating and Extending Models – Understanding and Comparing Models – Evaluating and Extending

North Carolina Standards Categories and Numbers	North Carolina Science Standards, High School	PreACT and ACT Science Reporting Categories and Skill Areas
PS.Phy.4.3	Use circuit models to qualitatively and quantitatively analyze the relationships among current, voltage, resistance, and power in series, parallel, and compound circuits.	**Interpretation of Data:** Locating and Understanding Inferring and Translating **Evaluating Scientific Arguments and Models with Evidence:** Inferences and Results – Evaluating and Extending Models – Understanding and Comparing Models – Evaluating and Extending
PS.Phy.5	Explain the concept of magnetism.	
PS.Phy.5.1	Use models to qualitatively explain the relationship between magnetic domains and magnetism.	**Interpretation of Data:** Locating and Understanding Inferring and Translating **Evaluating Scientific Arguments and Models with Evidence:** Inferences and Results – Evaluating and Extending Models – Understanding and Comparing Models – Evaluating and Extending
PS.Phy.5.2	Obtain, evaluate, and communicate information about the relationship between magnetism and electric currents to explain the role of magnets in current technology.	**Interpretation of Data:** Locating and Understanding Inferring and Translating **Evaluating Scientific Arguments and Models with Evidence:** Inferences and Results – Evaluating and Extending
PS.Phy.6	Understand the relationship among work, energy, and power.	
PS.Phy.6.1	Use models to qualitatively and quantitatively analyze the kinetic and potential energy in a system.	**Interpretation of Data:** Locating and Understanding Inferring and Translating **Evaluating Scientific Arguments and Models with Evidence:** Inferences and Results – Evaluating and Extending Models – Understanding and Comparing Models – Evaluating and Extending
PS.Phy.6.2	Analyze and interpret data to qualitatively and quantitatively explain the relationship among work, power, and energy	**Interpretation of Data:** Locating and Understanding Inferring and Translating **Evaluating Scientific Arguments and Models with Evidence:** Inferences and Results – Evaluating and Extending
PS.Phy.7	Analyze the behavior of waves and their applications.	

North Carolina Standards Categories and Numbers	North Carolina Science Standards, High School	PreACT and ACT Science Reporting Categories and Skill Areas
PS.Phy.7.1	Obtain, evaluate, and communicate information to compare mechanical and electromagnetic waves (specifically light and sound) in terms of wave characteristics (frequency, wavelength, period, amplitude, velocity, and energy).	**Interpretation of Data:** Locating and Understanding Inferring and Translating **Evaluating Scientific Arguments and Models with Evidence:** Inferences and Results – Evaluating and Extending
PS.Phy.7.2	Use models to qualitatively and quantitatively compare reflection and refraction (Snell's Law).	**Interpretation of Data:** Locating and Understanding Inferring and Translating **Evaluating Scientific Arguments and Models with Evidence:** Inferences and Results – Evaluating and Extending Models – Understanding and Comparing Models – Evaluating and Extending
PS.Phy.7.3	Obtain, evaluate, and communicate information to summarize how instruments that transmit and detect waves are used in everyday life.	**Interpretation of Data:** Locating and Understanding Inferring and Translating **Evaluating Scientific Arguments and Models with Evidence:** Inferences and Results – Evaluating and Extending

V. Educator Tips

This section is designed to help you use the following sections of this guide:

- Section III: Content and Reporting Category Descriptions
- Section IV: Alignment Crosswalks

Tips are provided for three groups:

- District leaders
- School leaders
- Classroom teachers

Some tips are repeated, as they apply to more than one group or element. Tips fall into the following categories:

- Best practices
- Consistency of emphases
- Content coverage
- Curriculum and assessment design support
- Data for improvement
- Professional development planning
- Response opportunity
- Sharing with students and families
- Skills language
- Test frequency and design model

For District Leaders

ACT Assessment Content Descriptions

- **Curriculum and assessment design support:** The information on the structure of ACT assessments, plus the test blueprints, can be used to plan district supports for curriculum and assessment designs. Note that ACT assessments are based on empirical research indicating the knowledge and skills needed for college and career readiness. For that reason, make sure the curriculum includes

sufficient opportunity for students to learn what is measured on relevant ACT assessments.

