



STATE MATCH

North Dakota
Content Standards
English Language Arts,
Mathematics, and Science
Grades 8–12

and

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

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About This Report

EXECUTIVE SUMMARY

(pp. 1–5)

This portion summarizes the findings of the alignment between North Dakota’s Content Standards and ACT’s Educational Planning and Assessment System (EPAS®) tests—EXPLORE® (8th and 9th grades), PLAN® (10th grade), and the ACT® (11th and 12th grades)—and ACT’s WorkKeys® assessments (Reading for Information, Applied Mathematics, and Locating Information). It also presents ACT’s involvement in meeting NCLB requirements and includes additional information about the unique programs and services ACT can provide to North Dakota.

SECTION A

(pp. 6–9)

This section provides tables by content area (English Language Arts, Mathematics, and Science), listing the precise number of North Dakota Content Standards measured by ACT’s EPAS tests and/or WorkKeys assessments by grade level.

SECTION B

(pp. 11–31)

All North Dakota Content Standards are listed here; each one highlighted is measured by ACT’s EPAS tests and/or WorkKeys assessments. Underlined science content indicates that the content topics are included in, but not directly measured by, ACT’s EPAS Science tests. North Dakota standards listed here are from the North Dakota Content Standards as presented on the North Dakota Department of Public Instruction website in September 2009:

North Dakota Content Standards	Publication Date
English Language Arts	April 2005
Mathematics	April 2005
Science	March 2006

SECTION C

(pp. 32–42)

ACT’s College Readiness Standards™ appear here. Highlighting indicates that a statement reflects one or more statements in the North Dakota Content Standards. College Readiness Standards not highlighted are not addressed in the North Dakota Content Standards.



SECTION D

(pp. 43–44)

WorkKeys skills appear here. Highlighting indicates that a statement reflects one or more statements in the North Dakota Content Standards. Skills not highlighted are not addressed in the North Dakota Content Standards.

A supplement that identifies the specific ACT College Readiness Standard(s) and WorkKeys Skill(s) corresponding to each North Dakota Content Standard in a side-by-side format is available at www.act.org/education/statematch.



Executive Summary

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

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

ACT'S TESTS MEASURE MOST NORTH DAKOTA CONTENT STANDARDS IN ENGLISH LANGUAGE ARTS, MATHEMATICS, AND SCIENCE.

1. Match Results: Comparisons conducted by our content specialists show that ACT's English, Reading, Writing, Mathematics, and Science tests and WorkKeys Reading for Information and Applied Mathematics assessments measure most North Dakota English Language Arts, Mathematics, and Science Content Standards. WorkKeys Locating Information assessment measures those skills contained in North Dakota's Science Standards that are associated with a student's ability to interpret and analyze graphic material.

■ **English Language Arts: 3 out of 6 Standards**

Many important North Dakota English Language Arts Content Standards in Reading, Writing, and Principles of Language are covered by ACT's English, Reading, and Writing tests and WorkKeys Reading for Information (RI) assessment.

■ **Mathematics: 5 out of 5 Standards**

All North Dakota Mathematics Content Standards are covered by ACT's Mathematics tests and WorkKeys Applied Mathematics (AM) assessment.

■ **Science: Process Standards: 1 out of 2
(Content Standards: 6 out of 6)**

Most North Dakota Science Content Standards are covered by ACT's Science tests and WorkKeys Locating Information (LI) assessment.

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



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

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

2. NCLB requirement? Yes; states such as Illinois and Michigan use ACT's tests as integral components of their statewide academic assessment systems under NCLB for Grade 11 students and submit evidence of compliance with NCLB to the U.S. Department of Education (ED) for approval. Through the peer review process, the ED determines whether such evidence demonstrates that a given state's assessment system meets NCLB requirements. The more closely a state's standards align with its assessments, the more likely it is that the outcome of the NCLB peer review will be favorable. With so much at stake, states must be rigorous both in developing their academic standards and in choosing assessment instruments that will help achieve the common goal of preparing students for life after high school.

3. Why implement EXPLORE, PLAN and the ACT? ACT's EPAS tests provide a longitudinal, systematic approach to educational and career planning, assessment, instructional support, and evaluation. The system focuses on the integrated, higher-order thinking skills students develop in grades K–12 that are important for success both during and after high school.

Unlike many other large-scale assessments of academic ability, EXPLORE, PLAN, and the ACT are first and foremost achievement tests. They are measures whose tasks correspond to recognized high school learning experiences, but which at the same time do not precisely duplicate the high school curriculum. EXPLORE, PLAN, and the ACT measure not an abstract quality, such as intelligence or aptitude, but rather what students are able to do with what they have learned in school.

States and school districts choose the EPAS system because student motivation is high, and EPAS is the *only curriculum-based assessment system that measures student readiness along a continuum of empirically derived college readiness benchmarks*. ACT's College Readiness Standards are precise descriptors of the essential skills and knowledge that students need to become ready for college and career, beginning in grade 8 and continuing through grade 12. Various groups claim to describe what students truly need to know and be able to do for college and/or workplace readiness. Such groups typically ask individual experts in education to gather and discuss what they feel is important for stu-

STATES CHOOSE ACT BECAUSE:

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



ACT BUILDS ITS
DEFINITION OF COLLEGE
READINESS ON A
SOUND EMPIRICAL
BASE:
1. THE ACT NATIONAL
CURRICULUM
SURVEY
2. ACT'S COLLEGE
READINESS
BENCHMARK
SCORES
3. ACT'S COLLEGE
READINESS
STANDARDS

dents to understand. Not surprisingly, the answers vary. In contrast, ACT defines college readiness through a unique and rigorous empirical process:

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

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

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

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

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

Using thousands of student records and responses, content and measurement experts at ACT have developed detailed statements that describe what students typically know and are able to do at different levels of test performance. These data-driven, empirically derived score descriptors articulate student achievement within various score ranges on the English, Reading, Writing, Mathematics, and Science tests on EXPLORE, PLAN, and the ACT. These statements provide specific details about students' college readiness and can be used to identify next steps for improvement.

ACT research has shown that, whether planning to enter college or workforce training programs after graduation, high school students need to be educated to a comparable level of readiness in reading and mathematics. Graduates need this level of readiness if they are to succeed in college-level courses without remediation and to enter workforce training programs ready to learn job-specific skills.

Early planning based on sound information is a key factor in helping students reach their academic and career goals. **EXPLORE** provides baseline information on the academic preparation of students that can be used to plan high school coursework. ACT's research has shown that eighth-grade academic achievement is the best predictor of college and career readiness by high school graduation. Further, improvement in eighth-grade academic achievement and being on target for college and career readiness in eighth grade are more beneficial than any high school-level achievement enhancement.



PLAN helps tenth-grade students build a foundation for future academic and career success and provides information needed to address school districts' high-priority issues. It is a comprehensive guidance resource that helps students measure their current academic development, explore career/training options, and make plans for the remaining years of high school and post-graduation years. PLAN provides a midpoint review of students' progress toward their education and career goals while there is still time to make necessary interventions.

The ACT test assesses high school students' general educational development and provides unparalleled information about a student's readiness for entry-level college coursework and ability to make successful transitions to college and work after high school.

Each test in ACT's EPAS system also includes noncognitive measures and surveys that allow students to build relationships between their academic development, their backgrounds, and their plans.

4. Why choose to include WorkKeys assessments? Students can use WorkKeys to help determine the skill levels and education required for various jobs. Educators can use WorkKeys to ensure that students enter the work world with the foundational skills needed in any field they choose.

Further, the WorkKeys scores offer a clear way for students to demonstrate their knowledge and skills to prospective employers. WorkKeys is at the center of the nationwide Career Readiness System that links qualified individuals with employers who recognize the value of skilled job applicants. ACT's National Career Readiness Certificate (NCRC) ensures that an individual has certain foundational skills that are important across a range of positions. The NCRC is a portable credential that employees can use anywhere in the nation. Individuals seeking employment gain a competitive edge with an NCRC because they are able to provide prospective employers with clear evidence that their knowledge and skills align with the requirements of the job they are applying for. The NCRC offers job seekers, employers, and educators an easily understood, conveniently attained, and universally valued credential.

Test takers are most commonly certified in the skills areas of Applied Mathematics, Locating Information, and Reading for Information. Higher scores qualify students for more jobs than do lower scores. New Jersey, Virginia, Louisiana, Kentucky, North Carolina, and New Mexico have already initiated certificate programs, and many other states are in the process of developing similar programs.

If the goal of high school education is to prepare students for college and career readiness, then we should be educating all high school students according to a common academic expectation, one that prepares them for both postsecondary education and the workforce. Only then—whether they are among the two-thirds who enter college directly after graduation or those who enter workforce training programs—will they be ready for life after high school.



ACT's EPAS system and WorkKeys would not only provide important information regarding students' academic achievement relative to the North Dakota Content Standards, but EPAS offers what no other testing program can: an empirically based, time-honored measure of college and career readiness that can help North Dakota students reach their educational and career goals and help provide North Dakota High Schools with the information they need to prepare their students for college and career.



**Section A: Number of North Dakota Content Standards
Measured by EXPLORE, PLAN, the ACT, and WorkKeys**

**Table A-1. Number of North Dakota English Language Arts Content Standards
Measured by EXPLORE, PLAN, the ACT, and WorkKeys**

North Dakota Standards*	Number of North Dakota Benchmark Expectations Measured by ACT's tests	Aspects of North Dakota Content Standards that are Not Measured
1. Research		
2. Reading	Gr 8: 4 out of 10 Gr 9: 6 out of 15 Gr 10: 5 out of 7 Gr 11: 6 out of 10 Gr 12: 5 out of 8	Identify satire and allegory Read for a variety of purposes and intents Critique literary merit of a work of literature
3. Writing	Gr 8: 3 out of 13 Gr 9: 5 out of 12 Gr 10: 9 out of 14 Gr 11: 6 out of 8 Gr 12: 8 out of 11	Write business or other formal documents Use variety of sources for supporting details Use techniques to convey an individual voice and style
4. Speaking and Listening		
5. Media		
6. Principles of Language	Gr 8: 3 out of 7 Gr 9: 5 out of 8 Gr 10: 2 out of 3 Gr 11: 2 out of 4 Gr 12: 2 out of 4	Interpret the use of language in different literary forms Identify allegory
TOTALS 3 out of 6 Standards	Gr 8: 10 out of 30 Gr 9: 16 out of 35 Gr 10: 16 out of 24 Gr 11: 14 out of 22 Gr 12: 15 out of 23	

*Refer to North Dakota's English Language Arts Content Standards on pages 11–20

= EPAS tests do not assess this material.



Table A-2. Number of North Dakota Mathematics Content Standards Measured by EXPLORE, PLAN, the ACT, and WorkKeys

North Dakota Standards*	Number of North Dakota Benchmark Expectations Measured by ACT's tests	Aspects of North Dakota Content Standards that are Not Measured
1. Number and Operation	Gr 8: 9 out of 9 Gr 9–10: 11 out of 11 Gr 11–12: 8 out of 8	
2. Geometry and Spatial Sense	Gr 8: 8 out of 8 Gr 9–10: 11 out of 11 Gr 11–12: 1 out of 1	
3. Data Analysis, Statistics, and Probability	Gr 8: 7 out of 7 Gr 9–10: 10 out of 10 Gr 11–12: 4 out of 4	
4. Measurement	Gr 8: 3 out of 3 Gr 9–10: 10 out of 10 Gr 11–12:	<i>No benchmark expectation at this level</i>
5. Algebra, Functions, and Patterns	Gr 8: 6 out of 6 Gr 9–10: 15 out of 15 Gr 11–12: 6 out of 6	
TOTALS 5 out of 5 Standards	Gr 8: 33 out of 33 Gr 9–10: 57 out of 57 Gr 11–12: 19 out of 19	

*Refer to North Dakota's Mathematics Content Standards on pages 21–25



Table A-3. Number of North Dakota Science Content Standards Measured by EXPLORE, PLAN, the ACT, and WorkKeys

North Dakota Standards*	Number of North Dakota Benchmark Expectations Measured by ACT's tests	Aspects of North Dakota Content Standards that are Not Measured
2. Science Inquiry	Gr 8: 3 out of 4 Gr 9–10: 5 out of 8 Gr 11–12: 7 out of 8	Explain how science advances through legitimate skepticism Use appropriate safety equipment and precautions during investigations Explain how new knowledge and methods emerge from different types of investigations and public communication among scientists
8. History and Nature of Science	Gr 8: 0 out of 1 Gr 9–10: 1 out of 5 Gr 11–12: 1 out of 1	Explain how many people from various cultures have made important contributions to the advancement of science and technology Identify the role of scientists in theoretical and applied science (e.g., careers, employment possibilities) Identify the human characteristics that influence scientific advancement Explain how views and attitudes have influenced the development of science
TOTALS 1 out of 2 Process Standards	Gr 8: 3 out of 5 Gr 9–10: 6 out of 13 Gr 11–12: 8 out of 9	



Table A-3. Number of North Dakota Science Content Standards Measured by EXPLORE, PLAN, the ACT, and WorkKeys

North Dakota Standards*	Number of North Dakota Benchmark Expectations Measured by ACT's tests	Aspects of North Dakota Content Standards that are Not Measured
1. Unifying Concepts	Gr 8: (1) out of (1) Gr 9–10: (6) out of (6) Gr 11–12: (5) out of (5)	
3. Physical Science	Gr 8: (6) out of (6) Gr 9–10: (10) out of (10) Gr 11–12: (13) out of (13)	
4. Life Science	Gr 8: (1) out of (1) Gr 9–10: (12) out of (13) Gr 11–12: (3) out of (3)	
5. Earth and Space Science	Gr 8: (10) out of (10) Gr 9–10: (6) out of (6) Gr 11–12: (3) out of (3)	
6. Science and Technology	Gr 8: Gr 9–10: (2) out of (3) Gr 11–12: (1) out of (3)	<i>No benchmark expectation at this level</i>
7. Science and Other Areas	Gr 8: (0) out of (1) Gr 9–10: (2) out of (2) Gr 11–12: (3) out of (4)	Explain how science and technology can influence personal, industrial, and cultural decision-making
TOTALS 6 out of 6 Content Standards	Gr 8: (18) out of (19) Gr 9–10: (38) out of (39) Gr 11–12: (28) out of (31)	

*Refer to North Dakota's Science Content Standards on pages 26–31



Section B: North Dakota's Grades 8–12 Content Standards Measured by EXPLORE, PLAN, the ACT, and WorkKeys

English Language Arts

NORTH DAKOTA Grade 8 English Language Arts Content Standards

Standard 1:

Students engage in the research process.

