



STATE MATCH

Minnesota Academic Standards

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

and

EXPLORE[®], PLAN[®],
and the ACT[®]

June 2011

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ACT[®]

About This Report

EXECUTIVE SUMMARY

(pp. 1–4)

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

SECTION A

(pp. 5–8)

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

SECTION B

(pp. 9–42)

All Minnesota Academic Standards are listed here; each one highlighted is measured by ACT’s EPAS tests. Underlined science content indicates that the content topics are included in, but not directly measured by, ACT’s EPAS Science tests. Minnesota standards listed here are from the Minnesota Academic Standards as presented on the Minnesota Department of Education website in April 2011:

Minnesota Academic Standards	Version
English Language Arts	9-27-10 Draft
Mathematics	2007
Science	2009

SECTION C

(pp. 43–54)

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

A supplement that identifies the specific ACT College Readiness Standard(s) corresponding to each Minnesota Standard and Benchmark 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 Minnesota students and educators, and this report offers strong evidence for this belief. This alignment analysis clearly answers three critical questions:

1. To what extent do ACT's Educational Planning and Assessment System (EPAS®) tests—EXPLORE® (8th and 9th grades), PLAN® (10th grade), and the ACT® (11th and 12th grades)—measure Minnesota's Academic Standards?
2. Can the results from ACT's testing programs be used to meet Minnesota's NCLB requirement?
3. Why should Minnesota choose EPAS?

ACT'S TESTS MEASURE MANY IMPORTANT MINNESOTA ACADEMIC 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 measure many important Minnesota English Language Arts, Mathematics, and Science Academic Standards.

- English Language Arts Grade 8: 2 out of 4 Strands
Grades 9–10: 2 out of 4 Strands
Grades 11–12: 3 out of 4 Strands

Many important Minnesota English Language Arts Academic Standards in Reading, Writing, and Language are covered by ACT's English, Reading, and Writing tests.

- Mathematics Grade 8: 4 out of 4 Strands
High School: 3 out of 3 Strands

Almost all Minnesota Mathematics Academic Standards are covered by ACT's Mathematics tests.

- Science: Process Standards: 1 out of 1
(Content Standards: 3 out of 3)

Most Minnesota Science Academic Standards are covered by ACT's Science tests.

(A note about science content: ACT's Science tests present content from biology, chemistry, physics, and Earth/space sciences. Although content knowledge in these content areas is needed to answer some of the test questions, the test questions emphasize scientific reasoning and are based in experimental science contexts. Factual content knowledge, although needed to answer some of the test questions, is not systematically sampled from the full content knowledge domain. Therefore, each ACT Science Test covers some, but not all, of the discrete science content knowledge specifically described in the Minnesota Science Academic 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 Minnesota 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 Minnesota Academic 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 Minnesota 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 students to understand. Not surprisingly, the answers vary. In contrast, ACT defines college readiness through a unique and rigorous empirical process:

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

- **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.

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



Section A: **Number of Minnesota Academic Standards
Measured by EXPLORE, PLAN, and the ACT**

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

Minnesota Strands*	Number of Minnesota Benchmarks Measured by ACT's tests			Aspects of Minnesota Standards that are Not Measured	
Reading	Anchor	10	out of	10	
	Literature	Gr 8: 4	out of	9	Cite strong and thorough textual evidence Analyze multiple interpretations Demonstrate knowledge of eighteenth-, nineteenth- and early-twentieth-century foundational works of American literature
		Gr 9–10: 5	out of	9	
		Gr 11–12: 6	out of	9	
	Informational Text	Gr 8: 8	out of	10	Analyze how style and content contribute to the power, persuasiveness, or beauty of the text Delineate and evaluate the reasoning in seminal U.S. texts Analyze seventeenth-, eighteenth-, and nineteenth-century foundational U.S. documents of historical and literary significance
		Gr 9–10: 8	out of	10	
		Gr 11–12: 6	out of	10	
	Literacy in History/ Social Studies	Gr 8: 7	out of	10	Cite specific textual, visual, or physical evidence Evaluate various explanations for actions or events Analyze how a complex primary or secondary source is structured Evaluate authors' differing points of view Integrate and evaluate multiple sources of information presented in diverse formats and media
		Gr 9–10: 5	out of	10	
		Gr 11–12: 3	out of	10	
	Literacy in Science and Technical Subjects	Gr 8: 10	out of	10	
		Gr 9–10: 10	out of	10	
		Gr 11–12: 10	out of	10	

(table continued on next page)



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

		Number of Minnesota Benchmarks Measured by ACT's tests		Aspects of Minnesota Standards that are Not Measured
Minnesota Strands*				
Writing	Anchor	5 out of 10		Use technology to produce writing Conduct research projects Gather relevant information from multiple sources Draw evidence from literary or informational texts to support analysis, reflection, and research
	Writing	Gr 8: 1 out of 10 Gr 9–10: 1 out of 10 Gr 11–12: 5 out of 10		Write narratives and other creative texts Use technology to produce writing Conduct research projects Gather relevant information from multiple sources Draw evidence from literary or informational texts to support analysis, reflection, and research
	Literacy in History/Social Studies, Science, and Technical Subjects	Gr 8: 1 out of 10 Gr 9–10: 1 out of 10 Gr 11–12: 1 out of 10		Write arguments focused on discipline-specific content Use technology to produce writing Conduct research projects Gather relevant information from multiple sources Draw evidence from literary or informational texts to support analysis, reflection, and research Write routinely over extended time frames
Speaking, Viewing, Listening, Media Literacy				
Language	Language	Anchor: 6 out of 6 Gr 8: 6 out of 6 Gr 9–10: 6 out of 6 Gr 11–12: 6 out of 6 Progr. Skills 17 out of 17		
	TOTALS 3 out of 4 Strands	Anchor: 21 out of 26 Gr 8: 37 out of 65 Gr 9–10: 36 out of 65 Gr 11–12: 37 out of 65 Progr. Skills 17 out of 17		

*Refer to Minnesota's English Language Arts Academic Standards on pages 9–28
 = EPAS tests do not assess this material.



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

Minnesota Strands*	Number of Minnesota Benchmarks Measured by ACT's tests	Aspects of Minnesota Standards that are Not Measured
1. Number & Operation	Gr 8: 5 out of 5	
2. Algebra	Gr 8: 21 out of 21 Gr 9–11: 30 out of 30	
3. Geometry & Measurement	Gr 8: 5 out of 6 Gr 9–11: 23 out of 25	Understand the roles of axioms, definitions, undefined terms and theorems in logical arguments Use technology tools
4. Data Analysis & Probability	Gr 8: 3 out of 3 Gr 9–11: 10 out of 16	Use the mean and standard deviation of a data set to fit it to a normal distribution Evaluate reports based on data published Design simple experiments Understand the Law of Large Numbers Use random numbers to perform probability simulations
TOTALS Gr 8: 4 out of 4 Strands HS: 3 out of 3 Strands	Gr 8: 34 out of 35 Gr 9–11: 63 out of 71	

*Refer to Minnesota's Mathematics Academic Standards on pages 29–33



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

Minnesota Strands*	Number of Minnesota Benchmarks Measured by ACT's tests	Aspects of Minnesota Standards that are Not Measured
1. Nature of Science and Engineering	Gr 8: 4 out of 8 Gr 9–12: 11 out of 30 Chem: 0 out of 2 Physics: 0 out of 2	Understand that scientists conduct investigations for a variety of reasons Explain how ethics impact research practices Identify sources of bias and explain how bias might influence research Explain how scientific and technological innovations can challenge accepted theories and models Understand that engineering designs and products are often continually checked so that subsequent designs are refined and improved Identify a problem and the associated constraints on possible design solutions Provide examples of how diverse cultures have contributed scientific and mathematical ideas and technological inventions Use significant figures and an understanding of accuracy and precision in scientific measurements to determine and express the uncertainty of a result
TOTALS 1 out of 1 Process Strand	Gr 8: 4 out of 8 Gr 9–12: 11 out of 30 Chem: 0 out of 2 Physics: 0 out of 2	
2. Physical Science	Gr 8: (7) out of (7) Gr 9–12: (20) out of (21) Chem: (17) out of (18) Physics: (22) out of (23)	Describe the trade-offs involved when technological developments impact the way we use energy, natural resources, or synthetic materials Use the kinetic molecular theory to explain the behavior of gases Compare the rate at which objects at different temperatures will transfer thermal energy by electromagnetic radiation
3. Earth and Space Science	Gr 8: (22) out of (22) Gr 9–12: (18) out of (19)	Analyze the benefits, costs, risks and tradeoffs associated with natural hazards
4. Life Science	Gr 9–12: (30) out of (32)	Describe contributions from diverse cultures Recognize that a gene mutation in a cell can result in uncontrolled cell division called cancer
TOTALS 3 out of 3 Content Strands	Gr 8: (29) out of (29) Gr 9–12: (68) out of (72) Chem: (17) out of (18) Physics: (22) out of (23)	

*Refer to Minnesota's Science Academic Standards on pages 34–42



Section B: Minnesota's Grades 8–12 Academic Standards Measured by EXPLORE, PLAN, and the ACT

English Language Arts

MINNESOTA English Language Arts Academic Standards* Anchor Standards

Reading

Key Ideas and Details

1. Read closely to determine what the text says explicitly and to make logical inferences from it; cite specific textual evidence when writing or speaking to support conclusions drawn from the text.
2. Determine central ideas or themes of a text and analyze their development; summarize the key supporting details and ideas.
3. Analyze how and why individuals, events, and ideas develop and interact over the course of a text.

Craft and Structure

4. Interpret words and phrases as they are used in a text, including determining technical, connotative, and figurative meanings, and analyze how specific word choices shape meaning or tone.
5. Analyze the structure of texts, including how specific sentences, paragraphs, and larger portions of the text (e.g., a section, chapter, scene, or stanza) relate to each other and the whole.
6. Assess how point of view or purpose shapes the content and style of a text.

Integration of Knowledge and Ideas

7. Integrate and evaluate content presented in diverse formats and media, including visually and quantitatively, as well as in words.

Integration of Knowledge and Ideas

8. Delineate and evaluate the argument and specific claims in a text, including the validity of the reasoning as well as the relevance and sufficiency of the evidence.
9. Analyze how two or more texts address similar themes or topics in order to build knowledge or to compare the approaches the authors take.

Range of Reading and Level of Text Complexity

10. Read and comprehend complex literary and informational texts independently and proficiently.

Writing

Text Types and Purposes

1. Write arguments to support claims in an analysis of substantive topics or texts, using valid reasoning and relevant and sufficient evidence.

2. Write informative/explanatory texts to examine and convey complex ideas and information clearly and accurately through the effective selection, organization, and analysis of content.
3. Write narratives and other creative texts to develop real or imagined experiences or events using effective technique, well-chosen details, and well-structured event sequences.

Writing Process: Production and Distribution of Writing

4. Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.
5. Use a writing process to develop and strengthen writing as needed by planning, drafting, revising, editing, rewriting, or trying a new approach.
6. Use technology, including the Internet, to produce and publish writing and to interact and collaborate with others.

Research to Build and Present Knowledge

7. Conduct short as well as more sustained research projects based on focused questions, demonstrating understanding of the subject under investigation.
8. Gather relevant information from multiple print and digital sources, assess the credibility and accuracy of each source, and integrate the information while avoiding plagiarism.
9. Draw evidence from literary or informational texts to support analysis, reflection, and research.

Range of Writing

10. Write routinely over extended time frames (time for research, reflection, and revision) and shorter time frames (a single sitting or a day or two) for a range of tasks, purposes, and audiences.

Speaking, Viewing, Listening and Media Literacy

Comprehension and Collaboration

1. Prepare for and participate effectively in a range of conversations and collaborations with diverse partners, building on others' ideas and expressing their own clearly and persuasively.
2. Integrate and evaluate information presented in diverse media and formats, including visually, quantitatively, and orally.
3. Evaluate a speaker's point of view, reasoning, and use of evidence and rhetoric.