- **Content coverage:** Look closely at the test blueprints to gauge the emphases of knowledge and skills. Use the emphases to help decide expectations for mastery levels of each content area measured. Consult the ACT College and Career Readiness Standards (CCRS) to understand how student performance with the different knowledge areas and skills assessed varies across relevant ACT assessment score ranges.
- **Consistency of emphases:** Review district high school course syllabi to check consistency in emphases of relevant ACT assessment reporting categories content. For inconsistencies, consider how the ACT test blueprints might inform and help standardize content emphases.
- **Test frequency and design model:** Consider using the test blueprints to determine frequency and design of local assessments. For example, for end-of-course assessments in high school English courses, you might use reporting categories and emphases similar to those in the relevant ACT assessments.
- **Response opportunity:** Be sure to provide school leaders and classroom educators with an opportunity to read, review, and discuss relevant ACT assessment content descriptions in this guide.

ACT Assessment Reporting Category Descriptions

- **Curriculum and assessment design support:** Like the test content descriptions, the reporting category descriptions can be used to plan district supports for curriculum and assessment designs. Per the test content description tip, make sure the curriculum includes sufficient opportunity for students to learn what is measured on relevant ACT assessments.
- **Skills language:** Consider using the reporting category tables to spark dialogue about skills language. Talk with school leaders, instructional coaches, and teachers about how educators describe their college and career preparation instruction. Suggest organizing a professional development activity on skills understanding and skills language consistency.

- **Skills language:** Look closely at the informal educator observation and coaching tools used in your district. Think about how the relevant ACT assessment tables language can help yield greater specificity in next-steps coaching (for example, using ACT assessment language to observe students working effectively to "manipulate and analyze scientific data presented in tables, graphs, and diagrams" rather than a broad focus on "improving student interpretations of data").
- **Response opportunity:** Be sure to provide school leaders and classroom educators with an opportunity to read, review, and discuss relevant ACT assessment reporting category descriptions in this guide.

Crosswalk: North Carolina Standards to ACT Assessments

- **Content coverage:** Does your district provide sufficient depth and breadth of content to meet both your state standards and ACT reporting categories? Consider reviewing curriculum, assessments, and instructional materials across the district to check that. The crosswalk alignment tables may help leaders identify strengths, redundancies, and gaps in programming by noting emphasis, duplication, and missing skills in the intersections of state standards and relevant ACT assessment content.
- **Skills language:** You may wish to provide school leaders and classroom educators with an opportunity to review the academic language represented in both your state standards and relevant ACT assessment reporting categories. Suggest developing a glossary to ensure consistency in interpretation of core skills instruction.
- **Response opportunity:** Be sure to provide school leaders and classroom educators with an opportunity to read, review, and discuss relevant ACT assessment content descriptions in this guide.

For School Leaders

ACT Assessment Content Descriptions

- **Consistency of emphases:** Review district high school course syllabi to check consistency in emphases relevant ACT assessment reporting categories content. For inconsistencies, consider how the ACT test blueprints might inform and help standardize content emphases.
- **Frequency and design model:** Consider coaching classroom teachers on using the test blueprints to determine frequency and design of local assessments. For example, for end-of-course assessments in high school English courses, you might use reporting categories and emphases similar to those in the relevant ACT assessments.
- **Sharing with students and families:** Consider excerpting sections of the test content descriptions information to share with students who are preparing to take an ACT assessment, as well as with the families of those students.

ACT Assessment Reporting Category Descriptions

- **Skills language:** As you observe classroom teaching, examine how educators define knowledge and skills. Consider coaching on how to build a consistent academic vocabulary across classrooms. This supports consistency in expectations and student understanding of core content. You may wish to provide classroom educators with an opportunity to review the academic language in both your state standards and ACT assessment reporting categories. Suggest developing a glossary to ensure consistency in interpretation of core skills instruction.
- **Best practices:** Provide time for educators to review the reporting category descriptions relevant to the content they teach. Then start a dialogue on the “best” instructional practices they use to support learning for each relevant reporting category. Encourage them to share these practices via a research-based “best practices playbook.”

Crosswalk: North Carolina Standards to ACT Assessments

- **Content coverage:** Does your district provide sufficient depth and breadth of content to meet both your state standards and relevant ACT assessment reporting categories? Consider reviewing curriculum, assessments, and instructional materials across the district to check that. The crosswalk alignment tables may help leaders identify strengths, redundancies, and gaps in programming.
- **Skills language:** As you observe classroom teaching, examine how educators define knowledge and skills. Consider coaching on how to build a consistent academic vocabulary across classrooms. This supports consistency in expectations and student understanding of core content. You may wish to provide classroom educators with an opportunity to review the academic language in both your state standards and ACT assessment reporting categories.
- **Professional development planning:** While planning professional development and next steps in coaching, examine the crosswalk tables. Consider strengthening educator knowledge of research-based strategies to teach skills represented by both your state standards and ACT assessment reporting categories. This is especially important for needs based on student performance data.