PLANNING RESEARCH

8.1.1. Use questions to narrow research topic

ACCESSING INFORMATION

8.1.2. Use a variety of primary and/or secondary sources to access information i.e., computer catalogs, magazines, newspapers, and primary sources

EVALUATING RESEARCH INFORMATION

8.1.3. Evaluate sources that present different perspectives e.g., by identifying sources of bias and distinguishing between primary and secondary sources

ORGANIZING AND PRESENTING RESEARCH INFORMATION

8.1.4. Use information from multiple sources when presenting research findings to defined audiences

PRESENTATION

8.1.5. Write a research report using a thesis

EVALUATE THE RESEARCH

8.1.6. Evaluate the research process

8.1.7. Evaluate a research product using a rubric

Standard 2:

Students engage in the reading process.

LITERARY AND INFORMATIONAL GENRES

8.2.1. Compare or contrast characteristics of fiction and nonfiction genres

READING STRATEGIES FOR INTERPRETING MEANING OF TEXTS

8.2.2. Use prior knowledge and experiences to aid text comprehension

8.2.3. Use a variety of strategies to construct meaning from text e.g., vocabulary building strategies, skimming, paraphrasing, summarizing, brainstorming, discussing

PURPOSES FOR READING

8.2.4. Read for a variety of purposes to develop lifetime reading skills and habits, e.g., for personal recreation, to model forms of writing

LITERARY ELEMENTS AND TECHNIQUES

8.2.5. Identify theme, protagonist, antagonist, and dialect in literary texts

8.2.6. Identify figurative language in literary texts including personification, simile, metaphor, and hyperbole

8.2.7. Make connections between literature and historical period, culture, and society

8.2.8. Explain the uses of sound devices in literary texts, including alliteration, onomatopoeia, rhyme, repetition, and rhythm

VOCABULARY

8.2.9. Use vocabulary building skills and strategies e.g., synonyms/antonyms, prefixes/suffixes, multiple meaning words context clues, word reference aids – dictionary, glossary, thesaurus, to determine the meaning of unfamiliar words and make sense of text

8.2.10. Build vocabulary e.g., Greek and Latin roots, dictionary information, content area terminology

Standard 3:

Students engage in the writing process.

INFORMATIVE WRITING

8.3.1. Compose informative writing, e.g., research, biographies, autobiographies, news articles, interviews

NARRATIVE WRITING

8.3.2. Write short stories that include story elements e.g., dialogue, action, physical description, background description, character development

PERSUASIVE WRITING

8.3.3. Produce persuasive writing e.g., editorials, essays, business letters, opinions

PREWRITING

8.3.4. Use free writing and journal writing to develop ideas for writing topics

8.3.5. Use language and format appropriate for intended audience and purpose

DRAFTING

8.3.6. Use prewriting product to create a first draft emphasizing details and referencing sources

8.3.7. Incorporate grade-level appropriate vocabulary in writing

8.3.8. Use organizational patterns e.g., introduction, body, conclusion or exposition/body/resolution

REVISING AND EDITING

8.3.9. Use criteria to evaluate own and others' writing

8.3.10. Use feedback and multiple drafts to revise text for specific purposes, e.g., clarity of ideas, organization, word choice, fluency

8.3.11. Edit for grammar, mechanics, usage, and spelling

FINAL DRAFT

No benchmark expectations at this level

PUBLICATION/PRESENTATION

8.3.12. Incorporate a variety of visual aids in publications

8.3.13. Use computer technology to present written work

Standard 4:

Students engage in the speaking and listening process.

PLANNING FOR AN AUDIENCE/PURPOSE

8.4.1. Speak with a purpose using delivery techniques appropriate for different audiences to inform, demonstrate, entertain, or persuade

8.4.2. Use supporting materials for topic development e.g., research, personal experience, literature, interview

CONVERSATION, GROUP DISCUSSION, AND ORAL PRESENTATION

8.4.3. Speak for different purposes e.g., group discussions, research presentations and demonstrations

VERBAL AND NONVERBAL COMMUNICATION

8.4.4. Use volume, eye contact, rate, pronunciation, and articulation effectively in oral presentations

Standard 5:

Students understand media.

MEDIA GENRES

8.5.1. Identify existing and developing media

USING MEDIA FOR A PURPOSE

8.5.2. Access media (e.g., television, film, music, electronic databases, videos, DVDs, comics, visual and performing arts, newspapers, and periodicals) for a variety of purposes

8.5.3. Construct media messages e.g., editorials, news articles, commentaries, web sites, commercials, advertisements

INTERPRETING MEDIA

8.5.4. Describe the role of the media in influencing and shaping public opinion

8.5.5. Show how media messages influence people in various ways e.g., comprehensiveness, appeal to emotions, attitudes and behaviors, authenticity, stereotyping

8.5.6. Define plagiarism and its consequences

8.5.7. Define copyright

Standard 6:

Students understand and use principles of language.

LANGUAGE CONVENTIONS/MECHANICS

8.6.1. Use varied sentence structure i.e., simple, compound, complex, and inverted order

8.6.2. Use conventions of grammar related to parts of speech; i.e., verbs progressive tense, complements

8.6.3. Use grade-appropriate mechanics and usage i.e., capitalization: publications and in letters; punctuation: commas, semi colons, colons, quotation marks, underlining, hyphens, apostrophes; usage: misplaced modifiers

LANGUAGE CONTEXT

8.6.4. Identify social differences in language e.g., the use of slang, cliché, formal and informal styles

8.6.5. Identify cultural and regional differences in language use e.g., different dialects and language diversity

8.6.6. Locate examples of professional uses of language including jargon and formal styles

LITERARY ELEMENTS AND TECHNIQUES

8.6.7. Use figurative language including simile, metaphor, alliteration, personification, onomatopoeia, hyperbole, and point of view

NORTH DAKOTA Grade 9 English Language Arts Content Standards

Standard 1:

Students engage in the research process.

PLANNING RESEARCH

9.1.1. Choose a broad topic, state the problem or question

9.1.2. Formulate a preliminary thesis statement

ACCESSING INFORMATION

No benchmark expectations at this level

EVALUATING RESEARCH INFORMATION

9.1.3. Cross-reference information

9.1.4. Evaluate relevancy of information

ORGANIZING RESEARCH INFORMATION

9.1.5. Organize information from a variety of sources e.g., chronological

9.1.6. Summarize information

9.1.7. Identify and avoid plagiarism

9.1.8. Use primary and secondary sources

9.1.9. Use graphic organizer

PRESENTATION

9.1.10. Write research papers and presentations using a thesis and organized information

EVALUATE THE RESEARCH PROCESS

No benchmark expectations at this level

Standard 2:

Students engage in the reading process.

LITERARY GENRES

9.2.1. Identify characteristics of a variety of fiction genres i.e., novels, short stories, plays, and poetry

9.2.2. Identify the organizational features of fiction, drama, and poetry i.e., stanza, act, scene, chapter, verse, and article

INFORMATIONAL GENRES

9.2.3. Differentiate between a variety of nonfiction genres i.e., newspapers, magazines, electronic texts, biographies, reference materials, essays, and speeches

READING STRATEGIES FOR INTERPRETING MEANING OF TEXTS

9.2.4. **Identify persuasive writing**

9.2.5. Locate redundancies in written texts to clarify meaning

9.2.6. Demonstrate oral reading fluency

9.2.7. Access prior knowledge to interpret meaning

PURPOSES FOR READING

9.2.8. Read for a variety of purposes and intents e.g., to become life-long readers, to model forms of writing

LITERARY ELEMENTS AND TECHNIQUES

9.2.9. **Identify character, setting, plot, stanza, act, scene, chapter, verse, article, fiction, nonfiction, point of view**

9.2.10. **Analyze an author's use of literary techniques and devices** i.e., mood, foreshadowing, flashbacks, dialogue, and poetic license

9.2.11. Identify universal themes

9.2.12. **Explain ways in which the setting affects the development of a story**

9.2.13. **Analyze author's use of literary techniques and devices** i.e., foreshadowing and flashbacks

VOCABULARY

9.2.14. **Use** decoding/encoding, **connotation, and denotation**

9.2.15. Build vocabulary by reading a variety of gradelevel texts and applying new vocabulary

Standard 3:

Students engage in the writing process.

INFORMATIVE WRITING

9.3.1. Write expository texts e.g., essays, directions, and letters

LITERARY/NARRATIVE WRITING

9.3.2. Write descriptive and narrative compositions e.g., journals, personal letters, biographies, short stories, autobiographical sketches, oneact plays, and poetry

PERSUASIVE WRITING

9.3.3. Develop a composition detailing an opinion

PREWRITING

9.3.4. Develop a focus for composition e.g., a theme or unifying idea

9.3.5. Organize the ideas and details of a composition according to purpose

DRAFTING

9.3.6. **Elaborate ideas through word choice and description** using grade-level vocabulary

9.3.7. **Organize** and write **compositions** for self and family

9.3.8. **Use supporting details**

LITERARY ELEMENTS AND TECHNIQUES

9.3.9. Use techniques of characterization in compositions e.g., description, dialogue, interior monologue

REVISING AND EDITING

9.3.10. **Edit and revise compositions for proper mechanics and grammar, syntax, diction, and order**

9.3.11. **Arrange paragraphs in a logical progression**

PUBLISHING/PRESENTATION

9.3.12. Use technology e.g., publishing software and graphic programs, to present written work

Standard 4:

Students engage in the speaking and listening process.

PLANNING FOR AN AUDIENCE/PURPOSE

9.4.1. Analyze the audience and adjust message and wording to suit purpose

VERBAL AND NONVERBAL COMMUNICATION

9.4.2. Use visual aids effectively in oral presentations

9.4.3. Use notes and manuscripts to make oral presentations

CONVERSATION, GROUP DISCUSSION, AND ORAL PRESENTATION

9.4.4. Engage in a group discussion

9.4.5. Use critical listening skills i.e., reflection

Standard 5:

Students understand media.

MEDIA GENRES

9.5.1. Identify existing and developing media

USING MEDIA FOR A PURPOSE

9.5.2. Access media (e.g., television, film, music, electronic databases, videos, DVDs, comics, visual and performing arts, newspapers, and periodicals) for a variety of purposes

INTERPRETING MEDIA

9.5.3. Compare and contrast a written work and a media version

Standard 6:

Students understand and use principles of language.

LANGUAGE CONVENTIONS/MECHANICS

9.6.1. Identify conventions of grammar related to sentence structure i.e., sentence reduction, parallel structure, elliptical clauses, conjunctions, clausal and phrasal patterns

9.6.2. Use conventions of grammar related to parts of speech i.e., verb tense and agreement

9.6.3. Use conventions of punctuation

LITERARY ELEMENTS AND TECHNIQUES

9.6.4. Identify idiomatic language and figurative language i.e., allusion, analogy, hyperbole, irony, personification, oxymoron, paradox

9.6.5. Identify the use of sound patterns in language i.e., alliteration, assonance, consonance

9.6.6. Interpret symbolism

LANGUAGE CONTEXT

9.6.7. Locate cultural differences in language i.e., colloquialisms, regional and ethnic dialects, indigenous vocabulary

9.6.8. Identify gender perspectives in language i.e., biased language

NORTH DAKOTA Grade 10 English Language Arts Content Standards

Standard 1:

Students engage in the research process.

RESEARCH PLANNING

10.1.1. Form questions to focus research

ACCESSING INFORMATION

10.1.2. Know ways to effectively search electronic databases e.g., defining key terms and using limiters to focus a search

10.1.3. Gather reliable information to support a thesis

EVALUATING RESEARCH INFORMATION

10.1.4. Use relevant information

ORGANIZING AND PRESENTING RESEARCH INFORMATION

10.1.5. Organize information from a variety of sources into a unified whole

10.1.6. Use a style sheet, such as MLA or APA, for citing primary and secondary sources

10.1.7. Paraphrase information

10.1.8. Use note cards

10.1.9. Develop an outline

PRESENTATION

10.1.10. Write a research paper

10.1.11. Present research information e.g., informative speech, computer-assisted presentation, video presentation

Standard 2:

Students engage in the reading process.

LITERARY GENRES

No benchmark expectations at this level

INFORMATIONAL GENRES

10.2.1. Summarize information from nonfiction genres

VOCABULARY

No benchmark expectations at this level

READING STRATEGIES FOR INTERPRETING MEANING OF TEXTS

10.2.2. Identify techniques used in persuasive writing i.e., deductive reasoning and use of fact and opinion

PURPOSES FOR READING

10.2.3. Read for a variety of purposes and intents e.g., to become life-long readers, to model forms of writing

LITERARY ELEMENTS AND TECHNIQUES

10.2.4. Identify author's use of figurative language including allusion, imagery, and symbolism

10.2.5. Analyze literary elements i.e., character, setting, plot, stanza, act, scene, chapter, verse, article, fiction, nonfiction, and point of view

10.2.6. Analyze author's use of mood

10.2.7. Apply universal themes to real life situations

Standard 3:

Students engage in the writing process.