Presentation of Knowledge and Ideas

4. Present information, findings, and supporting evidence such that listeners can follow the line of reasoning and the organization, development, and style are appropriate to task, purpose, and audience.
5. Make strategic use of digital media and visual displays of data to express information and enhance understanding of presentations.
6. Adapt speech to a variety of contexts and communicative tasks, demonstrating command of formal English when indicated or appropriate.

Media Literacy

- 7. Critically analyze information found in electronic, print, and mass media and use a variety of these sources.**
- 8. Communicate using traditional or digital multimedia formats and digital writing and publishing for a specific purpose.**

Language

Conventions of Standard English

1. Demonstrate command of the conventions of standard English grammar and usage when writing or speaking.

2. Demonstrate command of the conventions of standard English capitalization, punctuation, and spelling when writing.

Knowledge of Language

3. Apply knowledge of language to understand how language functions in different contexts, to make effective choices for meaning or style, and to comprehend more fully when reading or listening.

Vocabulary Acquisition and Use

4. Determine or clarify the meaning of unknown and multiple-meaning words and phrases by using context clues, analyzing meaningful word parts, and consulting general and specialized reference materials, as appropriate.
5. Demonstrate understanding of figurative language, word relationships, and nuances in word meanings.
6. Acquire and use accurately a range of general academic and domain-specific words and phrases sufficient for reading, writing, speaking, and listening at the college and career readiness level; demonstrate independence in gathering vocabulary knowledge when considering a word or phrase important to comprehension or expression.

MINNESOTA English Language Arts
Academic Standards
Grade 8

Reading

Reading Benchmarks: Literature

[RL]

Key Ideas and Details

8.4.1.1. Cite the textual evidence that most strongly supports an analysis of what the text says explicitly as well as inferences drawn from the text.

8.4.2.2. Determine a theme or central idea of a text, including those by and about Minnesota American Indians, and analyze its development over the course of the text, including its relationship to the characters, setting, and plot; provide an objective summary of the text.

8.4.3.3. Analyze how particular lines of dialogue or incidents in a story or drama propel the action, reveal aspects of a character, or provoke a decision.

Craft and Structure

8.4.4.4. Determine the meaning of words and phrases as they are used in a text, including figurative and connotative meanings; analyze the impact of specific word choices on meaning and tone, including analogies or allusions to other texts.

8.4.5.5. Compare and contrast the structure of two or more texts and analyze how the differing structure of each text contributes to its meaning and style.

8.4.6.6. Analyze how differences in the points of view of the characters and the audience or reader (e.g., created through the use of dramatic irony) create such effects as suspense or humor.

Integration of Knowledge and Ideas

8.4.7.7. Analyze the extent to which a filmed or live production of a story or drama stays faithful to or departs from the text or script, evaluating the choices made by the director or actors.

8.4.8.8. (Not applicable to literature)

8.4.9.9. Analyze how a modern work of fiction draws on themes, patterns of events, or character types from myths, traditional stories, including stories, poems, and historical novels of Minnesota American Indians, or religious works such as the Bible, including describing how the material is rendered new.

Range of Reading and Level of Text Complexity

8.4.10.10. By the end of the year, read and comprehend literature and other texts, including stories, dramas, and poems, in the grades 6–8 text complexity band proficiently and independently with appropriate scaffolding for texts at the high end of the range.

- a. Self-select texts for personal enjoyment, interest and academic tasks.
- b. Read widely to understand multiple perspectives and pluralistic viewpoints.

Reading Benchmarks: Informational Text

[RI]

Key Ideas and Details

8.5.1.1. Cite the textual evidence that most strongly supports an analysis of what the text says explicitly as well as inferences drawn from the text.

8.5.2.2. Determine a central idea of a text and analyze its development over the course of the text, including its relationship to supporting ideas; provide an objective summary of the text.

8.5.3.3. Analyze how a text makes connections among and distinctions between individuals, ideas, or events (e.g., through comparisons, analogies, or categories).

Craft and Structure

8.5.4.4. Determine the meaning of words and phrases as they are used in a text, including figurative, connotative, and technical meanings; analyze the impact of specific word choices on meaning and tone, including analogies or allusions to other texts.

8.5.5.5. Analyze in detail the structure of a specific paragraph in a text, including the role of particular sentences in developing and refining a key concept.

8.5.6.6. Determine an author's point of view or purpose in a text and analyze how the author acknowledges and responds to conflicting evidence or viewpoints.

Integration of Knowledge and Ideas

8.5.7.7. Evaluate the advantages and disadvantages of using different mediums (e.g., print or digital text, video, multimedia) to present a particular topic or idea.

8.5.8.8. Delineate and evaluate the argument and specific claims in a text, assessing whether the reasoning is sound and the evidence is relevant and sufficient; recognize when irrelevant evidence is introduced.

8.5.9.9. Analyze a case in which two or more texts, including one text by or about Minnesota American Indians or other diverse cultures, provide conflicting information on the same topic and identify where the texts disagree on matters of fact or interpretation.

Range of Reading and Level of Text Complexity

8.5.10.10. By the end of the year, read and comprehend literary nonfiction at the high end of the grades 6–8 text complexity band independently and proficiently.

- a. Self-select texts for personal enjoyment, interest, and academic tasks.

Reading Benchmarks: Literacy in History/Social Studies

[RH]

Key Ideas and Details

6.12.1.1. Cite specific textual, visual, or physical evidence to support analysis of primary and secondary sources.

6.12.2.2. Determine the central ideas or information of a primary or secondary source; provide an accurate summary of the source distinct from prior knowledge or opinions.

6.12.3.3. Identify key steps in a text’s description of a process related to history/social studies (e.g., how a bill becomes law, how interest rates are raised or lowered, **how individuals become noteworthy, how ideas develop, how geography influences history**).

Craft and Structure

6.12.4.4. Determine the meaning of words and phrases as they are used in a text, including vocabulary specific to domains related to history/social studies.

6.12.5.5. Describe how a text presents information (e.g., sequentially, comparatively, causally).

6.12.6.6. Identify aspects of a text that reveal an author’s or creator’s point of view or purpose (e.g., loaded language, inclusion or avoidance of particular facts or ideas, **use of color, formatting**).

Integration of Knowledge and Ideas

6.12.7.7. Integrate visual information (e.g., in charts, graphs, photographs, videos, or maps) with other information in print and digital texts.

6.12.8.8. Distinguish among fact, opinion, and reasoned judgment in a text.

6.12.9.9. Analyze the relationship between a primary and secondary source on the same topic.

Range of Reading and Level of Text Complexity

6.12.10.10. By the end of grade 8, read and comprehend history/social studies texts in the grades 6–8 text complexity band independently and proficiently.

Reading Benchmarks: Literacy in Science and Technical Subjects

[RST]

Key Ideas and Details

6.13.1.1. Cite specific textual evidence to support analysis of science and technical texts.

6.13.2.2. Determine the central ideas or conclusions of a text; provide an accurate summary of the text distinct from prior knowledge or opinions.

6.13.3.3. Follow precisely a multistep procedure when carrying out experiments, **designing solutions, taking measurements, or performing technical tasks.**

Craft and Structure

6.13.4.4. Determine the meaning of symbols, **equations, graphical representations, tabular representations, key terms,** and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 6–8 texts and topics.

6.13.5.5. Analyze the structure an author uses to organize a text, including how the major sections contribute to the whole and to an understanding of the topic.

6.13.6.6. Analyze the author’s purpose in **describing phenomena, providing an explanation, describing a procedure, or discussing/reporting an experiment in a text.**

Integration of Knowledge and Ideas

6.13.7.7. **Compare and** integrate quantitative or technical information expressed in words in a text with a version of that information expressed visually (e.g., in a flowchart, diagram, model, graph, or table, **map**).

6.13.8.8. Distinguish among **claims, evidence, reasoning, facts, and** reasoned judgment based on research findings, and speculation in a text.

6.13.9.9. Compare and contrast the information gained from experiments, simulations, video, or multimedia sources with that gained from reading a text on the same topic.

Range of Reading and Level of Text Complexity

6.13.10.10. By the end of grade 8, read and comprehend science/technical texts in the grades 6–8 text complexity band independently and proficiently.

Writing

[W]

Text Types and Purposes

8.7.1.1. Write arguments to support claims with clear reasons and relevant evidence.

- Introduce claim(s), acknowledge and distinguish the claim(s) from alternate or opposing claims, and organize the reasons and evidence logically.
- Support claim(s) with logical reasoning and relevant evidence, using accurate, credible sources and demonstrating an understanding of the topic or text.
- Use words, phrases, and clauses to create cohesion and clarify the relationships among claim(s), counterclaims, reasons, and evidence.
- Establish and maintain a formal style.
- Provide a concluding statement or section that follows from and supports the argument presented.

8.7.2.2. Write informative/explanatory texts to examine a topic and convey ideas, concepts, and information through the selection, organization, and analysis of relevant content.

- Introduce a topic clearly, previewing what is to follow; organize ideas, concepts, and information into broader categories; include formatting (e.g., headings), graphics (e.g., charts, tables), and multimedia when useful to aiding comprehension.
- Develop the topic with relevant, well-chosen facts, definitions, concrete details, quotations, or other information and examples.
- Use appropriate and varied transitions to create cohesion and clarify the relationships among ideas and concepts.
- Use precise language and domain-specific vocabulary to inform about or explain the topic.
- Establish and maintain a formal style.
- Provide a concluding statement or section that follows from and supports the information or explanation presented.

8.7.3.3. Write narratives **and other creative texts** to develop real or imagined experiences or events using effective technique, relevant descriptive details, and well-structured event sequences.

- Engage and orient the reader by establishing a context and point of view and introducing a narrator and/or characters; organize an event sequence that unfolds naturally and logically.

- b. Use **literary and** narrative techniques, such as dialogue, pacing, description, **rhythm, repetition, rhyme,** and reflection, to develop experiences, events, and/or characters.
- c. Use a variety of transition words, phrases, and clauses to convey sequence, signal shifts from one time frame or setting to another, and show the relationships among experiences and events.
- d. Use precise words and phrases, relevant descriptive details, **figurative** and sensory language to capture the action and convey experiences and events.
- e. Provide a conclusion (**when appropriate to the genre**) that follows from and reflects on the narrated experiences or events.

Writing Process: **Production and Distribution of Writing**

8.7.4.4. Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.

8.7.5.5. With some guidance and support from peers and adults, **use a writing process** to develop and **strengthen writing as needed by** planning, **drafting, revising, editing, rewriting,** or trying a new approach, **focusing on how well purpose** and audience **have been addressed.**

8.7.6.6. Use technology, including the Internet, to produce and publish writing and present the relationships between information and ideas efficiently as well as to interact and collaborate with others.

Research to Build and Present Knowledge

8.7.7.7. Conduct short research projects to answer a question (including a self-generated question), drawing on several sources and generating additional related, focused questions that allow for multiple avenues of exploration.

8.7.8.8. Gather relevant information from multiple print and digital sources, using search terms effectively; assess the credibility and accuracy of each source; and quote or paraphrase the data and conclusions of others while avoiding plagiarism and following a standard format for citation.

8.7.9.9. Draw evidence from literary or informational texts to support analysis, reflection, and research.

- a. Apply grade 8 Reading standards to literature (e.g., “Analyze how a modern work of fiction draws on themes, patterns of events, or character types from myths, traditional stories, **including stories, poems, and historical novels of Minnesota American Indians,** or religious works such as the Bible, including describing how the material is rendered new”).
- b. Apply grade 8 Reading standards to literary nonfiction (e.g., “Delineate and evaluate the argument and specific claims in a text, assessing whether the reasoning is sound and the evidence is relevant and sufficient; recognize when irrelevant evidence is introduced”).

Range of Writing

8.7.10.10. Write routinely over extended time frames (time for research, reflection, and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences.

- a. **Independently select writing topics and formats for personal enjoyment, interest, and academic tasks.**

Writing Benchmarks: Literacy in History/Social Studies, Science, and Technical Subjects [WHST]

Text Types and Purposes

6.14.1.1. Write arguments focused on discipline-specific content.

- a. Introduce claim(s) about a topic or issue, acknowledge and distinguish the claim(s) from alternate or opposing claims, and organize the reasons and evidence logically.
- b. Support claim(s) with logical reasoning and relevant, accurate data and **credible** evidence that demonstrate an understanding of the topic or text, using credible sources.
- c. Use words, phrases, and clauses to create cohesion and clarify the relationships among claim(s), counterclaims, reasons, and evidence.
- d. Establish and maintain a formal style.
- e. Provide a concluding statement or section that follows from and supports the argument presented.