For Classroom Teachers

ACT Assessment Content Descriptions

- **Test prep for students:** Review your course syllabi to determine if there are ways to build student understanding of relevant ACT assessment reporting categories relevant to each course. Look for ways to show students who plan to take ACT assessments how the course content will prepare them for success on that assessment, as well as in meeting your state standards.
- **Content coverage:** Consider the emphases of content in the courses you teach: How do they compare to the emphases of content in relevant ACT assessment subject test blueprints? Do you have sufficient time devoted to core skills? Time-on-task for core skills in the course and curriculum may be informed by the blueprints. Look

specifically at the number of items and percentage of time for each relevant reporting category. For example, nearly one-third of the ACT mathematics test measures student performance in modeling, a higher-order skill that requires integration of content across multiple domains. This may prompt you to see if there is sufficient time devoted to instruction on modeling.

- **Sharing with students and families:** Consider excerpting sections of the test content descriptions information to share with students who are preparing to take an ACT assessment, as well as with the families of those students.

ACT Assessment Reporting Category Descriptions

- **Content coverage:** Review your course syllabi to determine if all relevant skills assessed on an ACT assessment are represented in the plan for instruction. Also consider the emphases of course content in relation to the emphases of content in the related test blueprints. Depth and breadth of content coverage as well as time-on-task for core skills in the course syllabi and curriculum may be informed by the reporting categories descriptions.
- **Data for improvement:** Review the skills you measure in relation to each reporting category. Where you have data for your students (as individuals or as groups), think about strengths and opportunities for improvement represented by each reporting category. Which knowledge areas and skills are likely most in need of intervention and/or extension?
- **Skills language:** You can introduce skills language as you teach, so all students can grow their academic vocabulary in relation to your content. For consistency, consider working with other teachers at your school who teach the same content as you to develop a glossary of academic language. Use the language in reporting categories, along with the language in your curriculum and state standards to create this glossary.

Crosswalk: North Carolina Standards to the ACT

- **Content coverage:** Review your course syllabi to determine if all the relevant state standards and relevant ACT assessment reporting

categories are represented in the plan for instruction. Also consider the emphases of content in relation to the emphases of content in the related test blueprints.

- **Data for improvement:** Review the skills where there is overlap in your state standards and relevant ACT assessment reporting categories. Note where you have data on student performances linked to these skills and where you do not. Shape formative assessment to gather missing data. This will help you plan effectively to meet student needs linked to these critical content knowledge and skills.
- **Professional development planning:** As you review the intersections of concepts between your state standards and relevant ACT assessment reporting categories, reflect on professional learning goals. Consider setting goals to strengthen knowledge of research-based strategies to teach these intersection skills.

VI. Alignment Summary

Summary results of the alignment analysis at each grade level for ELA, mathematics, and science are discussed below. The detailed results of the analysis are included in the alignment tables found in Section IV: Alignment Crosswalks, of the report.

For each set of standards in North Carolina K–12 framework, the summary indicates the following:

- ACT tests that were analyzed for alignment
- Total number of standards evaluated
- Number of those standards assessed in whole or in part by items in one or more ACT assessment content category
- The standards for which no link to ACT assessments was found

We define alignment matches (i.e., the number of aligned standards in that category) as follows:

- **Very strong:** Equal to or greater than 90%
- **Strong:** 75%–89%
- **Moderate:** 50%–74%
- **Weak:** Less than 50%

Note: *In the summary below and the crosswalk tables presented in Section IV in this report, some of the sub-standards are given in separate rows, each with detailed alignment information to unique standards. The subject-matter experts who conducted the alignments in each subject made decisions about when to separate the subordinate standards in the alignment tables.*

English Language Arts (ELA)

ELA test development subject-matter experts conducted analyses of the alignment between several sets of North Carolina ELA standards and the ACT assessments.

Across all sections of the North Carolina ELA standards, the analyses found strong alignment. Overall, 86% of the ELA standards analyzed were assessed by the ELA sections of the ACT assessments, as summarized below. Some of the gaps identified are related to expectations in the standards that are difficult to assess in a timed, standardized test setting. Additionally, many of the gaps pertain to a sub-standard for which many other elements of the standard are aligned (see note below about counting the alphabetic sub-standards).