INFORMATIVE WRITING

10.3.1. Write expository texts including research papers

LITERARY/NARRATIVE WRITING

No benchmark expectations at this level

PERSUASIVE WRITING

10.3.2. Defend a personal opinion using facts as support

PREWRITING

10.3.3. Use prewriting techniques to generate ideas

10.3.4. Organize the ideas and details of a composition according to purpose

DRAFTING

10.3.5. Elaborate ideas through word choice and description using grade-level vocabulary

10.3.6. Organize and write compositions for school and peers

10.3.7. Use a variety of supporting details

LITERARY ELEMENTS AND TECHNIQUES

10.3.8. Use language appropriate to the format of the composition

10.3.9. Use precise language to describe people, places, and things

10.3.10. Use a specific point of view in compositions

REVISING AND EDITING

10.3.11. Edit and revise compositions with attention to content

10.3.12. Edit and revise compositions for consistent point of view

10.3.13. Use knowledge of sentence structure and sentence construction to edit and revise text

10.3.14. Use sentence reduction techniques to revise and edit compositions

PUBLISHING

No benchmark expectations at this level

Standard 4:

Students engage in the speaking and listening process.

PLANNING FOR AN AUDIENCE/PURPOSE

10.4.1. Analyze the audience and adjust message and wording to suit the purpose

VERBAL AND NONVERBAL COMMUNICATION

10.4.2. Use appropriate body language in oral presentations

CONVERSATION, GROUP DISCUSSION, AND ORAL PRESENTATION

10.4.3. Formulate questions in response to a verbal message

Standard 5:

Students understand media.

MEDIA GENRES

10.5.1. Identify existing and developing media

USING MEDIA FOR A PURPOSE

10.5.2. Use media (e.g., television, film, music, electronic databases, videos, DVDs, comics, visual and performing arts, newspapers, and periodicals) for a variety of purposes

INTERPRETING MEDIA

10.5.3. Evaluate the portrayal of ethnicity and lifestyles in media messages

10.5.4. Analyze media messages

Standard 6:

Students understand and use principles of language.

LANGUAGE CONVENTIONS/MECHANICS

10.6.1. **Use conventions of grammar related to sentence structure** i.e., sentence reduction, parallel structure, elliptical clauses, conjunctions, clausal and phrasal patterns

LITERARY ELEMENTS AND TECHNIQUES

10.6.2. **Analyze figurative language** i.e., allusion, analogy, hyperbole, irony, personification, oxymoron, paradox

10.6.3. Interpret the use of sound patterns in language i.e., alliteration, assonance, consonance

LANGUAGE CONTEXT

10.6.4. Critique cultural differences in language e.g., colloquialisms, regional and ethnic dialects, indigenous vocabulary

10.6.5. Critique gender perspectives in language i.e., biased language

NORTH DAKOTA Grade11 English Language Arts Content Standards

Standard 1:

Students engage in the research process.

RESEARCH PLANNING

11.1.1. Research topics independently using appropriate sources

ACCESSING INFORMATION

11.1.2. Evaluate and incorporate information from primary sources e.g., interviews and surveys

EVALUATING RESEARCH INFORMATION

11.1.3. Evaluate reliability, validity, comprehensiveness, author's bias, and author's expertise

11.1.4. Verify the quality, accuracy, and usefulness of information

ORGANIZING RESEARCH INFORMATION

11.1.5. Synthesize information in a logical sequence

11.1.6. Use quotations effectively

PRESENTATION

No benchmark expectations at this level

EVALUATING RESEARCH PROCESS

11.1.7. Evaluate the research process and develop strategies for improving it e.g., correct use of research format, accuracy of research, organization of information and use of sources

Standard 2:

Students engage in the reading process.

LITERARY GENRES

11.2.1. Identify characteristics of literary forms and genres i.e., parody

11.2.2. Analyze religious writing, biographies, and political writings

INFORMATIONAL GENRES

11.2.3. Analyze details, facts, and concepts from nonfiction genres

READING STRATEGIES FOR INTERPRETING MEANING OF TEXTS

11.2.4. Identify techniques used in persuasive writing including inductive reasoning and propaganda

11.2.5. Locate ambiguities in written text

11.2.6. Apply prior knowledge of content to interpret meaning of text

PURPOSES FOR READING

11.2.7. Read for a variety of purposes and intents e.g., to become life-long readers, to model forms of writing

LITERARY ELEMENTS AND TECHNIQUES

11.2.8. Analyze author's use of poetic license and dialogue

11.2.9. Evaluate literature based on social, cultural, and/or historical contexts

VOCABULARY

11.2.10. Use etymology to define words

Standard 3:

Students engage in the writing process.

INFORMATIVE WRITING

No benchmark expectations at this level

NARRATIVE WRITING

No benchmark expectations at this level

PERSUASIVE WRITING

11.3.1. Gather information supporting multiple sides of an issue

PREWRITING

11.3.2. Organize the ideas and details of a composition according to purpose

DRAFTING

11.3.3. Elaborate ideas through word choice and description using grade-level vocabulary

11.3.4. Organize and write compositions for town, city, and state

11.3.5. Use a variety of supporting details

LITERARY ELEMENTS AND TECHNIQUES

11.3.6. Use figurative language in writing

REVISING AND EDITING

11.3.7. Edit and revise compositions for standard writing conventions and transitional devices

PUBLISHING

11.3.8. Incorporate visual aids (e.g., graphs, tables, and pictures) into written work to enhance meaning

Standard 4:

Students engage in the speaking and listening process.

PLANNING FOR AN AUDIENCE/PURPOSE

11.4.1. Analyze the audience and adjust message and wording to suit the purpose

VERBAL AND NONVERBAL COMMUNICATION

No benchmark expectations at this level

CONVERSATION, GROUP DISCUSSION, AND ORAL PRESENTATION

11.4.2. Adapt to a variety of speaking and listening situations such as formal presentations, oral interpretations, and group discussions

Standard 5:

Students understand media.

MEDIA GENRES

11.5.1. Identify existing and developing media

USING MEDIA FOR A PURPOSE

11.5.2. Apply media (e.g., television, film, music, electronic databases, videos, DVDs, comics, visual and performing arts, newspapers, and periodicals) for a variety of purposes

INTERPRETING MEDIA

11.5.3. Evaluate how coverage of the same events differs depending on the media type i.e., radio, television, and newspaper report of the same product or situation

11.5.4. Evaluate the accuracy of details in media messages

11.5.5. Evaluate the impact of media messages on daily life and politics

Standard 6:

Students understand and use principles of language.

LANGUAGE CONVENTIONS/MECHANICS

11.6.1. Use conventions of grammar, usage, and punctuation to edit and revise

LITERARY ELEMENTS AND TECHNIQUES

11.6.2. Apply the use of sound patterns in language i.e., alliteration, assonance, consonance

11.6.3. Identify the use of language in different literary forms i.e., satire and parody

LANGUAGE CONTEXT

11.6.4. Identify emotionally charged language

NORTH DAKOTA Grade 12 English Language Arts Content Standards

Standard 1:

Students engage in the research process.

RESEARCH PLANNING

12.1.1. Plan a research strategy

12.1.2. Determine purpose e.g., inform, persuade

12.1.3. Develop a research question

ACCESSING INFORMATION

No benchmark expectations at this level

ORGANIZING RESEARCH INFORMATION

12.1.4. Defend research paper or project

PRESENTATION

No benchmark expectations at this level

EVALUATING RESEARCH PROCESS

12.1.5. Evaluate the research process and apply strategies to a variety of writing purposes e.g., correct use of research format, accuracy of research, organization of information and use of sources

Standard 2:

Students engage in the reading process.

LITERARY GENRES

12.2.1. Identify satire and allegory

INFORMATIONAL GENRES

12.2.2. Critique details, facts, and concepts from nonfiction genres

READING STRATEGIES FOR INTERPRETING MEANING OF TEXTS

12.2.3. Identify techniques used in persuasive writing such as fallacies of logic, faulty reasoning, and manipulative language

PURPOSES FOR READING

12.2.4. Read for a variety of purposes and intents e.g., to become life-long readers, to model forms of writing

LITERARY ELEMENTS AND TECHNIQUES

12.2.5. Interpret author's use of figurative language including allusion, imagery, and symbolism

12.2.6. Interpret author's use of syntax and word choice/diction

12.2.7. Critique literary merit of a work of literature

VOCABULARY

12.2.8. Use technical language/jargon to decipher meaning

Standard 3:

Students engage in the writing process.

INFORMATIVE WRITING

12.3.1. Write business or other formal documents, including resumes, scholarship letters, and letters of inquiry or complaint

NARRATIVE WRITING

No benchmark expectations at this level

PERSUASIVE WRITING

12.3.2. Write persuasive compositions, including structuring arguments logically, using rhetorical devices, defending positions with evidence, and addressing readers' concerns and biases e.g., editorials, critical reviews

PREWRITING

12.3.3. Organize the ideas and details of a composition according to purpose

12.3.4. Use variety of sources for supporting details

DRAFTING

12.3.5. Elaborate ideas through word choice and description using grade-level vocabulary

12.3.6. Organize and write compositions for nation and world

LITERARY ELEMENTS AND TECHNIQUES

12.3.7. Use techniques to convey an individual voice and style e.g., tone, syntax, diction, figurative language

REVISING AND EDITING

12.3.8. Edit and revise compositions for standard writing conventions and appropriate tone

12.3.9. Edit and revise compositions for unity, coherence, clarity, and fluency

12.3.10. Edit and revise compositions with an awareness of parallel structures and proper verb tense and agreement

12.3.11. Edit and revise compositions for the use of proper clausal and phrasal patterns

PUBLISHING

No benchmark expectations at this level

Standard 4:

Students engage in the speaking and listening process.

PLANNING FOR AN AUDIENCE/PURPOSE

12.4.1. Evaluate audience based on social characteristics, e.g., religion, culture, and gender

VERBAL AND NONVERBAL COMMUNICATION

12.4.2. Use tone, inflection, pitch, and emphasis effectively in oral presentations

CONVERSATION, GROUP DISCUSSION, AND ORAL PRESENTATION

12.4.3. Analyze the audience and adjust message and wording to suit the audience while speaking

12.4.4. Use critical listening responses, such as refutation and commentary, to critique the accuracy of messages

12.4.5. Use oral composition techniques to perform speeches such as memorized speeches, impromptu and extemporaneous, persuasive/argumentative, and expository speeches

Standard 5:

Students understand media.

MEDIA GENRES

12.5.1. Identify existing and developing media

USING MEDIA FOR A PURPOSE

12.5.2. Create a media project for a purpose

INTERPRETING MEDIA

12.5.3. Evaluate instances of gender equity and political correctness in media messages

12.5.4. Evaluate media messages in their historical and/or cultural contexts and intended audience

12.5.5. Examine advanced media techniques, e.g., music and sound, camera angles, lighting, and aesthetic effects

Standard 6:

Students understand and use principles of language.

LANGUAGE CONVENTIONS/MECHANICS

12.6.1. Use conventions of grammar, usage, and punctuation to edit and revise

LITERARY ELEMENTS AND TECHNIQUES

12.6.2. Apply figurative language i.e., allusion, analogy, hyperbole, irony, personification, oxymoron, paradox

12.6.3. Interpret the use of language in different literary forms i.e., satire, parody

12.6.4. Identify allegory

LANGUAGE CONTEXT

No benchmark expectations at this level

Mathematics

NORTH DAKOTA Grade 8 Mathematics

Content Standards

Standard 1: Number and Operation

Students understand and use basic and advanced concepts of number and number systems.

NUMBERS, NUMBER RELATIONSHIPS, AND NUMBER SYSTEMS

8.1.1. Identify subsets of the real number system, i.e., natural and whole numbers, integers, rational and irrational numbers

8.1.2. Solve real-world problems involving ratio, proportion, and percent

8.1.3. Identify perfect squares 1 to 144 and approximate square roots

8.1.4. Represent large and small numbers using scientific notation

OPERATIONS AND THEIR PROPERTIES

8.1.5. Apply operation properties to simplify computations and solve problems, i.e., commutative, associative, and distributive

8.1.6. Apply the order of operations to simplify numeric expressions and solve problems

COMPUTATIONAL FLUENCY AND ESTIMATION

8.1.7. Add, subtract, multiply, and divide integers

8.1.8. Select and use a computational technique (e.g., mental calculation, paper-and-pencil, technology) to solve problems

8.1.9. Determine when an estimate is sufficient and an exact answer is needed in problem situations

Standard 2: Geometry and Spatial Sense

Students understand and apply geometric concepts and spatial relationships to represent and solve problems in mathematical and nonmathematical situations.

TWO- AND THREE-DIMENSIONAL SHAPES, GEOMETRIC PROPERTIES AND RELATIONSHIPS

8.2.1. Use nets to represent the relationships between two- and three-dimensional figures

8.2.2. Classify quadrilaterals based on side lengths, angle measures, and sets of parallel sides

8.2.3. Identify the angles formed and the relationships between the angles when parallel lines are intersected by a transversal

8.2.4. Apply the Pythagorean Theorem to problems involving right triangles

COORDINATE GEOMETRY

8.2.5. Represent shapes using coordinate geometry

TRANSFORMATION AND SYMMETRY

8.2.6. Draw the results of a combination of transformations in the coordinate plane, i.e., reflections, rotations, and translations

8.2.7. Use scale, proportion, and congruency to solve problems involving similar figures

VISUALIZATION, SPATIAL REASONING, AND GEOMETRIC MODELING

8.2.8. Use two-dimensional representations of three-dimensional objects to visualize and solve problems, e.g., those involving surface area and volume

Standard 3: Data Analysis, Statistics, and Probability

Students use data collection and analysis techniques, statistical methods, and probability to solve problems.