6.14.2.2. Write informative/explanatory texts, **as they apply to each discipline and reporting format,** including the narration of historical events, **of** scientific procedures/experiments, or **description of** technical processes.

- a. Introduce a topic clearly, previewing what is to follow; organize ideas, concepts, and information into broader categories as appropriate to achieving purpose; include formatting (e.g., headings), graphics (e.g., charts, tables), and multimedia when useful to aiding comprehension.
- b. Develop the topic with relevant, **credible, sufficient, and** well-chosen facts, definitions, concrete details, quotations, or other information and examples.
- c. Use appropriate and varied transitions to create cohesion and clarify the relationships among ideas and concepts.
- d. Use precise language and domain-specific vocabulary to inform about or explain the topic.
- e. Establish and maintain a formal style and objective tone.
- f. Provide a concluding statement or section that follows from and supports the information or explanation presented.

6.14.3.3. (Not applicable as a separate requirement)

Writing Process: Production and Distribution of Writing

6.14.4.4. Produce clear and coherent writing in which the development, organization, and style are appropriate to **discipline**, task, purpose, and audience.

6.14.5.5. With some guidance and support from peers and adults, **use a writing process** to develop and **strengthen writing as needed by** planning, **drafting**, **revising**, **editing**, **rewriting**, or trying a new approach, **focusing on how well purpose, discipline**, and audience **have been addressed**.

6.14.6.6. Use technology, including, **but not limited to**, the Internet, to produce and publish writing **and multi-media texts**, and present the relationships between information and ideas clearly and efficiently.

Research to Build and Present Knowledge

6.14.7.7. Conduct short research projects to answer a question (including a self-generated question), drawing on several sources and generating additional related, focused questions that allow for multiple avenues of exploration.

6.14.8.8. Gather relevant information from multiple **data**, print, **physical (e.g., artifacts, objects, images)**, and digital sources, using search terms effectively; assess the credibility and accuracy of each source; and quote or paraphrase the data and conclusions of others while avoiding plagiarism and following a standard format for citation.

6.14.9.9. Draw evidence from **literary or** informational texts to support analysis, reflection, and research.

Range of Writing

6.14.10.10. Write routinely over extended time frames (time for reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences.

Speaking, Viewing, Listening and Media Literacy [SL]

Comprehension and Collaboration

8.9.1.1. Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade 8 topics, texts, and issues, building on others' ideas and expressing their own clearly.

- a. Come to discussions prepared, having read or researched material under study; explicitly draw on that preparation by referring to evidence on the topic, text, or issue to probe and reflect on ideas under discussion.
- b. Follow rules for collegial discussions and decision-making, track progress toward specific goals and deadlines, and define individual roles as needed.
- c. Pose questions that connect the ideas of several speakers and respond to others' questions and comments with relevant evidence, observations, and ideas.
- d. Acknowledge new information expressed by others, and, when warranted, qualify or justify their own views in light of the evidence presented.

e. Cooperate, mediate, and problem solve to make decisions or build consensus as appropriate for productive group discussion.

8.9.2.2. Analyze the purpose of information presented in diverse media and formats (e.g., visually, quantitatively, orally) and evaluate the motives (e.g., social, commercial, political) behind its presentation.

8.9.3.3. Delineate **and respond to** a speaker's argument, specific claims, **and intended audience**, evaluating the soundness of the reasoning and relevance and sufficiency of the evidence and identifying when irrelevant evidence is introduced.

Presentation of Knowledge and Ideas

8.9.4.4. Present claims and findings; **respect intellectual properties; emphasize** salient points in a focused, coherent manner with relevant evidence, sound valid reasoning, and well-chosen details; use appropriate eye contact, adequate volume, and clear pronunciation.

8.9.5.5. Integrate multimedia and visual displays into presentations to clarify information, strengthen claims and evidence, and add interest.

8.9.6.6. Adapt speech to a variety of contexts, **audiences**, tasks, **and feedback from self and others**, demonstrating command of formal English when indicated or appropriate.

Media Literacy

8.9.7.7 Understand, analyze, and use different types of print, digital, and multimodal media.

- a. **Evaluate mass media with regard to quality of production, accuracy of information, bias, stereotype, purpose, message and target audience (e.g., film, television, radio, video games, advertisements).**
- b. **Critically analyze the messages and points of view employed in different media (e.g., advertising, news programs, websites, video games, blogs, documentaries).**
- c. **Analyze design elements of various kinds of media productions to observe that media messages are constructed for a specific purpose.**
- d. **Recognize ethical standards and safe practices in social and personal media communications.**

8.9.8.8 As an individual or in collaboration, create a persuasive multimedia work or a piece of digital communication or contribute to an online collaboration for a specific purpose.

- a. **Demonstrate a developmentally appropriate understanding of copyright, attribution, principles of Fair Use, Creative Commons licenses and the effect of genre on conventions of attribution and citation.**
- b. **Publish the work and share with an audience.**

Conventions of Standard English

8.11.1.1. Demonstrate command of the conventions of standard English grammar and usage when writing or speaking.

- a. Explain the function of verbals (gerunds, participles, infinitives) in general and their function in particular sentences.
- b. Form and use verbs in the active and passive voice.
- c. Form and use verbs in the indicative, imperative, interrogative, conditional, and subjunctive mood.
- d. Recognize and correct inappropriate shifts in verb voice and mood.

8.11.2.2. Demonstrate command of the conventions of standard English capitalization, punctuation, and spelling when writing.

- a. Use punctuation (comma, ellipsis, dash) to indicate a pause or break.
- b. Use an ellipsis to indicate an omission.
- c. Spell correctly.

Knowledge of Language

8.11.3.3. Use knowledge of language and its conventions when writing, speaking, reading, or listening.

- a. Use verbs in the active and passive voice and in the conditional and subjunctive mood to achieve particular effects (e.g., emphasizing the actor or the action; expressing uncertainty or describing a state contrary to fact).

Vocabulary Acquisition and Use

8.11.4.4. Determine or clarify the meaning of unknown and multiple-meaning words or phrases based on grade 8 reading and content, choosing flexibly from a range of strategies.

- a. Use context (e.g., the overall meaning of a sentence or paragraph; a word's position or function in a sentence) as a clue to the meaning of a word or phrase.
- b. Use common, grade-appropriate Greek or Latin affixes and roots as clues to the meaning of a word (e.g., *precede*, *recede*, *secede*).
- c. Consult general and specialized reference materials (e.g., dictionaries, glossaries, thesauruses), both print and digital, to find the pronunciation of a word or determine or clarify its precise meaning or its part of speech.
- d. Verify the preliminary determination of the meaning of a word or phrase (e.g., by checking the inferred meaning in context or in a dictionary).

8.11.5.5. Demonstrate understanding of figurative language, word relationships, and nuances in word meanings to extend word consciousness.

- a. Interpret figures of speech (e.g. verbal irony, puns) in context.
- b. Use the relationship between particular words to better understand each of the words.
- c. Distinguish among the connotations (associations) of words with similar denotations (definitions) (e.g., *bullheaded*, *willful*, *firm*, *persistent*, *resolute*).

8.11.6.6. Acquire and use accurately grade-appropriate general academic and domain-specific words and phrases; gather vocabulary knowledge when considering a word or phrase important to comprehension or expression.

MINNESOTA English Language Arts
Academic Standards
Grades 9–10

Reading

Reading Benchmarks: Literature

[RL]

Key Ideas and Details

9.4.1.1. Cite strong and thorough textual evidence to support analysis of what the text says explicitly as well as inferences drawn from the text.

9.4.2.2. Determine a theme or central idea of a text and analyze in detail its development over the course of the text, including how it emerges and is shaped and refined by specific details; provide an objective summary of the text.

9.4.3.3. Analyze how complex characters (e.g., those with multiple or conflicting motivations) develop over the course of a text, interact with other characters, and advance the plot or develop the theme.

Craft and Structure

9.4.4.4. Determine the meaning of words and phrases as they are used in the text, including figurative and connotative meanings; analyze the cumulative impact of specific word choices on meaning and tone (e.g., how the language evokes a sense of time and place; how it sets a formal or informal tone).

9.4.5.5. Analyze how an author's choices concerning how to structure a text, order events within it (e.g., parallel plots), and manipulate time (e.g., pacing, flashbacks) create such effects as mystery, tension, or surprise.

9.4.6.6. Analyze a particular point of view or cultural experience reflected in a work of literature from outside the United States, drawing on a wide reading of world literature.

Integration of Knowledge and Ideas

9.4.7.7. Analyze the representation of a subject or a key scene in two different artistic mediums, including what is emphasized or absent in each treatment (e.g., Auden's "Musée des Beaux Arts" and Breughel's Landscape with the Fall of Icarus).

9.4.8.8. (Not applicable to literature)

9.4.9.9. Analyze how an author draws on and transforms source material in a specific work (e.g., how Shakespeare treats a theme or topic from Ovid or the Bible or how a later author draws on a play by Shakespeare) or how a Minnesota American Indian author uses oral tradition to create works of literature).

Range of Reading and Level of Text Complexity

9.4.10.10. By the end of grade 9, read and comprehend literature and other texts, including stories, dramas, and poems, in the grades 9–10 text complexity band proficiently, with scaffolding as needed at the high end of the range.

- a. Self-select texts for personal enjoyment, interest, and academic tasks.
- b. Read widely to understand multiple perspectives and pluralistic viewpoints.

By the end of grade 10, read and comprehend literature and other texts, including stories, dramas, and poems, at the high end of the grades 9–10 text complexity band independently and proficiently.

- a. Self-select texts for personal enjoyment, interest, and academic tasks.
- b. Read widely to understand multiple perspectives and pluralistic viewpoints.

Reading Benchmarks: Informational Text

[RI]

Key Ideas and Details

9.5.1.1. Cite strong and thorough textual evidence to support analysis of what the text says explicitly as well as inferences drawn from the text.

9.5.2.2. Determine a central idea of a text and analyze its development over the course of the text, including how it emerges and is shaped and refined by specific details; provide an objective summary of the text.

9.5.3.3. Analyze how the author unfolds an analysis or series of ideas or events, including the order in which the points are made, how they are introduced and developed, and the connections that are drawn between them.

Craft and Structure

9.5.4.4. Determine the meaning of words and phrases as they are used in a text, including figurative, connotative, and technical meanings; analyze the cumulative impact of specific word choices on meaning and tone (e.g., how the language of a court opinion differs from that of a newspaper).

9.5.5.5. Analyze in detail how an author's ideas or claims are developed and refined by particular sentences, paragraphs, or larger portions of a text (e.g., a section or chapter).

9.5.6.6. Determine an author's point of view or purpose in a text and analyze how an author uses rhetoric to advance that point of view or purpose.

Integration of Knowledge and Ideas

9.5.7.7. Analyze various accounts of a subject told in different mediums (e.g., a person's life story in both print and multimedia), determining which details are emphasized in each account.

9.5.8.8. Delineate and evaluate the argument and specific claims in a text, assessing whether the reasoning is valid and the evidence is relevant and sufficient; identify false statements and fallacious reasoning.

9.5.9.9. Analyze seminal U.S. documents of historical and literary significance (e.g., Washington's Farewell Address, the Gettysburg Address, Roosevelt's Four Freedoms speech, King's "Letter from Birmingham Jail," and other documents such as those written by Sojourner Truth, Chief Seattle, and Elizabeth Cady Stanton), including how they address related themes and concepts.

Range of Reading and Level of Text Complexity

9.5.10.10. By the end of grade 9, read and comprehend literary nonfiction in the grades 9–10 text complexity band proficiently, with scaffolding as needed at the high end of the range.

By the end of grade 10, read and comprehend literary nonfiction at the high end of the grades 9–10 text complexity band independently and proficiently.

- a. Self-select texts for personal enjoyment, interest, and academic tasks.