PreACT

PreACT Aligned to North Carolina ELA Standards, Grades 9–10

Content Area	Alignment Strength (Number of Standards Measured)
ELA	Strong (49 of 57)
Reading Standards for Literature	Strong (8 of 9)
Reading Standards for Informational Text	Very Strong (9 of 10)
Writing	Strong (22 of 28)
Language	Very Strong (10 of 10)

Notes:

- North Carolina's Speaking and Listening standards in ELA were excluded from the analysis because ACT assessments are not intended to measure the knowledge and skills in these standards.
- Several of the ELA standards included alphabetic sub-standards (e.g., RL.9-10.11.a). For the purpose of counting the number of aligned standards in the summary table, the sub-standards were counted separately because alignments were made to them individually.
- *Reading Standards for Literature* not assessed by the PreACT are:
    - RL.9-10.7. Analyze the representation of a subject or a key scene in two different artistic mediums, including what is emphasized or absent in each treatment.

- *Reading Standards for Informational Text* not assessed by the PreACT are:
    - RI.9-10.7. Analyze various accounts of a subject told in different mediums, determining which details are emphasized in each account.
- *Writing Standards* not assessed by the PreACT are:
    - W.9-10.1.a, W.9-10.2.a, & W.9-10.3.a. Organize information and ideas around a topic to plan and prepare to write.
    - W.9-10.4. Use digital tools and resources to produce, publish, and update individual or shared writing products, taking advantage of technology's capacity to link to other information and to display information flexibly and dynamically.
    - W.9-10.5. Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation.
    - W.9-10.6. Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the usefulness of each source in answering the research question; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and following a standard format for citation.

The ACT

The ACT Aligned to North Carolina ELA Standards, Grades 11–12

Content Area	Alignment Strength (Number of Standards Measured)
ELA	Strong (48 of 56)
Reading Standards for Literature	Strong (8 of 9)
Reading Standards for Informational Text	Very Strong (9 of 10)
Writing	Strong (22 of 28)
Language	Very Strong (9 of 9)

Notes:

- North Carolina's Speaking and Listening standards in ELA were excluded from the analysis because ACT assessments are not intended to measure the knowledge and skills in these standards.
- Several of the ELA standards included alphabetic sub-standards (e.g., RL.9-10.11.a). For the purpose of counting the number of aligned standards in the summary

table, the sub-standards were counted separately because alignments were made to them individually.

- *Reading Standards for Literature* not assessed by the ACT are:
    - RL.11-12.7. Analyze multiple interpretations of a story, drama, or poem, evaluating how each version interprets the source text.
- *Reading Standards for Informational Text* not assessed by the ACT are:
    - RI.11-12.9. Analyze foundational U.S. and/or British documents of historical and literary significance for their themes, purposes, and rhetorical features
- *Writing Standards* not assessed by the ACT are:
    - W.11-12.1.a., W.11-12.2.a, & W.11-12.3.a Organize information and ideas around a topic to plan and prepare to write.
    - W.11-12.4. Use digital tools and resources to produce, publish, and update individual or shared writing products in response to ongoing feedback, including new arguments or information.
    - W.11-12.5. Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation.
    - W.11-12.6. Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the strengths and limitations of each source in terms of the task, purpose, and audience; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and overreliance on any one source and following a standard format for citation.

Mathematics

Mathematics test development subject-matter experts conducted analyses of the linkage between the North Carolina mathematics standards for High School courses and the PreACT and the ACT mathematics tests.

Alignment results show broad and deep alignment, indicating that 98%, of the North Carolina math standards in Math 1–3 were assessed by items in one or more PreACT or ACT mathematics test content category. In most of the state's mathematics domains, all the standards are assessed by the PreACT and the ACT tests.

PreACT

The PreACT Mathematics Test is designed to serve as a practice experience for the ACT Mathematics Test, and therefore it assesses the same mathematics domain. The alignments for the PreACT are based on the standards for Math 1–3. See the ACT summary directly below.