DATA COLLECTION, DISPLAY, AND INTERPRETATION

8.3.1. Formulate a question and select a random or representative sample

8.3.2. Collect, organize, and display data using scatter and stem-and-leaf plot

PROBABILITY

8.3.3. Determine possible outcomes using organized lists, tree diagrams, Venn diagrams, factorials, and the basic counting principle

8.3.4. Distinguish between experimental and theoretical probability, i.e., the results of an experiment may not match the theoretical probability

STATISTICAL METHODS

8.3.5. Calculate and compare the measures of central tendency (i.e., mean, median, mode) and spread (i.e., range)

8.3.6. Identify an outlier within a set of data and discuss its effects on the measures of central tendency and spread

PREDICTIONS, DATA ANALYSIS, AND INFERENCES

8.3.7. Make inferences based on analysis of data and interpretation of graphs

Standard 4: Measurement

Students use concepts and tools of measurement to describe and quantify the world.

MEASURABLE ATTRIBUTES, MEASUREMENT SYSTEMS AND UNITS

8.4.1. Select an appropriate degree of precision when using measurements for calculations

8.4.2. Compare unit measurements between systems, e.g., a yard is almost a meter

MEASUREMENT TOOLS, TECHNIQUES, AND FORMULAS

8.4.3. Use formulas to determine the surface area and volume of right cones and spheres

Standard 5: Algebra, Functions, and Patterns

Students use algebraic concepts, functions, patterns, and relationships to solve problems.

PATTERNS, RELATIONS, AND FUNCTIONS

8.5.1. Extend numerical patterns, e.g., Pascal's triangle and the Fibonacci sequence

NUMERIC AND ALGEBRAIC REPRESENTATIONS

8.5.2. Use variables, expressions, and equations to represent problem situations

8.5.3. Apply the order of operations and the commutative, associative, and distributive properties to simplify algebraic expressions

8.5.4. Apply inverse operations and the properties of equality to solve multi-step equations and inequalities in one variable

MATHEMATICAL MODELING

8.5.5. Write multi-step equations and inequalities to represent problem situations

RATES OF CHANGE

8.5.6. Solve problems involving rates, i.e., speed equals distance divided by time (miles per hour)

NORTH DAKOTA Grades 9–10 Mathematics

Content Standards

Standard 1: Number and Operation

Students understand and use basic and advanced concepts of number and number systems.

NUMBERS, NUMBER RELATIONSHIPS, AND NUMBER SYSTEMS

9–10.1.1. Express numbers between one-billionth and one billion in fraction, decimal, and verbal form; express numbers of all magnitudes in scientific notation

9–10.1.2. Describe the hierarchical relationships (e.g., integers are rationals) among subsets of the real number system, i.e., reals, rationals, irrationals, integers, wholes, and naturals

9–10.1.3. Identify the properties of the real number system, i.e., commutative, associative, distributive, closure, inverse, and identity properties

9–10.1.4. Represent a set of data in a matrix

OPERATIONS AND THEIR PROPERTIES

9–10.1.5. Use the order of operations and properties of exponents to simplify an algebraic expression

9–10.1.6. Analyze the effects of multiplication, division, raising to a power, and extracting a root on the magnitudes of quantities, e.g., when will the square root of a number be greater than the number itself, or what will happen to the magnitude of a number when you multiply it by a negative number?

9–10.1.7. Apply basic properties of exponents to simplify algebraic expressions, i.e., power of a product, power of a power, products and quotients of powers, zero and negative exponents

COMPUTATIONAL FLUENCY AND ESTIMATION

9–10.1.8. Apply estimation skills to predict realistic solutions to problems

9–10.1.9. Select and use a computational technique (i.e., mental calculation, paper-and-pencil, or technology) to solve problems involving real numbers

9–10.1.10. Explain the reasonableness of a problem's solution and the process used to obtain it

9–10.1.11. Add, subtract, and perform scalar multiplication on matrices

Standard 2: Geometry and Spatial Sense

Students understand and apply geometric concepts and spatial relationships to represent and solve problems in mathematical and nonmathematical situations.

TWO- AND THREE-DIMENSIONAL SHAPES, GEOMETRIC PROPERTIES AND RELATIONSHIPS

9–10.2.1. Identify the properties and attributes of two- and three-dimensional objects that distinguish one from another, e.g., a cylinder has two parallel circular bases

9–10.2.2. Determine congruence and similarity among geometric objects

9–10.2.3. Use trigonometric relationships and the Pythagorean Theorem to determine side lengths and angle measures in right triangles

9–10.2.4. Using given information, establish the validity of a conjecture using a two-column or paragraph proof

COORDINATE GEOMETRY

9–10.2.5. Use Cartesian coordinates to determine distance, midpoint, and slope

9–10.2.6. Use distance, midpoint, and slope to determine relationships between points, lines, and plane figures in the Cartesian coordinate system, e.g., determine whether a triangle is scalene, isosceles, or equilateral given the coordinates of its vertices

TRANSFORMATION AND SYMMETRY

9–10.2.7. Identify and perform transformations of objects in the plane using sketches (translations, reflections, rotations, and dilations) and coordinates (translations, reflections, and dilations)

9–10.2.8. Describe the effects of combining basic transformations in a plane, e.g., two reflections over parallel lines results in a translation

VISUALIZATION, SPATIAL REASONING, AND GEOMETRIC MODELING

9–10.2.9. Construct plane figures using traditional and/or technological tools, i.e., congruent segments, congruent angles, angle and segment bisectors, perpendicular and parallel lines

9–10.2.10. Recognize images of the same object shown from different perspectives, i.e., a two-dimensional image of a three-dimensional object

9–10.2.11. Use geometric models to find solutions to problems in mathematics and other disciplines, e.g., art and architecture

Standard 3: Data Analysis, Statistics, and Probability

Students use data collection and analysis techniques, statistical methods, and probability to solve problems.

DATA COLLECTION, DISPLAY, AND INTERPRETATION

9–10.3.1. Construct appropriate displays of given data, i.e., circle graphs, bar graphs, histograms, stem-and-leaf plots, box-and-whisker plots, and scatter plots

9–10.3.2. Interpret a given visual representation (i.e., circle graphs, bar graphs, histograms, stem-and-leaf plots, box-and-whisker plots, and scatter plots) of a set of data

9–10.3.3. Identify the variable, sample, and population in a well-designed study, e.g., in an exit poll for a tax increase, the variable is the outcome of the vote, the sample is the set of people surveyed, the population is the set of all voters

PROBABILITY

9–10.3.4. Determine the number of possible outcomes for a given event, using appropriate counting techniques, e.g., fundamental counting principle, factorials, combinations, permutations

9–10.3.5. Calculate experimental and theoretical probabilities with and without replacement

9–10.3.6. Calculate probabilities of compound events using addition and multiplication rules

STATISTICAL METHODS

9–10.3.7. Calculate measures of central tendency and spread, i.e., mean, median, mode, range, and quartiles

9–10.3.8. Discuss relationships among measures of central tendency and spread, i.e., mean, median, mode, range, and quartiles

PREDICTIONS, DATA ANALYSIS, AND INFERENCES

9–10.3.9. Select two points and approximate an equation for the line of best fit (if appropriate) for a set of data

9–10.3.10. Identify the trend of a set of data and estimate the strength of the correlation between two variables, e.g., strong vs. weak, positive vs. negative

Standard 4: Measurement

Students use concepts and tools of measurement to describe and quantify the world.

MEASURABLE ATTRIBUTES, MEASUREMENT SYSTEMS AND UNITS

9–10.4.1. Select appropriate units and scales for problem situations involving measurement

9–10.4.2. Describe the effects of scalar change on the area and volume of a figure, e.g., the effect of doubling one or more edges of a solid on its surface area and volume

9–10.4.3. Use approximations to compare the standard and metric systems of measurement, e.g., a five-kilometer race is about three miles long

9–10.4.4. Given a conversion factor, convert between standard and metric measurements

MEASUREMENT TOOLS, TECHNIQUES, AND FORMULAS

9–10.4.5. Use methods necessary to achieve a specified degree of precision and accuracy (i.e., appropriate number of significant digits) in measurement situations

9–10.4.6. Employ estimation techniques to evaluate reasonableness of results in measurement situations

9–10.4.7. Use unit analysis to track units during computations

9–10.4.8. Given a formula list, compute the area of a regular polygon

9–10.4.9. Given a formula list, compute the surface area and volume of a right prism, right cylinder, right pyramid, right cone, and sphere

9–10.4.10. Apply indirect measurement techniques to solve problems involving irregular shapes or inaccessible objects, e.g., calculate the distance across a lake, triangulate an irregular region to find its approximate area

Standard 5: Algebra, Functions, and Patterns

Students use algebraic concepts, functions, patterns, and relationships to solve problems.

PATTERNS, RELATIONS, AND FUNCTIONS

9–10.5.1. Given the explicit and/or the recursive definition of a sequence, generate a specific term (explicit formula only) or a specified number of terms

9–10.5.2. Express relations and functions using a variety of representations, i.e., numeric, graphic, symbolic, and verbal

9–10.5.3. Determine whether a relation is a function by examining various representations of the relation, e.g., table, graph, equation, set of ordered pairs

9–10.5.4. Perform the operations of addition, subtraction, multiplication, and division on algebraic functions, e.g., given $f(x) = 2x$ and $g(x) = 5x - 7$, find $f(x) + g(x)$

9–10.5.5. Identify the independent variable, dependent variable, domain, and range of a function

9–10.5.6. Draw graphs of linear and quadratic functions using paper and pencil, labeling key features, e.g., graph a line and label its x-intercept and y-intercept, graph a parabola and label its vertex and one point on each side of the vertex

NUMERIC AND ALGEBRAIC REPRESENTATIONS

9–10.5.7. Develop algebraic expressions, equations, or inequalities involving one or two variables to represent relationships (e.g., given a verbal statement, write an equivalent algebraic expression or equation) found in various contexts (e.g., time and distance problems, mixture problems)

9–10.5.8. Manipulate algebraic expressions and equations using properties of real numbers, e.g., simplify, factor

9–10.5.9. Solve linear equations and inequalities, systems of two linear equations or inequalities, and quadratic equations having rational solutions, e.g., factoring, quadratic formula

9–10.5.10. Solve a literal equation for a specified variable, e.g., solve $l = prt$ for r , or solve $7n + p = t$ for n

MATHEMATICAL MODELING

9–10.5.11. Use essential quantitative relationships in a situation to determine whether the relationship can be modeled by a linear function, e.g., simple interest is linear, compound interest is not linear

9–10.5.12. Graphically represent the solution or solutions to an equation, inequality, or system

9–10.5.13. Interpret a graphical representation of a real-world situation

9–10.5.14. Draw conclusions about a situation being modeled

RATES OF CHANGE

9–10.5.15. Approximate and interpret rates of change from graphical and numerical data

NORTH DAKOTA Grades 11–12 Mathematics

Content Standards

Standard 1: Number and Operation

Students understand and use basic and advanced concepts of number and number systems.

NUMBERS, NUMBER RELATIONSHIPS, AND NUMBER SYSTEMS

11–12.1.1. Translate between radical expressions and expressions involving rational exponents

11–12.1.2. Describe the hierarchical relationships (e.g., explain why real numbers are complex) among subsets of the complex number system, i.e., complex, real, and imaginary

11–12.1.3. Use imaginary numbers to express square roots of negative numbers

11–12.1.4. Justify the steps of an algebraic process using the properties of the real number system, e.g., write an algebraic proof

OPERATIONS AND THEIR PROPERTIES

11–12.1.5. Determine which properties of the real number system hold for matrices, e.g., matrix multiplication is not commutative

11–12.1.6. Apply basic properties of exponents and logarithms to rewrite algebraic expressions, i.e., power of a product, power of a power, products and quotients of powers, zero and negative exponents, and log of a product, quotient, or power

COMPUTATIONAL FLUENCY AND ESTIMATION

11–12.1.7. Add, subtract, and multiply complex numbers

11–12.1.8. Multiply matrices containing no more than three rows or columns without the use of technology

Standard 2: Geometry and Spatial Sense

Students understand and apply geometric concepts and spatial relationships to represent and solve problems in mathematical and nonmathematical situations.

TWO- AND THREE-DIMENSIONAL SHAPES, GEOMETRIC PROPERTIES AND RELATIONSHIPS

11–12.2.1. Use trigonometric relationships to determine side lengths and angle measures in triangles, i.e., right triangle trigonometry, Law of Sines, and Law of Cosines

COORDINATE GEOMETRY

No benchmark expectations at this level

TRANSFORMATION AND SYMMETRY

No benchmark expectations at this level

VISUALIZATION, SPATIAL REASONING, AND GEOMETRIC MODELING

No benchmark expectations at this level

Standard 3: Data Analysis, Statistics, and Probability

Students use data collection and analysis techniques, statistical methods, and probability to solve problems.

DATA COLLECTION, DISPLAY, AND INTERPRETATION

11–12.3.1. Choose, construct, and interpret a display to represent a set of data

PROBABILITY

11–12.3.2. Make predictions based on theoretical probabilities and experimental results

STATISTICAL METHODS

11–12.3.3. Select, calculate, and use appropriate measures of central tendency and spread (i.e., mean, median, mode, range, and quartiles) to draw meaningful conclusions about a set of data

PREDICTIONS, DATA ANALYSIS, AND INFERENCES

11–12.3.4. Given a set of data exhibiting a linear trend, approximate an equation for the line of best fit (with or without technology) and use that model to make predictions

Standard 4: Measurement

Students use concepts and tools of measurement to describe and quantify the world.

MEASURABLE ATTRIBUTES, MEASUREMENT SYSTEMS AND UNITS

No benchmark expectations at this level

MEASUREMENT TOOLS, TECHNIQUES, AND FORMULAS

No benchmark expectations at this level

Standard 5: Algebra, Functions, and Patterns

Students use algebraic concepts, functions, patterns, and relationships to solve problems.