Reading Benchmarks: Literacy in History/Social Studies

[RH]

Key Ideas and Details

9.12.1.1. Cite specific textual, **visual, or physical** evidence to support analysis of primary and secondary sources, attending to such features as the date and origin of the information.

9.12.2.2. Determine the central ideas or information of a primary or secondary source; provide an accurate summary of how key events or ideas develop over the course of the text.

9.12.3.3. Analyze in detail a series of events described in a text; determine whether earlier events caused later ones or simply preceded them.

Craft and Structure

9.12.4.4. Determine the meaning of words and phrases as they are used in a text, including vocabulary describing political, social, **geographic, historical,** or economic aspects of history/social studies.

9.12.5.5. Analyze how a text uses structure to emphasize key points or advance an explanation or analysis.

9.12.6.6. Compare the point of view of two or more authors or creators for how they treat the same or similar topics, including which details they include and emphasize or **exclude** in their respective accounts, **including points of view about Minnesota American Indian history.**

Integration of Knowledge and Ideas

9.12.7.7. Integrate quantitative or technical analysis (e.g., charts, **maps,** research data) with qualitative analysis in print or digital text.

9.12.8.8. Assess the extent to which the reasoning and evidence in a text support the author's claims.

9.12.9.9. Compare and contrast treatments of the same topic in several primary and secondary sources, **including texts from various cultures and Minnesota American Indian culture.**

Range of Reading and Level of Text Complexity

9.12.10.10. By the end of grade 10, read and comprehend history/social studies texts in the grades 9–10 text complexity band independently and proficiently.

Reading Benchmarks: Literacy in Science and Technical Subjects

[RST]

Key Ideas and Details

9.13.1.1. Cite specific textual evidence to support analysis of science and technical texts, attending to the precise details of explanations or descriptions.

9.13.2.2. Determine the central ideas or conclusions of a text; trace the text's explanation or depiction of a complex process, phenomenon, or concept; provide an accurate summary of the text.

9.13.3.3. Follow precisely a complex multistep procedure when carrying out experiments, **designing solutions,** taking measurements, or performing technical tasks, attending to special cases (**constraints**) or exceptions defined in the text.

Craft and Structure

9.13.4.4. Determine the meaning of symbols, **equations, graphical representations, tabular representations,** key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 9–10 texts and topics.

9.13.5.5. Analyze the structure of the relationships among concepts in a text, including relationships among key terms (e.g., *force, friction, reaction force, energy*).

9.13.6.6. Analyze the author's purpose in **describing phenomena,** providing an explanation, describing a procedure, or discussing/reporting an experiment in a text, defining the question the author seeks to address.

Integration of Knowledge and Ideas

9.13.7.7. Translate quantitative or technical information expressed in words in a text into visual form (e.g., a table or chart) and translate information expressed visually or mathematically (e.g., in an equation) into words.

9.13.8.8. Assess the extent to which the reasoning and evidence in a text support the author's claim or a recommendation for solving a scientific or technical problem.

9.13.9.9. Compare and contrast findings presented in a text to those from other sources (including their own experiments), noting when the findings support or contradict previous explanations or accounts.

Range of Reading and Level of Text Complexity

9.13.10.10. By the end of grade 10, read and comprehend science/technical texts in the grades 9–10 text complexity band independently and proficiently.

Writing

[W]

Text Types and Purposes

9.7.1.1. Write arguments to support claims in an analysis of substantive topics or texts, using valid reasoning and relevant and sufficient evidence.

- a. Introduce precise claim(s), distinguish the claim(s) from alternate or opposing claims, and create an organization that establishes clear relationships among claim(s), counterclaims, reasons, and evidence.

- b. Develop claim(s) and counterclaims fairly, supplying evidence for each while pointing out the strengths and limitations of both in a manner that anticipates the audience’s knowledge level and concerns.
- c. Use words, phrases, and clauses to link the major sections of the text, create cohesion, and clarify the relationships between claim(s) and reasons, between reasons and evidence, and between claim(s) and counterclaims.
- d. Establish and maintain a formal style and objective tone while attending to the norms and conventions of the discipline in which they are writing.
- e. Provide a concluding statement or section that follows from and supports the argument presented.

9.7.2.2. Write informative/explanatory texts to examine and convey complex ideas, concepts, and information clearly and accurately through the effective selection, organization, and analysis of content.

- a. Introduce a topic; organize complex ideas, concepts, and information to make important connections and distinctions; include formatting (e.g., headings), graphics (e.g., figures, tables), and multimedia when useful to aiding comprehension.
- b. Develop the topic with well-chosen, relevant, and sufficient facts, extended definitions, concrete details, quotations, or other information and examples appropriate to the audience’s knowledge of the topic.
- c. Use appropriate and varied transitions to link the major sections of the text, create cohesion, and clarify the relationships among complex ideas and concepts.
- d. Use precise language and domain-specific vocabulary to manage the complexity of the topic.
- e. Establish and maintain a formal style and objective tone while attending to the norms and conventions of the discipline in which they are writing.
- f. Provide a concluding statement or section that follows from and supports the information or explanation presented (e.g., articulating implications or the significance of the topic).

9.7.3.3. Write narratives **and other creative texts** to develop real or imagined experiences or events using effective technique, well-chosen details, and well-structured event sequences.

- a. Engage and orient the reader by setting out a problem, situation, or observation, establishing one or multiple point(s) of view, and introducing a narrator and/or characters; create a smooth progression of experiences or events.
- b. Use **literary and** narrative techniques, such as dialogue, pacing, **rhythm, repetition, rhyme**, description, reflection, and multiple plot lines, to develop experiences, events, and/or characters.
- c. Use a variety of techniques to sequence events so that they build on one another to create a coherent whole.

- d. Use precise words and phrases, telling details, and **figurative and** sensory language to convey a vivid picture of the experiences, events, setting, and/or characters.
- e. Provide a conclusion (**when appropriate to the genre**) that follows from and reflects on what is experienced, observed, or resolved over the course of the narrative **or creative text**.

Writing Process: **Production and Distribution of Writing**

9.7.4.4. Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.

9.7.5.5. Use a writing process to develop and **strengthen writing as needed by** planning, **drafting, revising, editing,** rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience.

9.7.6.6. Use technology, including the Internet, to produce, publish, and update individual or shared writing products, taking advantage of technology’s capacity to link to other information and to display information flexibly and dynamically.

Research to Build and Present Knowledge

9.7.7.7. Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation.

9.7.8.8. Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the usefulness of each source in answering the research question; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and following a standard format for citation.

9.7.9.9. Draw evidence from literary or informational texts to support analysis, reflection, and research.

- a. Apply grades 9–10 Reading standards to literature (e.g., “Analyze how an author draws on and transforms source material in a specific work [e.g., how Shakespeare treats a theme or topic from Ovid or the Bible or how a later author draws on a play by Shakespeare]”).
- b. Apply grades 9–10 Reading standards to literary nonfiction (e.g., “Delineate and evaluate the argument and specific claims in a text, assessing whether the reasoning is valid and the evidence is relevant and sufficient; identify false statements and fallacious reasoning”).

Range of Writing

9.7.10.10. Write routinely over extended time frames (time for research, reflection, and revision) and shorter time frames (a single sitting or a day or two) for a range of tasks, purposes, and audiences.

- a. **Independently select writing topics and formats for personal enjoyment, interest, and academic tasks.**

Writing Benchmarks: Literacy in History/Social Studies, Science, and Technical Subjects [WHST]

Text Types and Purposes

9.14.1.1. Write arguments focused on discipline-specific content.

- a. Introduce precise claim(s), distinguish the claim(s) from alternate or opposing claims, and create an organization that establishes clear relationships among the claim(s), counterclaims, reasons, and evidence.
- b. Develop claim(s) and counterclaims fairly, supplying data and **credible** evidence for each while pointing out the strengths and limitations of both claim(s) and counterclaims in a discipline-appropriate form and in a manner that anticipates the audience's knowledge level and concerns.
- c. Use words, phrases, and clauses to link the major sections of the text, create cohesion, and clarify the relationships between claim(s) and reasons, between reasons and evidence, and between claim(s) and counterclaims.
- d. Establish and maintain a formal style and objective tone while attending to the norms and conventions of the discipline in which they are writing.
- e. Provide a concluding statement or section that follows from or supports the argument presented.

9.14.2.2. Write informative/explanatory texts, **as they apply to each discipline and reporting format**, including the narration of historical events, **of** scientific procedures/experiments, or **description of** technical processes.

- a. Introduce a topic and organize ideas, concepts, and information to make important connections and distinctions; include formatting (e.g., headings), graphics (e.g., figures, tables), and multimedia when useful to aiding comprehension.
- b. Develop the topic with well-chosen, relevant, **credible**, and sufficient facts, extended definitions, concrete details, quotations, or other information and examples appropriate to the audience's knowledge of the topic.
- c. Use varied transitions and sentence structures to link the major sections of the text, create cohesion, and clarify the relationships among ideas and concepts.
- d. Use precise language and domain-specific vocabulary to manage the complexity of the topic and convey a style appropriate to the discipline and context as well as to the expertise of likely readers.

- e. Establish and maintain a formal style and objective tone while attending to the norms and conventions of the discipline in which they are writing.
- f. Provide a concluding statement or section that follows from and supports the information or explanation presented (e.g., articulating implications or the significance of the topic).

9.14.3.3. (Not applicable as a separate requirement)

Writing Process: Production and Distribution of Writing

9.14.4.4. Produce clear and coherent writing in which the development, organization, and style are appropriate to **discipline**, task, purpose, and audience.

9.14.5.5. Use a writing process to develop and **strengthen writing as needed by** planning, **drafting**, **revising**, **editing**, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience, **and appropriate to the discipline.**

9.14.6.6. Use technology, including, **but not limited to**, the Internet, to produce, publish, and update individual or shared writing products **and multi-media texts**, taking advantage of technology's capacity to link to other information and to display information flexibly and dynamically.

Research to Build and Present Knowledge

9.14.7.7. Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize **ideas from** multiple sources on the subject, demonstrating understanding of the subject under investigation.

9.14.8.8. Gather relevant information from multiple authoritative **data**, print, **physical (e.g., artifacts, objects, images)**, and digital sources, using advanced searches effectively; assess the usefulness of each source in answering the research question; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and following a standard format for citation.

9.14.9.9. Draw evidence from **literary or** informational texts to support analysis, reflection, and research.

Range of Writing

9.14.10.10. Write routinely over extended time frames (time for reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences.

Comprehension and Collaboration

9.9.1.1. Initiate and participate effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grades 9–10 topics, texts, and issues, **including those by and about Minnesota American Indians**, building on others' ideas and expressing their own clearly and persuasively.

- a. Come to discussions prepared, having read and researched material under study; explicitly draw on that preparation by referring to evidence from texts and other research on the topic or issue to stimulate a thoughtful, well-reasoned exchange of ideas.
- b. Work with peers to set rules for collegial discussions and decision-making (e.g., informal consensus, taking votes on key issues, presentation of alternate views), clear goals and deadlines, and individual roles as needed.
- c. Propel conversations by posing and responding to questions that relate the current discussion to broader themes or larger ideas; actively incorporate others into the discussion; and clarify, verify, or challenge ideas and conclusions.
- d. Respond thoughtfully to diverse perspectives, summarize points of agreement and disagreement, and, when warranted, qualify or justify their own views and understanding and make new connections in light of the evidence and reasoning presented.

9.9.2.2. Integrate multiple sources of information presented in diverse media or formats (e.g., visually, quantitatively, orally) evaluating the credibility and accuracy of each source.

9.9.3.3. Evaluate a speaker's point of view, reasoning, **intended audience**, and use of evidence and rhetoric, identifying any fallacious reasoning or exaggerated or distorted evidence.

Presentation of Knowledge and Ideas

9.9.4.4. **While respecting intellectual property**, present information, findings, and supporting evidence clearly, concisely, and logically such that listeners can follow the line of reasoning and the organization, development, substance, and style are appropriate to purpose, audience, and task (e.g., **persuasion, argumentation, debate**).