The ACT

The ACT Aligned to North Carolina Standards, High School

Content Area	Alignment Strength (Number of Standards Measured)
Mathematics	Very Strong (182 of 185)
Math 1	Very Strong (57 of 58)
Mathematical Practice	Very Strong (8 of 8)
Number & Quantity	Very Strong (1 of 1)
Algebra	Very Strong (18 of 18)
Functions	Very Strong (18 of 18)
Geometry	Very Strong (3 of 3)
Statistics & Probability	Very Strong (9 of 10)
Math 2	Very Strong (67 of 67)
Mathematical Practice	Very Strong (8 of 8)
Number & Quantity	Very Strong (4 of 4)
Algebra	Very Strong (15 of 15)
Functions	Very Strong (8 of 8)
Geometry	Very Strong (22 of 22)
Statistics & Probability	Very Strong (10 of 10)
Math 3	Very Strong (58 of 60)
Mathematical Practice	Very Strong (8 of 8)
Number & Quantity	Very Strong (1 of 1)
Algebra	Very Strong (17 of 17)
Functions	Very Strong (20 of 20)

Geometry	Strong (8 of 9)
Statistics & Probability	Strong (4 of 5)

Notes:

- The ACT Mathematics Test is designed to be a curriculum-based measure of what is important for success in entry-level college mathematics. It measures what students can do with what they have learned through the beginning of grade 12. The North Carolina mathematics courses most commonly completed by students through the beginning of Grade 12 are Math 1, Math 2, and Math 3. Standards from these courses are the basis for alignments in this report.
- For the purpose of counting the number of standards in the summary below, each part of a standard that was evaluated separately for linkage to the ACT assessment (e.g. NC.M2.G-SRT.1a, b) is counted separately towards the total.
- Math 1 standards not assessed by the ACT are:
    - NC.M1.S-ID.9. Distinguish between association and causation.
- Math 3 standards not assessed by the ACT are:
    - NC.M3.G-CO.10. Verify experimentally properties of the centers of triangles (centroid, incenter, and circumcenter).
    - NC.M3.S-IC.6. Evaluate articles and websites that report data by identifying the source of the data, the design of the study, and the way the data are graphically displayed.

Science

Science test development subject-matter experts conducted analyses of the linkage between the North Carolina Science Standards (adopted 2023) and the PreACT and ACT science tests. In order to best indicate the type of linkage between North Carolina's standards and the science tests, the reviewers used a modified methodology that is slightly different than what was used for the other subjects included in this report.

The PreACT and ACT science tests are designed to assess how well students can apply scientific processes skills, practices, and cross-cutting concepts in the context of authentic scientific investigations, data, and arguments across the disciplines in science. The tests measure skills across three domains:

- Interpretation of Data

- Scientific Investigation
- Evaluating Scientific Arguments and Models with Evidence

Given this design, the reviewers looked for linkages between the transferable skills in science and engineering practices and crosscutting concepts in science as well as the three-dimensional items on the ACT science assessments and the practices embedded North Carolina's science standards and objectives for each high school course. The reviewers also drew on knowledge of the full range of disciplinary science knowledge that is used to create the rich scenarios on the ACT tests.

In the alignment crosswalk, each objective and standard was evaluated and aligned to one or more reporting categories and sub-reporting categories based on the skills most likely used to assess the learning objective.

Alignment results show broad and deep alignment, indicating that 100% the North Carolina high school science standards are assessed by items in one or more PreACT or ACT reporting category.

PreACT

The PreACT Science Test is designed to serve as a practice experience for the ACT science Test, and therefore it assesses the same science domain. The alignments for the PreACT are based on the standards as the ACT. See ACT summary directly below.

The ACT

The ACT Aligned to North Carolina Science Standards, High School

Content Area	Alignment Strength (Number of Knowledge and Skills Measured)
Science	Very Strong (126 of 126)
Biology	Very Strong (25 of 25)
Chemistry	Very Strong (20 of 20)
Earth/Environmental	Very Strong (28of 28)
Physical Science	Very Strong (34 of 34)
Physics	Very Strong (19 of 19)

Notes:

- The standards selected for alignment in this report represent the most common courses students take in grades 9 and 10 (Physical Science and Biology) as well as three common options for the third required science credit needed to graduate in North Carolina. Additionally, the ACT recommended science curriculum for students is at least three lab-based science course including Biology and either Chemistry or Physics.
- For the summary of alignment, the essential standard and associated clarifying objectives are counted as one item.
- The following direct links were determined during the analysis between North Carolina's science standard clusters and the ACT.
    - Nine of the nine Biology clusters have a direct link.
    - Seven of the seven Chemistry clusters have a direct link.
    - Six of the six Earth/Environmental Science clusters have a direct link.
    - Eight of the eight Physical Science clusters have a direct link.
    - Seven of the seven Physics clusters have a direct link.