PATTERNS, RELATIONS, AND FUNCTIONS

11–12.5.1. Perform advanced operations (i.e., composition and finding inverses) on algebraic functions

11–12.5.2. Generate graphs of a variety of functions (i.e., linear, quadratic, polynomial, absolute value, and exponential), using technology when appropriate

NUMERIC AND ALGEBRAIC REPRESENTATIONS

11–12.5.3. Solve quadratic equations involving complex roots

11–12.5.4. Use transformations (i.e., reflection, translation, dilation) to graph linear, quadratic, and absolute value functions

11–12.5.5. Given the graph of a transformed linear, quadratic, or absolute value function, write its equation

MATHEMATICAL MODELING

11–12.5.6. Determine and write an equation for a function (i.e., linear, quadratic, polynomial, absolute value, and exponential) that models a mathematical relationship

RATES OF CHANGE

No benchmark expectations at this level

Science

NORTH DAKOTA Grade 8 Science Content Standards

Standard 1: Unifying Concepts

Students understand the unifying concepts and processes of science.

MODELS

No benchmark expectations at this level

SYSTEMS

8.1.1. Organize changes (e.g., patterns, cycles) that occur sequentially in systems

CONSTANCY AND CHANGE

No benchmark expectations at this level

FORM AND FUNCTION

No benchmark expectations at this level

Standard 2: Science Inquiry

Students use the process of science inquiry.

UNDERSTANDINGS ABOUT SCIENTIFIC INQUIRY

8.2.1. Explain how science advances through legitimate skepticism

ABILITIES NECESSARY TO DO SCIENTIFIC INQUIRY

8.2.2. Use evidence to generate descriptions, explanations, predictions, and models

8.2.3. Use basic mathematics and statistics (e.g., operations, mean, median, mode, range, and estimation) to interpret quantitative data

8.2.4. Design and conduct a scientific investigation (e.g., making systematic observations, making accurate measurements, identifying and controlling variables)

Standard 3: Physical Science

Students understand the basic concepts and principles of physical science.

PROPERTIES OF MATTER

8.3.1. Identify elements and compounds

8.3.2. Explain the relationship between phases of matter and temperature

FORCE AND MOTION

8.3.3. Interpret the effect of balanced and unbalanced forces on the motion of an object (e.g., convection currents, orbital motion, tides)

8.3.4. Explain how all objects exert gravitational force and this force is affected by the distance between the masses of the objects

ENERGY TRANSFER AND TRANSFORMATION

8.3.5. Identify when heat can be transferred by conduction, convection, or radiation

VIBRATIONS AND WAVES

8.3.6. Explain the characteristic properties (e.g., wavelength, frequency) and behaviors (e.g., reflection, refraction) of waves

Standard 4: Life Science

Students understand the basic concepts and principles of life science.

STRUCTURE AND FUNCTION

No benchmark expectations at this level

GENETICS AND REPRODUCTION

No benchmark expectations at this level

INTERDEPENDENCE AMONG ORGANISMS

No benchmark expectations at this level

DIVERSITY AND UNITY AMONG ORGANISMS

No benchmark expectations at this level

NATURAL SELECTION AND BIOLOGICAL EVOLUTION

8.4.1. Identify the evidence of biological evolution (e.g., adaptation, radiation, extinction) as found in the fossil record

Standard 5: Earth and Space Science

Students understand the basic concepts and principles of earth and space science.

WEATHER, SEASONS, AND CLIMATE

8.5.1. Explain how factors (i.e., fronts, winds, air masses, air pressure, humidity, temperature, location) affect weather

GEOLOGIC PROCESSES

8.5.2. Understand the rock cycle

8.5.3. Explain the water cycle

8.5.4. Explain how landforms are changed (e.g., crustal deformation, volcanic eruption, deposition, weathering, erosion)

8.5.5. Identify evidence for plate tectonics theory (e.g., fit of continents, location of earthquakes, volcanoes, mid-ocean ridge, plate boundaries)

8.5.6. Identify a variety of methods (e.g., rock sequences, fossil correlation, radiometric dating) used to determine geologic time

8.5.7. Explain the changes Earth has undergone over geologic time (e.g., fossil record, plate tectonics, climate change, glaciation)

CHARACTERISTICS OF THE EARTH

8.5.8. Explain how phenomena on Earth (i.e., day, year, seasons, lunar phases, eclipses, tides) are related to the position and motion of the Sun, Moon, and Earth

THE UNIVERSE

8.5.9. Identify characteristics of stars (e.g., color, size, temperature, life cycle)

8.5.10. Identify the composition (e.g., stars, galaxies) and scale of the universe

Standard 6: Science and Technology

Students understand relations between science and technology.

TECHNOLOGY AND SOCIETY

No benchmark expectations at this level

Standard 7: Science and Other Areas

Students understand relations between science and personal, social, and environmental issues.

SCIENCE AND SOCIAL ISSUES

8.7.1. Explain the interaction of science and technology with social issues (e.g., mining, natural disasters)

Standard 8: History and Nature of Science

Students understand the history and nature of science.

PEOPLE IN SCIENCE

No benchmark expectations at this level

SCIENTIFIC KNOWLEDGE

8.8.1. Explain how many people from various cultures have made important contributions to the advancement of science and technology

NORTH DAKOTA Grades 9–10 Science

Content Standards

Standard 1: Unifying Concepts

Students understand the unifying concepts and processes of science.

MODELS

9–10.1.1. Explain how models can be used to illustrate scientific principles

SYSTEMS

9–10.1.2. Describe the interaction of components within a system (e.g., interactions between living and nonliving components of an ecosystem, interaction between organelles of a cell)

CONSTANCY AND CHANGE

9–10.1.3. Explain how a system can be dynamic yet may remain in equilibrium (e.g., water cycle, rock cycle, population)

FORM AND FUNCTION

9–10.1.4. Describe the relationship between form and function (e.g., solids, liquids, gases, cell specialization, simple machines, and plate tectonics)

9–10.1.5. Explain how classification can be based on the relationship between form and function (e.g., elements and compounds, biological classifications, types of clouds)

EVOLUTION AND EQUILIBRIUM

9–10.1.6. Identify principles governing evolution and equilibrium within systems (e.g., cause and effect, positive and negative feedback)

Standard 2: Science Inquiry

Students use the process of science inquiry.

UNDERSTANDINGS ABOUT SCIENTIFIC INQUIRY

9–10.2.1. Explain how scientific investigations can result in new ideas

ABILITIES NECESSARY TO DO SCIENTIFIC INQUIRY

9–10.2.2. Use appropriate safety equipment and precautions during investigations (e.g., goggles, apron, eye wash station)

9–10.2.3. Identify questions and concepts that guide scientific investigations

9–10.2.4. Formulate a testable hypothesis for a simple investigation

9–10.2.5. Identify the independent and dependent variables, the control, and the constants when conducting an experiment

9–10.2.6. Design and conduct a guided investigation

9–10.2.7. Maintain clear and accurate records of scientific investigations

9–10.2.8. Analyze data found in tables, charts, and graphs to formulate conclusions

Standard 3: Physical Science

Students understand the basic concepts and principles of physical science.

PROPERTIES OF MATTER

9–10.3.1. Classify elements according to similar properties. (e.g., metal, nonmetal, solids, liquids, gases)

9–10.3.2. Classify changes in matter as physical or chemical

9–10.3.3. Identify the Law of Conservation of Matter in physical and chemical changes

ATOMS AND MOLECULES

9–10.3.4. Construct a model of an atom (e.g., protons, neutrons, electrons, nucleus, electron cloud)

CHEMICAL REACTIONS

9–10.3.5. Identify the reactants and products in a chemical reaction

9–10.3.6. Distinguish between balanced and unbalanced chemical equations

FORCE AND MOTION

9–10.3.7. Use Newton's Laws to describe the motion of an object

ENERGY TRANSFER AND TRANSFORMATION

9–10.3.8. Describe the relationships between kinetic and potential energy in basic transformations (e.g., physical and chemical changes)

VIBRATIONS AND WAVES

9–10.3.9. Compare and contrast electromagnetic and mechanical waves (i.e. energy, energy transfer, medium)

ELECTRICITY AND MAGNETISM

9–10.3.10. Describe the differences between series and parallel circuits

Standard 4: Life Science

Students understand the basic concepts and principles of life science.

STRUCTURE AND FUNCTION

9–10.4.1. Relate cell function to cell structure (i.e., cell wall, cell membrane, nucleus, mitochondria, chloroplast)

9–10.4.2. Relate the functions of cells in multicellular organisms to their cell type (e.g., nerve cells, blood cells, guard cells)

9–10.4.3. Explain the relationship between protein structure and function

GENETICS AND REPRODUCTION

9–10.4.4. Relate DNA, genes, and chromosomes

9–10.4.5. Explain the relationship between spontaneous changes in DNA and a source of genetic variation

9–10.4.6. Compare and contrast the results of mitosis and meiosis (i.e., mitosis involves a nuclear division that results in two daughter nuclei that are identical to the parent)

nucleus; meiosis involves two nuclear divisions that result in gametes cells containing half the number of chromosomes)

9–10.4.7. Apply the basic concepts of genetics to predict inherited traits (i.e., segregation, independent assortment, dominant and recessive traits)

NATURAL SELECTION AND BIOLOGICAL EVOLUTION

9–10.4.8. Relate the concept of natural selection to its evolutionary consequences

9–10.4.9. Identify evidence for evolution (e.g., fossil records, vestigial structures, similarities between organisms, and DNA)

INTERDEPENDENCE AMONG ORGANISMS

9–10.4.10. Explain the energy and organization related to trophic pyramids

MATTER AND ENERGY IN LIVING SYSTEMS

9–10.4.11. Explain how matter and energy flow through living and nonliving components in an ecosystem (e.g., carbon cycle, water cycle, nitrogen cycle)

9–10.4.12. Compare and contrast photosynthesis and cellular respiration

Standard 5: Earth and Space Science

Students understand the basic concepts and principles of earth and space science.

THE UNIVERSE

9–10.5.1. Explain the relationship between the Big Bang Theory and the origin and evolution of the universe

EARTH'S HISTORY

9–10.5.2. Relate the changes in the Earth's atmosphere to the evolution of photosynthetic life forms

ENERGY IN THE EARTH SYSTEM

9–10.5.3. Explain how energy in the Earth system is governed by convection, conduction, and radiation (e.g., heat moves in the Earth's mantle by convection, conduction occurs along the mid-oceanic ridges, energy from the Sun reaches the Earth through radiation)

GEOLOGIC PROCESSES, HUMAN ACTIVITIES, AND THE ENVIRONMENT

9–10.5.4. Identify the short-term and long-term effects of physical processes (e.g., plate tectonics, extreme weather phenomenon) on the environment and society

9–10.5.5. Analyze how evidence of past natural hazards and geologic events has predicted subsequent hazards and events (e.g. Gap time method to predict earthquakes and tsunamis)

9–10.5.6. Explain the effects of human activities (e.g., dams, levees, farming practices, deforestation, land-use practices, landmanagement strategies) on the environment

Standard 6: Science and Technology

Students understand relations between science and technology.

TECHNOLOGICAL DESIGN

9–10.6.1. Use appropriate technologies and techniques to solve a problem (e.g., computer-assisted tools, Internet, research skills)

9–10.6.2. Explain how scientific principles have been used to create common technologies (e.g., household appliances, automotive parts, agricultural equipment, textiles, fabrics, computers, Internet resources, CD-ROMs)

TECHNOLOGY AND SOCIETY

9–10.6.3. Explain how emerging technologies (e.g., genetic manipulation, biofuels, and hydrogen fuels) may impact society and the environment

Standard 7: Science and Other Areas

Students understand relations between science and personal, social, and environmental issues.

SCIENCE AND PERSONAL HEALTH

9–10.7.1. Explain how personal health is related to fitness, substance abuse, sexual activity, and nutrition

SCIENCE AND ENVIRONMENTAL ISSUES

9–10.7.2. Identify factors that affect populations (e.g., food webs, carrying capacity, overpopulation, disease, food supply, algal blooms, resources, conservation practices)

SCIENCE AND SOCIAL ISSUES

No benchmark expectations at this level

Standard 8: History and Nature of Science

Students understand the history and nature of science.

PEOPLE IN SCIENCE

9–10.8.1. Identify the role of scientists in theoretical and applied science (e.g., careers, employment possibilities)

9–10.8.2. Identify the human characteristics that influence scientific advancement (e.g., intellectual honesty, openness, objectivity, curiosity, skepticism, ethical conduct, cooperation)

9–10.8.3. Explain how individuals and groups, from different disciplines in and outside of science, contribute to science at different levels of complexity

SCIENTIFIC KNOWLEDGE

9–10.8.4. Identify theories that have changed over time (e.g., alchemy, atomic structure, model of the solar system)

SCIENCE AND SOCIETY

9–10.8.5. Explain how views and attitudes have influenced the development of science (e.g., religion, previous knowledge, cultural tradition, superstition, folklore, legends)

NORTH DAKOTA Grades 11–12 Science Content Standards

Standard 1: Unifying Concepts

Students understand the unifying concepts and processes of science.

MODELS

11–12.1.1. Explain how scientists create and use models to address scientific knowledge

SYSTEMS

11–12.1.2. Identify the structure, organization, and dynamics of components within a system (e.g., cells, tissues, organs, organ systems, reactants and products in chemical equilibrium)

CONSTANCY AND CHANGE

11–12.1.3. Explain how a system can be dynamic yet may remain in equilibrium (e.g., balance of forces, Le Chatelier's Principle, acid base systems)

FORM AND FUNCTION

11–12.1.4. Explain the relationship between form and function (e.g., atoms and ions, enzymes, aerodynamics)

11–12.1.5. Explain how classification can be based on the relationship between form and function (e.g., polar vs. nonpolar molecules, structure of periodic table, DNA vs. RNA)

EVOLUTION AND EQUILIBRIUM

No benchmark expectations at this level

Standard 2: Science Inquiry

Students use the process of science inquiry.