9.9.5.5. Make strategic use of digital media (e.g., textual, graphical, audio, visual, and interactive elements) in presentations to enhance understanding of findings, reasoning, and evidence and to add interest.

9.9.6.6. Adapt speech to a variety of contexts, **audiences, tasks, and feedback from self and others**, demonstrating command of formal English when indicated or appropriate.

- a. **Apply assessment criteria to evaluate oral presentations by self and others.**

9.9.7.7. Understand, analyze, evaluate, and use different types of print, digital, and multimodal media.

- a. Evaluate the content and effect of persuasive techniques used in different mass media.
- b. Synthesize information and recognize categories, trends, and themes across multiple sources.
- c. Demonstrate an understanding of ethics in mass communication and describe the characteristics of ethical and unethical behavior.
- d. Recognize ethical standards and safe practices in social and personal media communications, and understand the consequences of personal choices.

9.9.8.8. As an individual or in collaboration, create a multimedia work, a remix of original work and the work of others, or a piece of digital communication for a specific purpose (e.g., to interpret or respond to a piece of literature, to represent thematic similarities between two literary works, to interact or collaborate globally, to critique a current event or social issue.)

- a. Present, transform, or remix content in an ethical manner, demonstrating an understanding of copyright, attribution, citation, the principles of Fair Use, and of the different types of Creative Commons licenses.
- b. Publish the work and share with an audience.

Conventions of Standard English

9.11.1.1. Demonstrate command of the conventions of standard English grammar and usage when writing or speaking.

- a. Use parallel structure.
- b. Use various types of phrases (noun, verb, adjectival, adverbial, participial, prepositional, absolute) and clauses (independent, dependent; noun, relative, adverbial) to convey specific meanings and add variety and interest to writing or presentations.

9.11.2.2. Demonstrate command of the conventions of standard English capitalization, punctuation, and spelling when writing.

- a. Use a semicolon (and perhaps a conjunctive adverb) to link two or more closely related independent clauses.
- b. Use a colon to introduce a list or quotation.
- c. Spell correctly.

Knowledge of Language

9.11.3.3. Apply knowledge of language to understand how language functions in different contexts, to make effective choices for meaning or style, and to comprehend more fully when reading or listening.

- a. Write and edit work so that it conforms to the guidelines in a style manual (e.g., *MLA Handbook*, Turabian's *Manual for Writers*) appropriate for the discipline and writing type.

Vocabulary Acquisition and Use

9.11.4.4. Determine or clarify the meaning of unknown and multiple-meaning words and phrases based on grades 9–10 reading and content, choosing flexibly from a range of strategies.

- a. Use context (e.g., the overall meaning of a sentence, paragraph, or text; a word's position or function in a sentence) as a clue to the meaning of a word or phrase.
- b. Identify and correctly use patterns of word changes that indicate different meanings or parts of speech (e.g., *analyze*, *analysis*, *analytical*; *advocate*, *advocacy*).

- c. Consult general and specialized reference materials (e.g., dictionaries, glossaries, thesauruses), both print and digital, to find the pronunciation of a word or determine or clarify its precise meaning, its part of speech, or its etymology.
- d. Verify the preliminary determination of the meaning of a word or phrase (e.g., by checking the inferred meaning in context or in a dictionary).

9.11.5.5. Demonstrate understanding of figurative language, word relationships, and nuances in word meanings.

- a. Interpret figures of speech (e.g., euphemism, oxymoron) in context and analyze their role in the text.
- b. Analyze nuances in the meaning of words with similar denotations.

9.11.6.6. Acquire and use accurately general academic and domain-specific words and phrases, sufficient for reading, writing, speaking, and listening at the college and career readiness level; demonstrate independence in gathering vocabulary knowledge when considering a word or phrase important to comprehension or expression.

MINNESOTA English Language Arts
Academic Standards
Grades 11–12

Reading

Reading Benchmarks: Literature

[RL]

Key Ideas and Details

11.4.1.1. Cite strong and thorough textual evidence to support analysis of what the text says explicitly as well as inferences drawn from the text, including determining where the text leaves matters uncertain.

11.4.2.2. Determine two or more themes or central ideas of a text and analyze their development over the course of the text, including how they interact and build on one another to produce a complex account; provide an objective summary of the text.

11.4.3.3. Analyze the impact of the author's choices regarding how to develop and relate elements of a story or drama (e.g., where a story is set, how the action is ordered, how the characters are introduced and developed).

Craft and Structure

11.4.4.4. Determine the meaning of words and phrases as they are used in the text, including figurative and connotative meanings; analyze the impact of specific word choices on meaning and tone, including words with multiple meanings or language that is particularly fresh, engaging, or beautiful. (Include Shakespeare as well as other authors.)

11.4.5.5. Analyze how an author's choices concerning how to structure specific parts of a text (e.g., the choice of where to begin or end a story, the choice to provide a comedic or tragic resolution) contribute to its overall structure and meaning as well as its aesthetic impact.

11.4.6.6. Analyze a case in which grasping point of view requires distinguishing what is directly stated in a text from what is really meant (e.g., satire, sarcasm, irony, or understatement).

Integration of Knowledge and Ideas

11.4.7.7. Analyze multiple interpretations of a story, drama, or poem (e.g., recorded or live production of a play or recorded novel or poetry), evaluating how each version interprets the source text. (Include at least one play by Shakespeare and one play by an American dramatist.)

11.4.8.8. (Not applicable to literature)

11.4.9.9. Demonstrate knowledge of eighteenth-, nineteenth- and early-twentieth-century foundational works of American literature, including **American Indian and other diverse cultures' texts** and how two or more texts from the same period treat similar themes or topics.

Range of Reading and Level of Text Complexity

11.4.10.10. By the end of grade 11, read and comprehend literature **and other texts**, including stories, dramas, and poems, in the grades 11–CCR text complexity band proficiently, with scaffolding as needed at the high end of the range.

- a. Self-select texts for personal enjoyment, interest, and academic tasks.

- b. Read widely to understand multiple perspectives and pluralistic viewpoints.

By the end of grade 12, read and comprehend literature **and other texts**, including stories, dramas, and poems, at the high end of the grades 11–CCR text complexity band independently and proficiently.

- a. Self-select texts for personal enjoyment, interest, and academic tasks.
- b. Read widely to understand multiple perspectives and pluralistic viewpoints.

Reading Benchmarks: Informational Text

[RI]

Key Ideas and Details

11.5.1.1. Cite strong and thorough textual evidence to support analysis of what the text says explicitly as well as inferences drawn from the text, including determining where the text leaves matters uncertain.

11.5.2.2. Determine two or more central ideas of a text and analyze their development over the course of the text, including how they interact and build on one another to provide a complex analysis; provide an objective summary of the text.

11.5.3.3. Analyze a complex set of ideas or sequence of events and explain how specific individuals, ideas, or events interact and develop over the course of the text.

Craft and Structure

11.5.4.4. Determine the meaning of words and phrases as they are used in a text, including figurative, connotative, and technical meanings; analyze how an author uses and refines the meaning of a key term or terms over the course of a text (e.g., how Madison defines *faction* in *Federalist* No. 10).

11.5.5.5. Analyze and evaluate the effectiveness of the structure an author uses in his or her exposition or argument, including whether the structure makes points clear, convincing, and engaging.

11.5.6.6. Determine an author's point of view or purpose in a text in which the rhetor is particularly effective, analyzing how style and content contribute to the power, persuasiveness, or beauty of the text.

Integration of Knowledge and Ideas

11.5.7.7. Integrate and evaluate multiple sources of information presented in different media or formats (e.g., visually, quantitatively) as well as in words in order to address a question or solve a problem.

11.5.8.8. Delineate and evaluate the reasoning in seminal U.S. texts, including the application of constitutional principles and use of legal reasoning (e.g., in U.S. Supreme Court majority opinions and dissents) and the premises, purposes, and arguments in works of public advocacy (e.g., *The Federalist*, presidential addresses).

11.5.9.9. Analyze seventeenth-, eighteenth-, and nineteenth-century foundational U.S. documents of historical and literary significance (including The Declaration of Independence, the Preamble to the Constitution, the Bill of Rights, and Lincoln’s Second Inaugural Address) for their themes, purposes, and rhetorical features.

Range of Reading and Level of Text Complexity

11.5.10.10. By the end of grade 11, read and comprehend literary nonfiction in the grades 11–CCR text complexity band proficiently, with scaffolding as needed at the high end of the range.

By the end of grade 12, read and comprehend literary nonfiction at the high end of the grades 11–CCR text complexity band independently and proficiently.

- a. Self-select texts for personal enjoyment, interest, and academic tasks.

Reading Benchmarks: Literacy in History/Social Studies

[RH]

Key Ideas and Details

11.12.1.1. Cite specific textual, **visual, or physical** evidence to support analysis of primary and secondary sources, connecting insights gained from specific details to an understanding of the text as a whole.

11.12.2.2. Determine the central ideas or information of a primary or secondary source; provide an accurate summary that makes clear the relationships among the key details and ideas.

11.12.3.3. Evaluate various explanations for actions or events and determine which explanation best accords with textual evidence, acknowledging where the text leaves matters uncertain.

Craft and Structure

11.12.4.4. Determine the meaning of words and phrases as they are used in a text, including analyzing how an author uses, **reinforces**, and refines the meaning of a key term over the course of a text (e.g., how Madison defines *faction* in *Federalist* No. 10).

11.12.5.5. Analyze in detail how a complex primary or secondary source is structured, including how key sentences, paragraphs, and larger portions of the text contribute to the whole.

11.12.6.6. Evaluate authors’ differing points of view, **including differing points of view about Minnesota American Indian history**, on the same historical event or issue by assessing the authors’ claims, reasoning, and evidence.

Integration of Knowledge and Ideas

11.12.7.7. Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g., visually, quantitatively, **spatially, aurally, physically**, as well as in words) in order to address a question or solve a problem.

11.12.8.8. Evaluate an author’s premises, claims, and evidence by corroborating or challenging them with other information.

11.12.9.9. Integrate information from diverse sources, both primary and secondary, into a coherent understanding of an idea or event, noting discrepancies among sources.

Range of Reading and Level of Text Complexity

11.12.10.10. By the end of grade 12, read and comprehend history/social studies texts in the grades 11–CCR text complexity band independently and proficiently.

Reading Benchmarks: Literacy in Science and Technical Subjects

[RST]

Key Ideas and Details

11.13.1.1. Cite specific textual evidence to support analysis of science and technical texts, attending to important distinctions the author makes and to any gaps or inconsistencies in the account.

11.13.2.2. Determine the central ideas or conclusions of a text; summarize complex concepts, processes, or information presented in a text by paraphrasing them in simpler but still accurate terms.

11.13.3.3. Follow precisely a complex multistep procedure when carrying out experiments, **designing solutions**, taking measurements, or performing technical tasks; analyze the specific results based on explanations in the text.

Craft and Structure

11.13.4.4. Determine the meaning of symbols, **equations, graphical representations, tabular representations**, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 11–12 texts and topics.

11.13.5.5. Analyze how the text structures information or ideas into categories or hierarchies, demonstrating understanding of the information or ideas.

11.13.6.6. Analyze the author’s purpose in **describing phenomena**, providing an explanation, describing a procedure, or discussing/reporting an experiment in a text, identifying important issues and questions that remain unresolved.

Integration of Knowledge and Ideas

11.13.7.7. Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g., quantitative data, video, multimedia) in order to address a question or solve a problem.

11.13.8.8. Evaluate the hypotheses, data, analysis, and conclusions in a science or technical text, verifying the data when possible and corroborating or challenging conclusions with other sources of information.

11.13.9.9. Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible.

Range of Reading and Level of Text Complexity

11.13.10.10. By the end of grade 12, read and comprehend science/technical texts in the grades 11–CCR text complexity band independently and proficiently.

Text Types and Purposes

11.7.1.1. Write arguments to support claims in an analysis of substantive topics or texts, using valid reasoning and relevant and sufficient evidence.

- Introduce precise, knowledgeable claim(s), establish the significance of the claim(s), distinguish the claim(s) from alternate or opposing claims, and create an organization that logically sequences claim(s), counterclaims, reasons, and evidence.
- Develop claim(s) and counterclaims fairly and thoroughly, supplying the most relevant evidence for each while pointing out the strengths and limitations of both in a manner that anticipates the audience's knowledge level, concerns, values, and possible biases.
- Use words, phrases, and clauses as well as varied syntax to link the major sections of the text, create cohesion, and clarify the relationships between claim(s) and reasons, between reasons and evidence, and between claim(s) and counterclaims.
- Establish and maintain a formal style and objective tone while attending to the norms and conventions of the discipline in which they are writing.
- Provide a concluding statement or section that follows from and supports the argument presented.

11.7.2.2. Write informative/explanatory texts to examine and convey complex ideas, concepts, and information clearly and accurately through the effective selection, organization, and analysis of content.

- Introduce a topic; organize complex ideas, concepts, and information so that each new element builds on that which precedes it to create a unified whole; include formatting (e.g., headings), graphics (e.g., figures, tables), and multimedia when useful to aiding comprehension.
- Develop the topic thoroughly by selecting the most significant and relevant facts, extended definitions, concrete details, quotations, or other information and examples appropriate to the audience's knowledge of the topic.
- Use appropriate and varied transitions and syntax to link the major sections of the text, create cohesion, and clarify the relationships among complex ideas and concepts.
- Use precise language, domain-specific vocabulary, and techniques such as metaphor, simile, and analogy to manage the complexity of the topic.
- Establish and maintain a formal style and objective tone while attending to the norms and conventions of the discipline in which they are writing.
- Provide a concluding statement or section that follows from and supports the information or explanation presented (e.g., articulating implications or the significance of the topic).

11.7.3.3. Write narratives and other creative texts to develop real or imagined experiences or events using effective technique, well-chosen details, and well-structured event sequences.

- Engage and orient the reader by setting out a problem, situation, or observation and its significance, establishing one or multiple point(s) of view, and introducing a narrator and/or characters; create a smooth progression of experiences or events.
- Use **literary and** narrative techniques, such as dialogue, pacing, **rhythm, repetition, rhyme**, description, reflection, and multiple plot lines, to develop experiences, events, and/or characters.
- Use a variety of techniques to sequence events so that they build on one another to create a coherent whole and build toward a particular tone and outcome (e.g., a sense of mystery, suspense, growth, or resolution).
- Use precise words and phrases, telling details, and **figurative and** sensory language to convey a vivid picture of the experiences, events, setting, and/or characters.
- Provide a conclusion (**when appropriate to the genre**) that follows from and reflects on what is experienced, observed, or resolved over the course of the narrative or creative text.

Writing Process: **Production and Distribution of Writing**

11.7.4.4. Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.

11.7.5.5. Use a writing process to develop and strengthen writing as needed by planning, **drafting, revising, editing**, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience.

11.7.6.6. Use technology, including the Internet, to produce, publish, and update individual or shared writing products in response to ongoing feedback, including new arguments or information.

Research to Build and Present Knowledge

11.7.7.7. Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation.

11.7.8.8. Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the strengths and limitations of each source in terms of the task, purpose, and audience; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and overreliance on any one source and following a standard format for citation.

11.7.9.9. Draw evidence from literary or informational texts to support analysis, reflection, and research.

- a. Apply grades 11–12 Reading standards to literature (e.g., “Demonstrate knowledge of eighteenth-, nineteenth- and early-twentieth-century foundational works of American literature, including how two or more texts from the same period treat similar themes or topics”).
- b. Apply grades 11–12 Reading standards to literary nonfiction (e.g., “Delineate and evaluate the reasoning in seminal U.S. texts, including the application of constitutional principles and use of legal reasoning [e.g., in U.S. Supreme Court Case majority opinions and dissents] and the premises, purposes, and arguments in works of public advocacy [e.g., *The Federalist*, presidential addresses]”).

Range of Writing

11.7.10.10. Write routinely over extended time frames (time for research, reflection, and revision) and shorter time frames (a single sitting or a day or two) for a range of tasks, purposes, and audiences.

- a. Independently select writing topics and formats for personal enjoyment, interest, and academic tasks.

Writing Benchmarks: Literacy in History/Social Studies, Science, and Technical Subjects [WHST]

Text Types and Purposes

11.14.1.1. Write arguments focused on discipline-specific content.

- a. Introduce precise, knowledgeable claim(s), establish the significance of the claim(s), distinguish the claim(s) from alternate or opposing claims, and create an organization that logically sequences the claim(s), counterclaims, reasons, and evidence.
- b. Develop claim(s) and counterclaims fairly and thoroughly, supplying the most relevant data and credible evidence for each while pointing out the strengths and limitations of both claim(s) and counterclaims in a discipline-appropriate form that anticipates the audience’s knowledge level, concerns, values, and possible biases.
- c. Use words, phrases, and clauses as well as varied syntax to link the major sections of the text, create cohesion, and clarify the relationships between claim(s) and reasons, between reasons and evidence, and between claim(s) and counterclaims.
- d. Establish and maintain a formal style and objective tone while attending to the norms and conventions of the discipline in which they are writing.
- e. Provide a concluding statement or section that follows from or supports the argument presented.

11.14.2.2. Write informative/explanatory texts, as they apply to each discipline and reporting format, including the narration of historical events, of scientific procedures/experiments, or description of technical processes.

- a. Introduce a topic and organize complex ideas, concepts, and information so that each new element builds on that which precedes it to create a unified whole; include formatting (e.g., headings), graphics (e.g., figures, tables), and multimedia when useful to aiding comprehension.
- b. Develop the topic thoroughly by selecting the most significant, credible, sufficient, and relevant facts, extended definitions, concrete details, quotations, or other information and examples appropriate to the audience’s knowledge of the topic.
- c. Use varied transitions and sentence structures to link the major sections of the text, create cohesion, and clarify the relationships among complex ideas and concepts.
- d. Use precise language, domain-specific vocabulary and techniques such as metaphor, simile, and analogy to manage the complexity of the topic; convey a knowledgeable stance in a style that responds to the discipline and context as well as to the expertise of likely readers.
- e. Establish and maintain a formal style and objective tone while attending to the norms and conventions of the discipline in which they are writing.
- f. Provide a concluding statement or section that follows from and supports the information or explanation provided (e.g., articulating implications or the significance of the topic).

11.14.3.3. (Not applicable as a separate requirement)

Writing Process: Production and Distribution of Writing

11.14.4.4. Produce clear and coherent writing in which the development, organization, and style are appropriate to discipline, task, purpose, and audience.

11.14.5.5. Use a writing process to develop and strengthen writing as needed by planning, drafting, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience, and appropriate to the discipline.

11.14.6.6. Use technology, including, but not limited to, the Internet, to produce, publish, and update individual or shared writing products and multimedia texts in response to ongoing feedback, including new arguments or information.

Research to Build and Present Knowledge

11.14.7.7. Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize ideas from multiple sources on the subject, demonstrating understanding of the subject under investigation.

11.14.8.8. Gather relevant information from multiple authoritative **data**, print, **physical (e.g., artifacts, objects, images)**, and digital sources, using advanced searches effectively; assess the strengths and limitations of each source in terms of the specific task, purpose, and audience; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and overreliance on any one source and following a standard format for citation.

11.14.9.9. Draw evidence from **literary or** informational texts to support analysis, reflection, and research.

Range of Writing

11.14.10.10. Write routinely over extended time frames (time for reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences.

Speaking, Viewing, Listening and Media Literacy [SL]

Comprehension and Collaboration

11.9.1.1. Initiate and participate effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grades 11–12 topics, texts, and issues, **including those by and about Minnesota American Indians**, building on others' ideas and expressing their own clearly and persuasively.

- a. Come to discussions prepared, having read and researched material under study; explicitly draw on that preparation by referring to evidence from texts and other research on the topic or issue to stimulate a thoughtful, well-reasoned exchange of ideas.
- b. Work with peers to promote civil, democratic discussions and decision-making, set clear goals and deadlines, and establish individual roles as needed.
- c. Propel conversations by posing and responding to questions that probe reasoning and evidence; ensure a hearing for a full range of positions on a topic or issue; clarify, verify, or challenge ideas and conclusions; and promote divergent and creative perspectives.
- d. Respond thoughtfully to diverse perspectives; synthesize comments, claims, and evidence made on all sides of an issue; resolve contradictions when possible; and determine what additional information or research is required to deepen the investigation or complete the task.

11.9.2.2. Integrate multiple sources of information presented in diverse formats and media (e.g., visually, quantitatively, orally) in order to make informed decisions and solve problems, evaluating the credibility and accuracy of each source and noting any discrepancies among the data.

11.9.3.3. Evaluate a speaker's point of view, reasoning, **intended audience**, and use of evidence and rhetoric, assessing the stance, premises, links among ideas, word choice, points of emphasis, and tone used.

Presentation of Knowledge and Ideas

11.9.4.4. While respecting intellectual property, present information, findings, and supporting evidence, conveying a clear and distinct perspective, such that listeners can follow the line of reasoning, alternative or opposing perspectives are addressed, and the organization, development, substance, and style are appropriate to purpose, audience, and a range of formal and informal tasks (e.g., **persuasion, argumentation, debate**).

11.9.5.5. Make strategic use of digital media (e.g., textual, graphical, audio, visual, and interactive elements) in presentations to enhance understanding of findings, reasoning, and evidence and to add interest.

11.9.6.6. Adapt speech to a variety of contexts, **audiences, tasks, and feedback from self and others**, demonstrating command of formal English when indicated or appropriate.

- a. **Apply assessment criteria to evaluate oral presentations by self and others.**

Media Literacy

11.9.7.7 Understand, analyze, evaluate, and use different types of print, digital, and multimodal media.

- a. **Evaluate the aural, visual, and written images and other special effects used in mass media for their ability to inform, persuade, and entertain.**
- b. **Examine the intersections and conflicts between visual (e.g., media images, painting, film, graphic arts) and verbal messages.**
- c. **Recognize how visual techniques or design elements (e.g., special effects, camera angles) carry or influence messages in various media.**
- d. **Recognize ethical standards and safe practices in social and personal media communications, and understand the consequences of personal choices.**

11.9.8.8 As an individual or in collaboration, create a multimedia work, a remix of original work and the work of others, or a piece of digital communication for a specific purpose (e.g., to connect literature to a culture or a literary period, to recast a piece of literature into a different time period or culture, to critique popular culture, to create a parody or satire).

- a. **Present, transform or remix content in an ethical manner, demonstrating an understanding of copyright, attribution, citation, the principles of Fair Use, and the different types of Creative Commons licenses.**
- b. **Publish the work and share with an audience.**

Language [L]

Conventions of Standard English

11.11.1.1. Demonstrate command of the conventions of standard English grammar and usage when writing or speaking.

- a. **Apply the understanding that usage is a matter of convention**, can change over time, and is sometimes contested.

- b. Resolve issues of complex or contested usage, consulting references (e.g., *Merriam-Webster's Dictionary of English Usage*, *Garner's Modern American Usage*) as needed.

11.11.2.2. Demonstrate command of the conventions of standard English capitalization, punctuation, and spelling when writing.

- a. Observe hyphenation conventions.
- b. Spell correctly.

Knowledge of Language

11.11.3.3. Apply knowledge of language to understand how language functions in different contexts, to make effective choices for meaning or style, and to comprehend more fully when reading or listening.

- a. Vary syntax for effect, consulting references (e.g., Tufte's *Artful Sentences*) for guidance as needed; apply an understanding of syntax to the study of complex texts when reading.

Vocabulary Acquisition and Use

11.11.4.4. Determine or clarify the meaning of unknown and multiple-meaning words and phrases based on grades 11–12 reading and content, choosing flexibly from a range of strategies.

- a. Use context (e.g., the overall meaning of a sentence, paragraph, or text; a word's position or function in a sentence) as a clue to the meaning of a word or phrase.

- b. Identify and correctly use patterns of word changes that indicate different meanings or parts of speech (e.g., *conceive*, *conception*, *conceivable*).

- c. Consult general and specialized reference materials (e.g., dictionaries, glossaries, thesauruses), both print and digital, to find the pronunciation of a word or determine or clarify its precise meaning, its part of speech, its etymology, or its standard usage.