UNDERSTANDINGS ABOUT SCIENTIFIC INQUIRY

11–12.2.1. Explain how new knowledge and methods emerge from different types of investigations and public communication among scientists

ABILITIES NECESSARY TO DO SCIENTIFIC INQUIRY

11–12.2.2. Select and use appropriate instruments, measuring tools, and units of measure to improve scientific investigations

11–12.2.3. Use data from scientific investigations to accept or reject a hypothesis

11–12.2.4. Formulate and revise explanations based upon scientific knowledge and experimental data

11–12.2.5. Use technology and mathematics to improve investigations and communications

11–12.2.6. Analyze data using appropriate strategies (e.g., interpolation, and extrapolation of data, significant figures, dimensional analysis)

11–12.2.7. Design and conduct an independent investigation

11–12.2.8. Communicate and defend a scientific argument

Standard 3: Physical Science

Students understand the basic concepts and principles of physical science.

PROPERTIES OF MATTER

No benchmark expectations at this level

ATOMIC STRUCTURE AND PROPERTIES

11–12.3.1. Explain how the structure of an atom, isotope, or ion relates to its properties

11–12.3.2. Identify the basic organization of the periodic table (e.g., elements are listed according to the number of protons [atomic number]; repeating patterns of physical and chemical properties)

ATOMS AND MOLECULES

11–12.3.3. Compare and contrast the role of electrons in ionic and covalent bonding

11–12.3.4. Identify the basic bonding characteristics of carbon which lead to a large variety of structures

CHEMICAL REACTIONS

11–12.3.5. Identify the effect of concentration, temperature, surface area, pressure, and catalysts on reaction rates as it relates to the Kinetic Theory

11–12.3.6. Write the chemical formula and name for compounds using a table of element names, symbols, and oxidation numbers

11–12.3.7. Balance chemical equations

FORCE AND MOTION

11–12.3.8. Identify the principles and relationships influencing forces and motion (e.g., gravitational force, vectors, velocity, friction)

FORMS OF ENERGY

11–12.3.9. Explain the relationship among thermal energy, temperature, and the motion of particles

ENERGY TRANSFER AND TRANSFORMATION

11–12.3.10. Apply the law of conservation of energy to a variety of situations

11–12.3.11. Explain how energy is related to physical changes of matter (e.g., phase changes, temperature changes)

VIBRATIONS AND WAVES

11–12.3.12. Relate wave energy to wavelength and frequency

ELECTRICITY AND MAGNETISM

11–12.3.13. Explain how magnetic forces relate to electric forces

Standard 4: Life Science

Students understand the basic concepts and principles of life science.

STRUCTURE AND FUNCTION

11–12.4.1. Explain the importance of cell differentiation in the development of tissues, organs, organ systems, and multicellular organisms.

GENETICS AND REPRODUCTION

11–12.4.2. Explain how types of DNA technology (e.g., genetic engineering, forensic science, cloning) may impact society now and in the future.

NATURAL SELECTION AND BIOLOGICAL EVOLUTION

11–12.4.3. Explain how change through time has ensured adaptation to changing environments

INTERDEPENDENCE AMONG ORGANISMS

No benchmark expectations at this level

MATTER AND ENERGY IN LIVING SYSTEMS

No benchmark expectations at this level

Standard 5: Earth and Space Science

Students understand the basic concepts and principles of earth and space science.

THE UNIVERSE

11–12.5.1. Explain how the Sun and other stars are powered by nuclear reactions (e.g., the fusion of hydrogen to form helium, formation of elements)

EARTH'S HISTORY

No benchmark expectations at this level

ENERGY IN THE EARTH SYSTEM

11–12.5.2. Explain how Earth systems are in dynamic equilibrium (e.g., cycling of energy and matter through the atmosphere, hydrosphere, and lithosphere)

CYCLES IN THE EARTH SYSTEM

No benchmark expectations at this level

GEOLOGIC PROCESSES, HUMAN ACTIVITIES, AND THE ENVIRONMENT

11–12.5.3. Explain the short-term and long-term effects of chemical processes (e.g., acid rain, CO₂ emissions, ozone depletion, run-off) on the environment and society

Standard 6: Science and Technology

Students understand relations between science and technology.

TECHNOLOGICAL DESIGN

11–12.6.1. Select and use appropriate technologies, tools, and techniques to solve a problem (e.g., computer-assisted tools, Internet, research skills, CBL, graphing calculators)

11–12.6.2. Identify examples of how new technologies advance science

TECHNOLOGY AND SOCIETY

11–12.6.3. Explain how designing and implementing technology requires weighing trade-offs between positive and negative impacts on humans and the environment

Standard 7: Science and Other Areas

Students understand relations between science and personal, social, and environmental issues.

SCIENCE AND PERSONAL HEALTH

No benchmark expectations at this level

SCIENCE AND ENVIRONMENTAL ISSUES

11–12.7.1. Explain the impact of environmental laws and policies on the environment and society (e.g., waste/pollutants from industry, carbon dioxide emissions, location and number of animals in a feedlot versus water supply)

11–12.7.2. Explain ways renewable and nonrenewable resources are managed (e.g., land reclamation, forest management, CRP, hunting licenses, energy-conserving technologies)

11–12.7.3. Explain the economic and social impact of using alternative energy resources

SCIENCE AND SOCIAL ISSUES

11–12.7.4. Explain how science and technology can influence personal, industrial, and cultural decision-making (e.g., organ transplants, cloning, stem cell research, genetic manipulation, use of genetic profile, archeological discoveries, land management, resource management)

Standard 8: History and Nature of Science

Students understand the history and nature of science.

PEOPLE IN SCIENCE

No benchmark expectations at this level

SCIENTIFIC KNOWLEDGE

11–12.8.1. Identify the criteria that scientific explanations must meet to be considered valid (e.g., must be based on consistent and repeatable data, be consistent with experimental and observational evidence about nature, make accurate predictions about systems being studied, be logical, report methods and results, be open to question and reexamination, respect rules of evidence)

SCIENCE AND SOCIETY

No benchmark expectations at this level

Section C: ACT's College Readiness Standards Included in North Dakota's Grade 8–12 Content Standards

In recent years ACT has brought a distinctive voice to the debate on what it means to be truly ready for college. Using a wealth of longitudinal data—data that no one else possesses—ACT has pioneered empirical approaches to assessing students' college readiness. Using thousands of student records and responses, content and measurement experts at ACT have developed detailed statements that describe what students typically know and are able to do at different levels of test performance. These data-driven, empirically derived score descriptors, known as ACT's College Readiness Standards, describe student achievement within various score ranges on the English, Reading, Writing, Mathematics, and Science tests on EXPLORE, PLAN, and the ACT.

How ACT College Readiness Standards Work with ACT College Readiness Benchmarks

The ACT College Readiness Benchmarks are the minimum ACT test scores required for students to have a high probability of success in first-year, credit-bearing college courses—English Composition, Algebra, social sciences courses, or Biology. EXPLORE and PLAN Benchmarks provided minimum score targets for eighth- and tenth-grade students to gauge their progress in becoming college ready by the time they graduate from high school.

ACT's College Readiness Benchmarks				
Test	College Course	ACT Test Score	PLAN Test Score	EXPLORE Test Score
English	English Composition	18	15	13
Mathematics	College Algebra	22	19	17
Reading	College Social Studies/Humanities	21	17	15
Science	College Biology	24	21	20

Students who meet a Benchmark on the ACT have approximately a 50 percent chance of earning a B or better and approximately a 75 percent chance or better of earning a C or better in the corresponding entry-level college course or courses. Students who meet a Benchmark on EXPLORE or PLAN have a high chance of meeting the College Readiness Benchmarks for the ACT and of being ready for the corresponding college course(s) by the time they graduate from high school.

The knowledge and skills in the score ranges that include these Benchmark scores are shown in the tables on the following pages. Students who master these standards are more likely than those who do not to persist to the second year at the same institution; achieve a grade of B or higher in first-year college courses; achieve a first-year college GPA of 2.5 or higher; progress toward a college degree; and complete a college degree.



Research shows that the academic quality and intensity of the high school curriculum is a key determinant of success in postsecondary education. *States should ensure that high school coursework be of sufficient rigor to prepare their graduates for postsecondary education and workforce training.*

This section (Section C) provides information about the North Dakota Content Standards as they relate to ACT's College Readiness Standards. The ACT College Readiness Standards included in the North Dakota Content Standards are highlighted. College Readiness Standards not highlighted are those that include specific content, complexity, and/or proficiency level descriptors that ACT content experts determined were not included in the North Dakota Content Standards.



Score Ranges	Table C-1. ACT's College Readiness Standards — English		
Benchmarks	Topic Development in Terms of Purpose and Focus	Organization, Unity, and Coherence	Word Choice in Terms of Style, Tone, Clarity, and Economy
13–15 EXPL: 13 PLAN: 15		Use conjunctive adverbs or phrases to show time relationships in simple narrative essays (e.g., <i>then, this time</i>)	Revise sentences to correct awkward and confusing arrangements of sentence elements Revise vague nouns and pronouns that create obvious logic problems
16–19 ACT: 18	Identify the basic purpose or role of a specified phrase or sentence Delete a clause or sentence because it is obviously irrelevant to the essay	Select the most logical place to add a sentence in a paragraph	Delete obviously synonymous and wordy material in a sentence Revise expressions that deviate from the style of an essay
20–23	Identify the central idea or main topic of a straightforward piece of writing Determine relevancy when presented with a variety of sentence-level details	Use conjunctive adverbs or phrases to express straightforward logical relationships (e.g., <i>first, afterward, in response</i>) Decide the most logical place to add a sentence in an essay Add a sentence that introduces a simple paragraph	Delete redundant material when information is repeated in different parts of speech (e.g., “alarmingly startled”) Use the word or phrase most consistent with the style and tone of a fairly straightforward essay Determine the clearest and most logical conjunction to link clauses
24–27	Identify the focus of a simple essay, applying that knowledge to add a sentence that sharpens that focus or to determine if an essay has met a specified goal Delete material primarily because it disturbs the flow and development of the paragraph Add a sentence to accomplish a fairly straightforward purpose such as illustrating a given statement	Determine the need for conjunctive adverbs or phrases to create subtle logical connections between sentences (e.g., <i>therefore, however, in addition</i>) Rearrange the sentences in a fairly uncomplicated paragraph for the sake of logic Add a sentence to introduce or conclude the essay or to provide a transition between paragraphs when the essay is fairly straightforward	Revise a phrase that is redundant in terms of the meaning and logic of the entire sentence Identify and correct ambiguous pronoun references Use the word or phrase most appropriate in terms of the content of the sentence and tone of the essay
28–32*	Apply an awareness of the focus and purpose of a fairly involved essay to determine the rhetorical effect and suitability of an existing phrase or sentence, or to determine the need to delete plausible but irrelevant material Add a sentence to accomplish a subtle rhetorical purpose such as to emphasize, to add supporting detail, or to express meaning through connotation	Make sophisticated distinctions concerning the logical use of conjunctive adverbs or phrases, particularly when signaling a shift between paragraphs Rearrange sentences to improve the logic and coherence of a complex paragraph Add a sentence to introduce or conclude a fairly complex paragraph	Correct redundant material that involves sophisticated vocabulary and sounds acceptable as conversational English (e.g., “an aesthetic viewpoint” versus “the outlook of an aesthetic viewpoint”) Correct vague and wordy or clumsy and confusing writing containing sophisticated language
33–36†	Determine whether a complex essay has accomplished a specific purpose Add a phrase or sentence to accomplish a complex purpose, often expressed in terms of the main focus of the essay	Consider the need for introductory sentences or transitions, basing decisions on a thorough understanding of both the logic and rhetorical effect of the paragraph and essay	Delete redundant material that involves subtle concepts or that is redundant in terms of the paragraph as a whole