- d. Verify the preliminary determination of the meaning of a word or phrase (e.g., by checking the inferred meaning in context or in a dictionary).

11.11.5.5. Demonstrate understanding of figurative language, word relationships, and nuances in word meanings.

- a. Interpret figures of speech (e.g., hyperbole, paradox) in context and analyze their role in the text.
- b. Analyze nuances in the meaning of words with similar denotations.

11.11.6.6. Acquire and use accurately general academic and domain-specific words phrases, sufficient for reading, writing, speaking, and listening at the college and career readiness level; demonstrate independence in gathering vocabulary knowledge when considering a word or phrase important to comprehension or expression.

MINNESOTA English Language Arts
Academic Standards
Language Progressive Skills

Language

The following skills, introduced in Grades 3–9, are particularly likely to require continued attention in higher grades as they are applied to increasingly sophisticated writing and speaking.

L.3.1f. (MN 3.10.1.1.f) Ensure subject-verb and pronoun-antecedent agreement.

L.3.3a. (MN 3.10.3.3.f) Choose words and phrases for effect.

L.4.1f. (MN 4.10.1.1.f) Produce complete sentences, recognizing and correcting inappropriate fragments and run-ons.

L.4.1g. (MN 4.10.1.1.g) Correctly use frequently confused words (e.g., *to/too/two*; *there/their*).

L.4.3b. (MN 4.10.3.3.b) Choose punctuation for effect.

L.5.1d. (MN 5.10.1.1.d) Recognize and correct inappropriate shifts in verb tense.

L.5.2a. (MN 5.10.2.2.a) Use punctuation to separate items in a series.

L.6.1c. (MN 6.11.1.1.c) Recognize and correct inappropriate shifts in pronoun number and person.

[L]

L.6.1d. (MN 6.11.1.1.d) Recognize and correct vague pronouns (i.e., ones with unclear or ambiguous antecedents).

L.6.1e. (MN 6.11.1.1.e) Recognize variations from standard English in their own and others' writing and speaking, and identify and use strategies to improve expression in conventional language.

L.6.2a. (MN 6.11.2.2.a) Use punctuation (commas, parentheses, dashes) to set off nonrestrictive/parenthetical elements.

L.6.3a. (MN 6.11.3.3.a) Vary sentence patterns for meaning, reader/listener interest, and style.

L.6.3b. (MN 6.11.3.3.b) Maintain consistency in style and tone.

L.7.1c. (MN 7.11.1.1.c) Place phrases and clauses within a sentence, recognizing and correcting misplaced and dangling modifiers.

L.7.3a. (MN 7.11.3.3.a) Choose language that expresses ideas precisely and concisely, recognizing and eliminating wordiness and redundancy.

L.8.1d. (MN 8.11.1.1.d) Recognize and correct inappropriate shifts in verb voice and mood.

L.9–10.1a. (MN 9.11.1.1.a) Use parallel structure.

Mathematics

MINNESOTA Grade 8 Mathematics Academic Standards

8.1: Number & Operation

8.1.1. Read, write, compare, classify and represent real numbers, and use them to solve problems in various contexts.

8.1.1.1. Classify real numbers as rational or irrational. Know that when a square root of a positive integer is not an integer, then it is irrational. Know that the sum of a rational number and an irrational number is irrational, and the product of a non-zero rational number and an irrational number is irrational.

8.1.1.2. Compare real numbers; locate real numbers on a number line. Identify the square root of a positive integer as an integer, or if it is not an integer, locate it as a real number between two consecutive positive integers.

8.1.1.3. Determine rational approximations for solutions to problems involving real numbers.

8.1.1.4. Know and apply the properties of positive and negative integer exponents to generate equivalent numerical expressions.

8.1.1.5. Express approximations of very large and very small numbers using scientific notation; understand how calculators display numbers in scientific notation. Multiply and divide numbers expressed in scientific notation, express the answer in scientific notation, using the correct number of significant digits when physical measurements are involved.

8.2: Algebra

8.2.1. Understand the concept of function in real-world and mathematical situations, and distinguish between linear and nonlinear functions.

8.2.1.1. Understand that a function is a relationship between an independent variable and a dependent variable in which the value of the independent variable determines the value of the dependent variable. Use functional notation, such as $f(x)$, to represent such relationships.

8.2.1.2. Use linear functions to represent relationships in which changing the input variable by some amount leads to a change in the output variable that is a constant times that amount.

8.2.1.3. Understand that a function is linear if it can be expressed in the form $f(x) = mx + b$ or if its graph is a straight line.

8.2.1.4. Understand that an arithmetic sequence is a linear function that can be expressed in the form $f(x) = mx + b$, where $x = 0, 1, 2, 3, \dots$

8.2.1.5. Understand that a geometric sequence is a non-linear function that can be expressed in the form $f(x) = ab^x$, where $x = 0, 1, 2, 3, \dots$

8.2.2. Recognize linear functions in real-world and mathematical situations; represent linear functions and other functions with tables, verbal descriptions, symbols and graphs; solve problems involving these functions and explain results in the original context.

8.2.2.1. Represent linear functions with tables, verbal descriptions, symbols, equations and graphs; translate from one representation to another.

8.2.2.2. Identify graphical properties of linear functions including slopes and intercepts. Know that the slope equals the rate of change, and that the y -intercept is zero when the function represents a proportional relationship.

8.2.2.3. Identify how coefficient changes in the equation $f(x) = mx + b$ affect the graphs of linear functions. Know how to use graphing technology to examine these effects.

8.2.2.4. Represent arithmetic sequences using equations, tables, graphs and verbal descriptions, and use them to solve problems.

8.2.2.5. Represent geometric sequences using equations, tables, graphs and verbal descriptions, and use them to solve problems.

8.2.3. Generate equivalent numerical and algebraic expressions and use algebraic properties to evaluate expressions.

8.2.3.1. Evaluate algebraic expressions, including expressions containing radicals and absolute values, at specified values of their variables.

8.2.3.2. Justify steps in generating equivalent expressions by identifying the properties used, including the properties of algebra. Properties include the associative, commutative and distributive laws, and the order of operations, including grouping symbols.

8.2.4. Represent real-world and mathematical situations using equations and inequalities involving linear expressions. Solve equations and inequalities symbolically and graphically. Interpret solutions in the original context.

8.2.4.1. Use linear equations to represent situations involving a constant rate of change, including proportional and non-proportional relationships.

8.2.4.2. Solve multi-step equations in one variable. Solve for one variable in a multi-variable equation in terms of the other variables. Justify the steps by identifying the properties of equalities used.

8.2.4.3. Express linear equations in slope-intercept, point-slope and standard forms, and convert between these forms. Given sufficient information, find an equation of a line.

8.2.4.4. Use linear inequalities to represent relationships in various contexts.

8.2.4.5. Solve linear inequalities using properties of inequalities. Graph the solutions on a number line.

8.2.4.6. Represent relationships in various contexts with equations and inequalities involving the absolute value of a linear expression. Solve such equations and inequalities and graph the solutions on a number line.

8.2.4.7. Represent relationships in various contexts using systems of linear equations. Solve systems of linear equations in two variables symbolically, graphically and numerically.

8.2.4.8. Understand that a system of linear equations may have no solution, one solution, or an infinite number of solutions. Relate the number of solutions to pairs of lines that are intersecting, parallel or identical. Check whether a pair of numbers satisfies a system of two linear equations in two unknowns by substituting the numbers into both equations.

8.2.4.9. Use the relationship between square roots and squares of a number to solve problems.

8.3: Geometry & Measurement

8.3.1. Solve problems involving right triangles using the Pythagorean Theorem and its converse.

8.3.1.1. Use the Pythagorean Theorem to solve problems involving right triangles.

8.3.1.2. Determine the distance between two points on a horizontal or vertical line in a coordinate system. Use the Pythagorean Theorem to find the distance between any two points in a coordinate system.

8.3.1.3. Informally justify the Pythagorean Theorem by using measurements, diagrams and computer software.

8.3.2. Solve problems involving parallel and perpendicular lines on a coordinate system.

8.3.2.1. Understand and apply the relationships between the slopes of parallel lines and between the slopes of perpendicular lines. Dynamic graphing software may be used to examine these relationships.

8.3.2.2. Analyze polygons on a coordinate system by determining the slopes of their sides.

8.3.2.3. Given a line on a coordinate system and the coordinates of a point not on the line, find lines through that point that are parallel and perpendicular to the given line, symbolically and graphically.

8.4: Data Analysis & Probability

8.4.1. Interpret data using scatterplots and approximate lines of best fit. Use lines of best fit to draw conclusions about data.

8.4.1.1. Collect, display and interpret data using scatterplots. Use the shape of the scatterplot to informally estimate a line of best fit and determine an equation for the line. Use appropriate titles, labels and units. Know how to use graphing technology to display scatterplots and corresponding lines of best fit.

8.4.1.2. Use a line of best fit to make statements about approximate rate of change and to make predictions about values not in the original data set.

8.4.1.3. Assess the reasonableness of predictions using scatterplots by interpreting them in the original context.

MINNESOTA Grades 9–11 Mathematics
Academic Standards

9.2: Algebra

9.2.1. Understand the concept of function, and identify important features of functions and other relations using symbolic and graphical methods where appropriate.

9.2.1.1. Understand the definition of a function. Use functional notation and evaluate a function at a given point in its domain.

9.2.1.2. Distinguish between functions and other relations defined symbolically, graphically or in tabular form.

9.2.1.3. Find the domain of a function defined symbolically, graphically or in a real-world context.

9.2.1.4. Obtain information and draw conclusions from graphs of functions and other relations.

9.2.1.5. Identify the vertex, line of symmetry and intercepts of the parabola corresponding to a quadratic function, using symbolic and graphical methods, when the function is expressed in the form $f(x) = ax^2 + bx + c$, in the form $f(x) = a(x - h)^2 + k$, or in factored form.

9.2.1.6. Identify intercepts, zeros, maxima, minima and intervals of increase and decrease from the graph of a function.

9.2.1.7. Understand the concept of an asymptote and identify asymptotes for exponential functions and reciprocals of linear functions, using symbolic and graphical methods.

9.2.1.8. Make qualitative statements about the rate of change of a function, based on its graph or table of values.

9.2.1.9. Determine how translations affect the symbolic and graphical forms of a function. Know how to use graphing technology to examine translations.

9.2.2. Recognize linear, quadratic, exponential and other common functions in real-world and mathematical situations; represent these functions with tables, verbal descriptions, symbols and graphs; solve problems involving these functions, and explain results in the original context.

9.2.2.1. Represent and solve problems in various contexts using linear and quadratic functions.

9.2.2.2. Represent and solve problems in various contexts using exponential functions, such as investment growth, depreciation and population growth.

9.2.2.3. Sketch graphs of linear, quadratic and exponential functions, and translate between graphs, tables and symbolic representations. Know how to use graphing technology to graph these functions.

9.2.2.4. Express the terms in a geometric sequence recursively and by giving an explicit (closed form) formula, and express the partial sums of a geometric series recursively.

9.2.2.5. Recognize and solve problems that can be modeled using finite geometric sequences and series, such as home mortgage and other compound interest examples. Know how to use spreadsheets and calculators to explore geometric sequences and series in various contexts.

9.2.2.6. Sketch the graphs of common non-linear functions such as $f(x) = \sqrt{x}$, $f(x) = |x|$, $f(x) = \frac{1}{x}$, $f(x) = x^3$, and translations of these functions, such as $f(x) = \sqrt{x - 2} + 4$. Know how to use graphing technology to graph these functions.

9.2.3. Generate equivalent algebraic expressions involving polynomials and radicals; use algebraic properties to evaluate expressions.

9.2.3.1. Evaluate polynomial and rational expressions and expressions containing radicals and absolute values at specified points in their domains.

9.2.3.2. Add, subtract and multiply polynomials; divide a polynomial by a polynomial of equal or lower degree.

9.2.3.3. Factor common monomial factors from polynomials, factor quadratic polynomials, and factor the difference of two squares.