* Statements apply to PLAN & ACT only

† Statements apply to the ACT only

Score Ranges	Table C-1. ACT's College Readiness Standards — English (continued)		
Bench- marks	Sentence Structure and Formation	Conventions of Usage	Conventions of Punctuation
13–15 <i>EXPL:</i> 13 <i>PLAN:</i> 15	<p>Use conjunctions or punctuation to join simple clauses</p> <p>Revise shifts in verb tense between simple clauses in a sentence or between simple adjoining sentences</p>	<p>Solve such basic grammatical problems as how to form the past and past participle of irregular but commonly used verbs and how to form comparative and superlative adjectives</p>	<p>Delete commas that create basic sense problems (e.g., between verb and direct object)</p>
16–19 <i>ACT:</i> 18	<p>Determine the need for punctuation and conjunctions to avoid awkward-sounding sentence fragments and fused sentences</p> <p>Decide the appropriate verb tense and voice by considering the meaning of the entire sentence</p>	<p>Solve such grammatical problems as whether to use an adverb or adjective form, how to ensure straightforward subject-verb and pronoun-antecedent agreement, and which preposition to use in simple contexts</p> <p>Recognize and use the appropriate word in frequently confused pairs such as <i>there</i> and <i>their</i>, <i>past</i> and <i>passed</i>, and <i>led</i> and <i>lead</i></p>	<p>Provide appropriate punctuation in straightforward situations (e.g., items in a series)</p> <p>Delete commas that disturb the sentence flow (e.g., between modifier and modified element)</p>
20–23	<p>Recognize and correct marked disturbances of sentence flow and structure (e.g., participial phrase fragments, missing or incorrect relative pronouns, dangling or misplaced modifiers)</p>	<p>Use idiomatically appropriate prepositions, especially in combination with verbs (e.g., <i>long for</i>, <i>appeal to</i>)</p> <p>Ensure that a verb agrees with its subject when there is some text between the two</p>	<p>Use commas to set off simple parenthetical phrases</p> <p>Delete unnecessary commas when an incorrect reading of the sentence suggests a pause that should be punctuated (e.g., between verb and direct object clause)</p>
24–27	<p>Revise to avoid faulty placement of phrases and faulty coordination and subordination of clauses in sentences with subtle structural problems</p> <p>Maintain consistent verb tense and pronoun person on the basis of the preceding clause or sentence</p>	<p>Ensure that a pronoun agrees with its antecedent when the two occur in separate clauses or sentences</p> <p>Identify the correct past and past participle forms of irregular and infrequently used verbs and form present-perfect verbs by using <i>have</i> rather than <i>of</i></p>	<p>Use punctuation to set off complex parenthetical phrases</p> <p>Recognize and delete unnecessary commas based on a careful reading of a complicated sentence (e.g., between the elements of a compound subject or compound verb joined by <i>and</i>)</p> <p>Use apostrophes to indicate simple possessive nouns</p> <p>Recognize inappropriate uses of colons and semicolons</p>
28–32*	<p>Use sentence-combining techniques, effectively avoiding problematic comma splices, run-on sentences, and sentence fragments, especially in sentences containing compound subjects or verbs</p> <p>Maintain a consistent and logical use of verb tense and pronoun person on the basis of information in the paragraph or essay as a whole</p>	<p>Correctly use reflexive pronouns, the possessive pronouns <i>its</i> and <i>your</i>, and the relative pronouns <i>who</i> and <i>whom</i></p> <p>Ensure that a verb agrees with its subject in unusual situations (e.g., when the subject-verb order is inverted or when the subject is an indefinite pronoun)</p>	<p>Use commas to set off a nonessential/nonrestrictive appositive or clause</p> <p>Deal with multiple punctuation problems (e.g., compound sentences containing unnecessary commas and phrases that may or may not be parenthetical)</p> <p>Use an apostrophe to show possession, especially with irregular plural nouns</p> <p>Use a semicolon to indicate a relationship between closely related independent clauses</p>
33–36†	<p>Work comfortably with long sentences and complex clausal relationships within sentences, avoiding weak conjunctions between independent clauses and maintaining parallel structure between clauses</p>	<p>Provide idiomatically and contextually appropriate prepositions following verbs in situations involving sophisticated language or ideas</p> <p>Ensure that a verb agrees with its subject when a phrase or clause between the two suggests a different number for the verb</p>	<p>Use a colon to introduce an example or an elaboration</p>

* Statements apply to PLAN & ACT only

† Statements apply to the ACT only

Score Ranges	Table C-2. ACT's College Readiness Standards — Reading	
Bench- marks	Main Ideas and Author's Approach	Supporting Details
13–15 <i>EXPL:</i> 15	Recognize a clear intent of an author or narrator in uncomplicated literary narratives	Locate basic facts (e.g., names, dates, events) clearly stated in a passage
16–19 <i>PLAN:</i> 17	Identify a clear main idea or purpose of straightforward paragraphs in uncomplicated literary narratives	Locate simple details at the sentence and paragraph level in uncomplicated passages Recognize a clear function of a part of an uncomplicated passage
20–23 <i>ACT:</i> 21	Infer the main idea or purpose of straightforward paragraphs in uncomplicated literary narratives Understand the overall approach taken by an author or narrator (e.g., point of view, kinds of evidence used) in uncomplicated passages	Locate important details in uncomplicated passages Make simple inferences about how details are used in passages
24–27	Identify a clear main idea or purpose of any paragraph or paragraphs in uncomplicated passages Infer the main idea or purpose of straightforward paragraphs in more challenging passages Summarize basic events and ideas in more challenging passages Understand the overall approach taken by an author or narrator (e.g., point of view, kinds of evidence used) in more challenging passages	Locate important details in more challenging passages Locate and interpret minor or subtly stated details in uncomplicated passages Discern which details, though they may appear in different sections throughout a passage, support important points in more challenging passages
28–32*	Infer the main idea or purpose of more challenging passages or their paragraphs Summarize events and ideas in virtually any passage Understand the overall approach taken by an author or narrator (e.g., point of view, kinds of evidence used) in virtually any passage	Locate and interpret minor or subtly stated details in more challenging passages Use details from different sections of some complex informational passages to support a specific point or argument
33–36†	Identify clear main ideas or purposes of complex passages or their paragraphs	Locate and interpret details in complex passages Understand the function of a part of a passage when the function is subtle or complex

* Statements apply to PLAN & ACT only

† Statements apply to the ACT only

Descriptions of the ACT Reading Passages

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

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

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

Score Ranges	Table C-2. ACT's College Readiness Standards — Reading (continued)		
Bench- marks	Sequential, Comparative, and Cause-Effect Relationships	Meanings of Words	Generalizations and Conclusions
13–15 <i>EXPL:</i> 15	Determine when (e.g., first, last, before, after) or if an event occurred in uncomplicated passages Recognize clear cause-effect relationships described within a single sentence in a passage	Understand the implication of a familiar word or phrase and of simple descriptive language	Draw simple generalizations and conclusions about the main characters in uncomplicated literary narratives
16–19 <i>PLAN:</i> 17	Identify relationships between main characters in uncomplicated literary narratives Recognize clear cause-effect relationships within a single paragraph in uncomplicated literary narratives	Use context to understand basic figurative language	Draw simple generalizations and conclusions about people, ideas, and so on in uncomplicated passages
20–23 <i>ACT:</i> 21	Order simple sequences of events in uncomplicated literary narratives Identify clear relationships between people, ideas, and so on in uncomplicated passages Identify clear cause-effect relationships in uncomplicated passages	Use context to determine the appropriate meaning of some figurative and nonfigurative words, phrases, and statements in uncomplicated passages	Draw generalizations and conclusions about people, ideas, and so on in uncomplicated passages Draw simple generalizations and conclusions using details that support the main points of more challenging passages
24–27	Order sequences of events in uncomplicated passages Understand relationships between people, ideas, and so on in uncomplicated passages Identify clear relationships between characters, ideas, and so on in more challenging literary narratives Understand implied or subtly stated cause-effect relationships in uncomplicated passages Identify clear cause-effect relationships in more challenging passages	Use context to determine the appropriate meaning of virtually any word, phrase, or statement in uncomplicated passages Use context to determine the appropriate meaning of some figurative and nonfigurative words, phrases, and statements in more challenging passages	Draw subtle generalizations and conclusions about characters, ideas, and so on in uncomplicated literary narratives Draw generalizations and conclusions about people, ideas, and so on in more challenging passages
28–32*	Order sequences of events in more challenging passages Understand the dynamics between people, ideas, and so on in more challenging passages Understand implied or subtly stated cause-effect relationships in more challenging passages	Determine the appropriate meaning of words, phrases, or statements from figurative or somewhat technical contexts	Use information from one or more sections of a more challenging passage to draw generalizations and conclusions about people, ideas, and so on
33–36†	Order sequences of events in complex passages Understand the subtleties in relationships between people, ideas, and so on in virtually any passage Understand implied, subtle, or complex cause-effect relationships in virtually any passage	Determine, even when the language is richly figurative and the vocabulary is difficult, the appropriate meaning of context-dependent words, phrases, or statements in virtually any passage	Draw complex or subtle generalizations and conclusions about people, ideas, and so on, often by synthesizing information from different portions of the passage Understand and generalize about portions of a complex literary narrative

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

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

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

Table C-3. ACT's College Readiness Standards — Writing*			
Score Ranges	Expressing Judgments	Focusing on the Topic	Developing a Position
3–4	<p>Show a little understanding of the persuasive purpose of the task but neglect to take or to maintain a position on the issue in the prompt</p> <p>Show limited recognition of the complexity of the issue in the prompt</p>	Maintain a focus on the general topic in the prompt through most of the essay	<p>Offer a little development, with one or two ideas; if examples are given, they are general and may not be clearly relevant; resort often to merely repeating ideas</p> <p>Show little or no movement between general and specific ideas and examples</p>
5–6	<p>Show a basic understanding of the persuasive purpose of the task by taking a position on the issue in the prompt but may not maintain that position</p> <p>Show a little recognition of the complexity of the issue in the prompt by acknowledging, but only briefly describing, a counterargument to the writer's position</p>	Maintain a focus on the general topic in the prompt throughout the essay	<p>Offer limited development of ideas using a few general examples; resort sometimes to merely repeating ideas</p> <p>Show little movement between general and specific ideas and examples</p>
7–8	<p>Show understanding of the persuasive purpose of the task by taking a position on the issue in the prompt</p> <p>Show some recognition of the complexity of the issue in the prompt by</p> <ul style="list-style-type: none"> acknowledging counterarguments to the writer's position providing some response to counterarguments to the writer's position 	<p>Maintain a focus on the general topic in the prompt throughout the essay and attempt a focus on the specific issue in the prompt</p> <p>Present a thesis that establishes focus on the topic</p>	<p>Develop ideas by using some specific reasons, details, and examples</p> <p>Show some movement between general and specific ideas and examples</p>
9–10	<p>Show clear understanding of the persuasive purpose of the task by taking a position on the specific issue in the prompt and offering a broad context for discussion</p> <p>Show recognition of the complexity of the issue in the prompt by</p> <ul style="list-style-type: none"> partially evaluating implications and/or complications of the issue, and/or posing and partially responding to counterarguments to the writer's position 	<p>Maintain a focus on discussion of the specific topic and issue in the prompt throughout the essay</p> <p>Present a thesis that establishes a focus on the writer's position on the issue</p>	<p>Develop most ideas fully, using some specific and relevant reasons, details, and examples</p> <p>Show clear movement between general and specific ideas and examples</p>
11–12	<p>Show clear understanding of the persuasive purpose of the task by taking a position on the specific issue in the prompt and offering a critical context for discussion</p> <p>Show understanding of the complexity of the issue in the prompt by</p> <ul style="list-style-type: none"> examining different perspectives, and/or evaluating implications or complications of the issue, and/or posing and fully discussing counterarguments to the writer's position 	<p>Maintain a clear focus on discussion of the specific topic and issue in the prompt throughout the essay</p> <p>Present a critical thesis that clearly establishes the focus on the writer's position on the issue</p>	<p>Develop several ideas fully, using specific and relevant reasons, details, and examples</p> <p>Show effective movement between general and specific ideas and examples</p>

*The shaded row in this table shows the minimum level of writing skills needed by students to be ready for college-level writing assignments.

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

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

Score Ranges	Table C-4. ACT's College Readiness Standards — Mathematics			
Bench- marks	Basic Operations & Applications	Probability, Statistics, & Data Analysis	Numbers: Concepts & Properties	Expressions, Equations, & Inequalities
13–15	<p>Perform one-operation computation with whole numbers and decimals</p> <p>Solve problems in one or two steps using whole numbers</p> <p>Perform common conversions (e.g., inches to feet or hours to minutes)</p>	<p>Calculate the average of a list of positive whole numbers</p> <p>Perform a single computation using information from a table or chart</p>	<p>Recognize equivalent fractions and fractions in lowest terms</p>	<p>Exhibit knowledge of basic expressions (e.g., identify an expression for a total as $b + g$)</p> <p>Solve equations in the form $x + a = b$, where a and b are whole numbers or decimals</p>
16–19 <i>EXPL:</i> 17 <i>PLAN:</i> 19	<p>Solve routine one-step arithmetic problems (using whole numbers, fractions, and decimals) such as single-step percent</p> <p>Solve some routine two-step arithmetic problems</p>	<p>Calculate the average of a list of numbers</p> <p>Calculate the average, given the number of data values and the sum of the data values</p> <p>Read tables and graphs</p> <p>Perform computations on data from tables and graphs</p> <p>Use the relationship between the probability of an event and the probability of its complement</p>	<p>Recognize one-digit factors of a number</p> <p>Identify a digit's place value</p>	<p>Substitute whole numbers for unknown quantities to evaluate expressions</p> <p>Solve one-step equations having integer or decimal answers</p> <p>Combine like terms (e.g., $2x + 5x$)</p>
20–23 <i>ACT:</i> 22	<p>Solve routine two-step or three-step arithmetic problems involving concepts such as rate and proportion, tax added, percentage off, and computing with a given average</p>	<p>Calculate the missing data value, given the average and all data values but one</p> <p>Translate from one representation of data to another (e.g., a bar graph to a circle graph)</p> <p>Determine the probability of a simple event</p> <p>Exhibit knowledge of simple counting techniques*</p>	<p>Exhibit knowledge of elementary number concepts including rounding, the ordering of decimals, pattern identification, absolute value, primes, and greatest common factor</p>	<p>Evaluate algebraic expressions by substituting integers for unknown quantities</p> <p>Add and subtract simple algebraic expressions</p> <p>Solve routine first-degree equations</p> <p>Perform straightforward word-to-symbol translations</p> <p>Multiply two binomials*</p>
24–27	<p>Solve multistep arithmetic problems that involve planning or converting units of measure (e.g., feet per second to miles per hour)</p>	<p>Calculate the average, given the frequency counts of all the data values</p> <p>Manipulate data from tables and graphs</p> <p>Compute straightforward probabilities for common situations</p> <p>Use Venn diagrams in counting*</p>	<p>Find and use the least common multiple</p> <p>Order fractions</p> <p>Work with numerical factors</p> <p>Work with scientific notation</p> <p>Work with squares and square roots of numbers</p> <p>Work problems involving positive integer exponents*</p> <p>Work with cubes and cube roots of numbers*</p> <p>Determine when an expression is undefined*</p> <p>Exhibit some knowledge of the complex numbers†</p>	<p>Solve real-world problems using first-degree equations</p> <p>Write expressions, equations, or inequalities with a single variable for common pre-algebra settings (e.g., rate and distance problems and problems that can be solved by using proportions)</p> <p>Identify solutions to simple quadratic equations</p> <p>Add, subtract, and multiply polynomials*</p> <p>Factor simple quadratics (e.g., the difference of squares and perfect square trinomials)*</p> <p>Solve first-degree inequalities that do not require reversing the inequality sign*</p>
28–32*	<p>Solve word problems containing several rates, proportions, or percentages</p>	<p>Calculate or use a weighted average</p> <p>Interpret and use information from figures, tables, and graphs</p> <p>Apply counting techniques</p> <p>Compute a probability when the event and/or sample space are not given or obvious</p>	<p>Apply number properties involving prime factorization</p> <p>Apply number properties involving even/odd numbers and factors/multiples</p> <p>Apply number properties involving positive/negative numbers</p> <p>Apply rules of exponents</p> <p>Multiply two complex numbers†</p>	<p>Manipulate expressions and equations</p> <p>Write expressions, equations, and inequalities for common algebra settings</p> <p>Solve linear inequalities that require reversing the inequality sign</p> <p>Solve absolute value equations</p> <p>Solve quadratic equations</p> <p>Find solutions to systems of linear equations</p>
33–36†	<p>Solve complex arithmetic problems involving percent of increase or decrease and problems requiring integration of several concepts from pre-algebra and/or pre-geometry (e.g., comparing percentages or averages, using several ratios, and finding ratios in geometry settings)</p>	<p>Distinguish between mean, median, and mode for a list of numbers</p> <p>Analyze and draw conclusions based on information from figures, tables, and graphs</p> <p>Exhibit knowledge of conditional and joint probability</p>	<p>Draw conclusions based on number concepts, algebraic properties, and/or relationships between expressions and numbers</p> <p>Exhibit knowledge of logarithms and geometric sequences</p> <p>Apply properties of complex numbers</p>	<p>Write expressions that require planning and/or manipulating to accurately model a situation</p> <p>Write equations and inequalities that require planning, manipulating, and/or solving</p> <p>Solve simple absolute value inequalities</p>

* Statements apply to PLAN & ACT only

ACT's Mathematics College Readiness Standards

† Statements apply to the ACT only

■ = Included in North Dakota Content Standards

Score Ranges Bench- marks	Table C-4. ACT's College Readiness Standards — Mathematics (continued)			
	Graphical Representations	Properties of Plane Figures	Measurement	Functions†
13–15	Identify the location of a point with a positive coordinate on the number line		Estimate or calculate the length of a line segment based on other lengths given on a geometric figure	
16–19 <i>EXPL:</i> 17 <i>PLAN:</i> 19	Locate points on the number line and in the first quadrant	Exhibit some knowledge of the angles associated with parallel lines	Compute the perimeter of polygons when all side lengths are given Compute the area of rectangles when whole number dimensions are given	
20–23 <i>ACT:</i> 22	Locate points in the coordinate plane Comprehend the concept of length on the number line* Exhibit knowledge of slope*	Find the measure of an angle using properties of parallel lines Exhibit knowledge of basic angle properties and special sums of angle measures (e.g., 90°, 180°, and 360°)	Compute the area and perimeter of triangles and rectangles in simple problems Use geometric formulas when all necessary information is given	Evaluate quadratic functions, expressed in function notation, at integer values
24–27	Identify the graph of a linear inequality on the number line* Determine the slope of a line from points or equations* Match linear graphs with their equations* Find the midpoint of a line segment*	Use several angle properties to find an unknown angle measure Recognize Pythagorean triples* Use properties of isosceles triangles*	Compute the area of triangles and rectangles when one or more additional simple steps are required Compute the area and circumference of circles after identifying necessary information Compute the perimeter of simple composite geometric figures with unknown side lengths*	Evaluate polynomial functions, expressed in function notation, at integer values Express the sine, cosine, and tangent of an angle in a right triangle as a ratio of given side lengths
28–32*	Interpret and use information from graphs in the coordinate plane Match number line graphs with solution sets of linear inequalities Use the distance formula Use properties of parallel and perpendicular lines to determine an equation of a line or coordinates of a point Recognize special characteristics of parabolas and circles (e.g., the vertex of a parabola and the center or radius of a circle)†	Apply properties of 30°-60°-90°, 45°-45°-90°, similar, and congruent triangles Use the Pythagorean theorem	Use relationships involving area, perimeter, and volume of geometric figures to compute another measure	Evaluate composite functions at integer values Apply basic trigonometric ratios to solve right-triangle problems
33–36†	Match number line graphs with solution sets of simple quadratic inequalities Identify characteristics of graphs based on a set of conditions or on a general equation such as $y = ax^2 + c$ Solve problems integrating multiple algebraic and/or geometric concepts Analyze and draw conclusions based on information from graphs in the coordinate plane	Draw conclusions based on a set of conditions Solve multistep geometry problems that involve integrating concepts, planning, visualization, and/or making connections with other content areas Use relationships among angles, arcs, and distances in a circle	Use scale factors to determine the magnitude of a size change Compute the area of composite geometric figures when planning or visualization is required	Write an expression for the composite of two simple functions Use trigonometric concepts and basic identities to solve problems Exhibit knowledge of unit circle trigonometry Match graphs of basic trigonometric functions with their equations

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ACT's Mathematics College Readiness Standards

† Statements apply to the ACT only

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Score Ranges	Table C-5. ACT's College Readiness Standards — Science		
Benchmarks	Interpretation of Data	Scientific Investigation	Evaluation of Models, Inferences, and Experimental Results
13–15	Select a single piece of data (numerical or nonnumerical) from a simple data presentation (e.g., a table or graph with two or three variables; a food web diagram) Identify basic features of a table, graph, or diagram (e.g., headings, units of measurement, axis labels)		
16–19	Select two or more pieces of data from a simple data presentation Understand basic scientific terminology Find basic information in a brief body of text Determine how the value of one variable changes as the value of another variable changes in a simple data presentation	Understand the methods and tools used in a simple experiment	
20–23 EXPL: 20 PLAN: 21	Select data from a complex data presentation (e.g., a table or graph with more than three variables; a phase diagram) Compare or combine data from a simple data presentation (e.g., order or sum data from a table) Translate information into a table, graph, or diagram	Understand the methods and tools used in a moderately complex experiment Understand a simple experimental design Identify a control in an experiment Identify similarities and differences between experiments	Select a simple hypothesis, prediction, or conclusion that is supported by a data presentation or a model Identify key issues or assumptions in a model
24–27 ACT: 24	Compare or combine data from two or more simple data presentations (e.g., categorize data from a table using a scale from another table) Compare or combine data from a complex data presentation Interpolate between data points in a table or graph Determine how the value of one variable changes as the value of another variable changes in a complex data presentation Identify and/or use a simple (e.g., linear) mathematical relationship between data Analyze given information when presented with new, simple information	Understand the methods and tools used in a complex experiment Understand a complex experimental design Predict the results of an additional trial or measurement in an experiment Determine the experimental conditions that would produce specified results	Select a simple hypothesis, prediction, or conclusion that is supported by two or more data presentations or models Determine whether given information supports or contradicts a simple hypothesis or conclusion, and why Identify strengths and weaknesses in one or more models Identify similarities and differences between models Determine which model(s) is(are) supported or weakened by new information Select a data presentation or a model that supports or contradicts a hypothesis, prediction, or conclusion
28–32*	Compare or combine data from a simple data presentation with data from a complex data presentation Identify and/or use a complex (e.g., nonlinear) mathematical relationship between data Extrapolate from data points in a table or graph	Determine the hypothesis for an experiment Identify an alternate method for testing a hypothesis	Select a complex hypothesis, prediction, or conclusion that is supported by a data presentation or model Determine whether new information supports or weakens a model, and why Use new information to make a prediction based on a model
33–36†	Compare or combine data from two or more complex data presentations Analyze given information when presented with new, complex information	Understand precision and accuracy issues Predict how modifying the design or methods of an experiment will affect results Identify an additional trial or experiment that could be performed to enhance or evaluate experimental results	Select a complex hypothesis, prediction, or conclusion that is supported by two or more data presentations or models Determine whether given information supports or contradicts a complex hypothesis or conclusion, and why

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

Life Science/Biology	Physical Science/Chemistry, Physics	Earth & Space Science
<ul style="list-style-type: none"> Animal behavior Animal development and growth Body systems Cell structure and processes Ecology Evolution Genetics Homeostasis Life cycles Molecular basis of heredity Origin of life Photosynthesis Plant development, growth, structure Populations Taxonomy 	<ul style="list-style-type: none"> Atomic structure Chemical bonding, equations, nomenclature, reactions Electrical circuits Elements, compounds, mixtures Force and motions Gravitation Heat and work Kinetic and potential energy Magnetism Momentum The Periodic Table Properties of solutions Sound and light States, classes, and properties of matter Waves 	<ul style="list-style-type: none"> Earthquakes and volcanoes Earth's atmosphere Earth's resources Fossils and geological time Geochemical cycles Groundwater Lakes, rivers, oceans Mass movements Plate tectonics Rocks, minerals Solar system Stars, galaxies, and the universe Water cycle Weather and climate Weathering and erosion

Section D: **ACT's WorkKeys Skills Included in North Dakota's Content Standards**

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

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

Because North Dakota educators are the experts on the North Dakota Content Standards, we would strongly encourage them to examine this document and offer their interpretations.



WorkKeys Skills

Level	Reading for Information	Applied Mathematics	Locating Information
3	<p>Identify main ideas and clearly stated details</p> <p>Choose the correct meaning of a word that is clearly defined in the reading</p> <p>Choose the correct meaning of common, everyday and workplace words</p> <p>Choose when to perform each step in a short series of steps</p> <p>Apply instructions to a situation that is the same as the one in the reading materials</p>	<p>Solve problems that require a single type of mathematics operation (addition, subtraction, multiplication, and division) using whole numbers</p> <p>Add or subtract negative numbers</p> <p>Change numbers from one form to another using whole numbers, fractions, decimals, or percentages</p> <p>Convert simple money and time units (e.g., hours to minutes)</p>	<p>Find one or two pieces of information in a graphic</p> <p>Fill in one or two pieces of information that are missing from a graphic</p>
4	<p>Identify important details that may not be clearly stated</p> <p>Use the reading material to figure out the meaning of words that are not defined</p> <p>Apply instructions with several steps to a situation that is the same as the situation in the reading materials</p> <p>Choose what to do when changing conditions call for a different action (follow directions that include "if-then" statements)</p>	<p>Solve problems that require one or two operations</p> <p>Multiply negative numbers</p> <p>Calculate averages, simple ratios, simple proportions, or rates using whole numbers and decimals</p> <p>Add commonly known fractions, decimals, or percentages (e.g., $\frac{1}{2}$, .75, 25%)</p> <p>Add three fractions that share a common denominator</p> <p>Multiply a mixed number by a whole number or decimal</p> <p>Put the information in the right order before performing calculations</p>	<p>Find several pieces of information in one or two graphics</p> <p>Understand how graphics are related to each other</p> <p>Summarize information from one or two straightforward graphics</p> <p>Identify trends shown in one or two straightforward graphics</p> <p>Compare information and trends shown in one or two straightforward graphics</p>
5	<p>Figure out the correct meaning of a word based on how the word is used</p> <p>Identify the correct meaning of an acronym that is defined in the document</p> <p>Identify the paraphrased definition of a technical term or jargon that is defined in the document</p> <p>Apply technical terms and jargon and relate them to stated situations</p> <p>Apply straightforward instructions to a new situation that is similar to the one described in the material</p> <p>Apply complex instructions that include conditionals to situations described in the materials</p>	<p>Decide what information, calculations, or unit conversions to use to solve the problem</p> <p>Look up a formula and perform single-step conversions within or between systems of measurement</p> <p>Calculate using mixed units (e.g., 3.5 hours and 4 hours 30 minutes)</p> <p>Divide negative numbers</p> <p>Find the best deal using one- and two-step calculations and then comparing results</p> <p>Calculate perimeters and areas of basic shapes (rectangles and circles)</p> <p>Calculate percentage discounts or markups</p>	<p>Sort through distracting information</p> <p>Summarize information from one or more detailed graphics</p> <p>Identify trends shown in one or more detailed or complicated graphics</p> <p>Compare information and trends from one or more complicated graphics</p>
6	<p>Identify implied details</p> <p>Use technical terms and jargon in new situations</p> <p>Figure out the less common meaning of a word based on the context</p> <p>Apply complicated instructions to new situations</p> <p>Figure out the principles behind policies, rules, and procedures</p> <p>Apply general principles from the materials to similar and new situations</p> <p>Explain the rationale behind a procedure, policy, or communication</p>	<p>Use fractions, negative numbers, ratios, percentages, or mixed numbers</p> <p>Rearrange a formula before solving a problem</p> <p>Use two formulas to change from one unit to another within the same system of measurement</p> <p>Use two formulas to change from one unit in one system of measurement to a unit in another system of measurement</p> <p>Find mistakes in items that belong at Levels 3, 4, and 5</p> <p>Find the best deal and use the result for another calculation</p> <p>Find areas of basic shapes when it may be necessary to rearrange the formula, convert units of measurement in the calculations, or use the result in further calculations</p> <p>Find the volume of rectangular solids</p> <p>Calculate multiple rates</p>	<p>Draw conclusions based on one complicated graphic or several related graphics</p> <p>Apply information from one or more complicated graphics to specific situations</p> <p>Use the information to make decisions</p>
7	<p>Figure out the definitions of difficult, uncommon words based on how they are used</p> <p>Figure out the meaning of jargon or technical terms based on how they are used</p> <p>Figure out the general principles behind the policies and apply them to situations that are quite different from any described in the materials</p>	<p>Solve problems that include nonlinear functions and/or that involve more than one unknown</p> <p>Find mistakes in Level 6 items</p> <p>Convert between systems of measurement that involve fractions, mixed numbers, decimals, and/or percentages</p> <p>Calculate multiple areas and volumes of spheres, cylinders, or cones</p> <p>Set up and manipulate complex ratios or proportions</p> <p>Find the best deal when there are several choices</p> <p>Apply basic statistical concepts</p>	