9.2.3.4. Add, subtract, multiply, divide and simplify algebraic fractions.

9.2.3.5. Check whether a given complex number is a solution of a quadratic equation by substituting it for the variable and evaluating the expression, using arithmetic with complex numbers.

9.2.3.6. Apply the properties of positive and negative rational exponents to generate equivalent algebraic expressions, including those involving n th roots.

9.2.3.7. Justify steps in generating equivalent expressions by identifying the properties used. Use substitution to check the equality of expressions for some particular values of the variables; recognize that checking with substitution does not guarantee equality of expressions for all values of the variables.

9.2.4. Represent real-world and mathematical situations using equations and inequalities involving linear, quadratic, exponential and n th root functions. Solve equations and inequalities symbolically and graphically. Interpret solutions in the original context.

9.2.4.1. Represent relationships in various contexts using quadratic equations and inequalities. Solve quadratic equations and inequalities by appropriate methods including factoring, completing the square, graphing and the quadratic formula. Find non-real complex roots when they exist. Recognize that a particular solution may not be applicable in the original context. Know how to use calculators, graphing utilities or other technology to solve quadratic equations and inequalities.

9.2.4.2. Represent relationships in various contexts using equations involving exponential functions; solve these equations graphically or numerically. Know how to use calculators, graphing utilities or other technology to solve these equations.

9.2.4.3. Recognize that to solve certain equations, number systems need to be extended from whole numbers to integers, from integers to rational numbers, from rational numbers to real numbers, and from real numbers to complex numbers. In particular, non-real complex numbers

are needed to solve some quadratic equations with real coefficients.

9.2.4.4. Represent relationships in various contexts using systems of linear inequalities; solve them graphically. Indicate which parts of the boundary are included in and excluded from the solution set using solid and dotted lines.

9.2.4.5. Solve linear programming problems in two variables using graphical methods.

9.2.4.6. Represent relationships in various contexts using absolute value inequalities in two variables; solve them graphically.

9.2.4.7. Solve equations that contain radical expressions. Recognize that extraneous solutions may arise when using symbolic methods.

9.2.4.8. Assess the reasonableness of a solution in its given context and compare the solution to appropriate graphical or numerical estimates; interpret a solution in the original context.

9.3: Geometry & Measurement

9.3.1. Calculate measurements of plane and solid geometric figures; know that physical measurements depend on the choice of a unit and that they are approximations.

9.3.1.1. Determine the surface area and volume of pyramids, cones and spheres. Use measuring devices or formulas as appropriate.

9.3.1.2. Compose and decompose two- and three-dimensional figures; use decomposition to determine the perimeter, area, surface area and volume of various figures.

9.3.1.3. Understand that quantities associated with physical measurements must be assigned units; apply such units correctly in expressions, equations and problem solutions that involve measurements; and convert between measurement systems.

9.3.1.4. Understand and apply the fact that the effect of a scale factor k on length, area and volume is to multiply each by k , k^2 and k^3 , respectively.

9.3.1.5. Make reasonable estimates and judgments about the accuracy of values resulting from calculations involving measurements.

9.3.2. Construct logical arguments, based on axioms, definitions and theorems, to prove theorems and other results in geometry.

9.3.2.1. Understand the roles of axioms, definitions, undefined terms and theorems in logical arguments.

9.3.2.2. Accurately interpret and use words and phrases such as “if...then,” “if and only if,” “all,” and “not.” Recognize the logical relationships between an “if...then” statement and its inverse, converse and contrapositive.

9.3.2.3. Assess the validity of a logical argument and give counterexamples to disprove a statement.

9.3.2.4. Construct logical arguments and write proofs of theorems and other results in geometry, including proofs by contradiction. Express proofs in a form that clearly justifies the reasoning, such as two-column proofs, paragraph proofs, flow charts or illustrations.

9.3.2.5. Use technology tools to examine theorems, make and test conjectures, perform constructions and develop mathematical reasoning skills in multi-step problems. The tools may include compass and straight edge, dynamic geometry software, design software or Internet applets.

9.3.3. Know and apply properties of geometric figures to solve real-world and mathematical problems and to logically justify results in geometry.

9.3.3.1. Know and apply properties of parallel and perpendicular lines, including properties of angles formed by a transversal, to solve problems and logically justify results.

9.3.3.2. Know and apply properties of angles, including corresponding, exterior, interior, vertical, complementary and supplementary angles, to solve problems and logically justify results.

9.3.3.3. Know and apply properties of equilateral, isosceles and scalene triangles to solve problems and logically justify results.

9.3.3.4. Apply the Pythagorean Theorem and its converse to solve problems and logically justify results.

9.3.3.5. Know and apply properties of right triangles, including properties of 45-45-90 and 30-60-90 triangles, to solve problems and logically justify results.

9.3.3.6. Know and apply properties of congruent and similar figures to solve problems and logically justify results.

9.3.3.7. Use properties of polygons—including quadrilaterals and regular polygons—to define them, classify them, solve problems and logically justify results.

9.3.3.8. Know and apply properties of a circle to solve problems and logically justify results.

9.3.4. Solve real-world and mathematical geometric problems using algebraic methods.

9.3.4.1. Understand how the properties of similar right triangles allow the trigonometric ratios to be defined, and determine the sine, cosine and tangent of an acute angle in a right triangle.

9.3.4.2. Apply the trigonometric ratios sine, cosine and tangent to solve problems, such as determining lengths and areas in right triangles and in figures that can be decomposed into right triangles. Know how to use calculators, tables or other technology to evaluate trigonometric ratios.

9.3.4.3. Use calculators, tables or other technologies in connection with the trigonometric ratios to find angle measures in right triangles in various contexts.

9.3.4.4. Use coordinate geometry to represent and analyze line segments and polygons, including determining lengths, midpoints and slopes of line segments.

9.3.4.5. Know the equation for the graph of a circle with radius r and center (h,k) , $(x-h)^2 + (y-k)^2 = r^2$, and justify this equation using the Pythagorean Theorem and properties of translations.

9.3.4.6. Use numeric, graphic and symbolic representations of transformations in two dimensions, such as reflections, translations, scale changes and rotations about the origin

by multiples of 90° , to solve problems involving figures on a coordinate grid.

9.3.4.7. Use algebra to solve geometric problems unrelated to coordinate geometry, such as solving for an unknown length in a figure involving similar triangles, or using the Pythagorean Theorem to obtain a quadratic equation for a length in a geometric figure.

9.4: Data Analysis & Probability

9.4.1. Display and analyze data; use various measures associated with data to draw conclusions, identify trends and describe relationships.

9.4.1.1. Describe a data set using data displays, including box-and-whisker plots; describe and compare data sets using summary statistics, including measures of center, location and spread. Measures of center and location include mean, median, quartile and percentile. Measures of spread include standard deviation, range and inter-quartile range. Know how to use calculators, spreadsheets or other technology to display data and calculate summary statistics.

9.4.1.2. Analyze the effects on summary statistics of changes in data sets.

9.4.1.3. Use scatterplots to analyze patterns and describe relationships between two variables. Using technology, determine regression lines (line of best fit) and correlation coefficients; use regression lines to make predictions and correlation coefficients to assess the reliability of those predictions.

9.4.1.4. Use the mean and standard deviation of a data set to fit it to a normal distribution (bell-shaped curve) and to estimate population percentages. Recognize that there are data sets for which such a procedure is not appropriate. Use calculators, spreadsheets and tables to estimate areas under the normal curve.

9.4.2. Explain the uses of data and statistical thinking to draw inferences, make predictions and justify conclusions.

9.4.2.1. Evaluate reports based on data published in the media by identifying the source of the data, the design of the study, and the way the data are analyzed and displayed. Show how graphs and data can be distorted to support different points of view. Know how to use

spreadsheet tables and graphs or graphing technology to recognize and analyze distortions in data displays.

9.4.2.2. Identify and explain misleading uses of data; recognize when arguments based on data confuse correlation and causation.

9.4.2.3. Design simple experiments and explain the impact of sampling methods, bias and the phrasing of questions asked during data collection.

9.4.3. Calculate probabilities and apply probability concepts to solve real-world and mathematical problems.

9.4.3.1. Select and apply counting procedures, such as the multiplication and addition principles and tree diagrams, to determine the size of a sample space (the number of possible outcomes) and to calculate probabilities.

9.4.3.2. Calculate experimental probabilities by performing simulations or experiments involving a probability model and using relative frequencies of outcomes.

9.4.3.3. Understand that the Law of Large Numbers expresses a relationship between the probabilities in a probability model and the experimental probabilities found by performing simulations or experiments involving the model.

9.4.3.4. Use random numbers generated by a calculator or a spreadsheet, or taken from a table, to perform probability simulations and to introduce fairness into decision making.

9.4.3.5. Apply probability concepts such as intersections, unions and complements of events, and conditional probability and independence, to calculate probabilities and solve problems.

9.4.3.6. Describe the concepts of intersections, unions and complements using Venn diagrams. Understand the relationships between these concepts and the words AND, OR, NOT, as used in computerized searches and spreadsheets.

9.4.3.7. Understand and use simple probability formulas involving intersections, unions and complements of events.

9.4.3.8. Apply probability concepts to real-world situations to make informed decisions.

9.4.3.9. Use the relationship between conditional probabilities and relative frequencies in contingency tables.

Science

MINNESOTA Grade 8 Science Academic Standards

Strand 1: Nature of Science and Engineering

Substrand 1: The Practice of Science

Standard 1. Understandings about science

Science is a way of knowing about the natural world and is characterized by empirical criteria, logical argument and skeptical review.

8.1.1.1.1. Evaluate the reasoning in arguments in which fact and opinion are intermingled or when conclusions do not follow logically from the evidence given.

Standard 2. Scientific inquiry and investigation

Scientific inquiry uses multiple interrelated processes to investigate questions and propose explanations about the natural world.

8.1.1.2.1. Use logical reasoning and imagination to develop descriptions, explanations, predictions and models based on evidence.

Substrand 3: Interactions Among Science, Technology, Engineering, Mathematics and Society

Standard 2. Careers and contributions in science and engineering

Men and women throughout the history of all cultures, including Minnesota American Indian tribes and communities, have been involved in engineering design and scientific inquiry.

8.1.3.2.1. Describe examples of important contributions to the advancement of science, engineering and technology made by individuals representing different groups and cultures at different times in history.

Standard 3. Mutual influence of science, engineering and society

Science and engineering operate in the context of society and both influence and are influenced by this context.

8.1.3.3.1. Explain how scientific laws and engineering principles, as well as economic, political, social, and ethical expectations, must be taken into account in designing engineering solutions or conducting scientific investigations.

8.1.3.3.2. Understand that scientific knowledge is always changing as new technologies and information enhance observations and analysis of data.

8.1.3.3.3. Provide examples of how advances in technology have impacted the ways in which people live, work and interact.

Standard 4. The role of mathematics and technology in science and engineering

Current and emerging technologies have enabled humans to develop and use models to understand and communicate how natural and designed systems work and interact.

8.1.3.4.1. Use maps, satellite images and other data sets to describe patterns and make predictions about local and global systems in Earth science contexts.

8.1.3.4.2. Determine and use appropriate safety procedures, tools, measurements, graphs and mathematical analyses to describe and investigate natural and designed systems in Earth and physical science contexts.

Strand 2: Physical Science

Substrand 1: Matter

Standard 1. Properties and structure of matter

Pure substances can be identified by properties which are independent of the sample of the substance and the properties can be explained by a model of matter that is composed of small particles.

8.2.1.1.1. Distinguish between a mixture and a pure substance and use physical properties including color, solubility, density, melting point and boiling point to separate mixtures and identify pure substances.

8.2.1.1.2. Use physical properties to distinguish between metals and non-metals.

Standard 2. Changes in matter

Substances can undergo physical and chemical changes which may change the properties of the substance but do not change the total mass in a closed system.

8.2.1.2.1. Identify evidence of chemical changes, including color change, generation of a gas, solid formation and temperature change.

8.2.1.2.2. Distinguish between chemical and physical changes in matter.

8.2.1.2.3. Use the particle model of matter to explain how mass is conserved during physical and chemical changes in a closed system.

8.2.1.2.4. Recognize that acids are compounds whose properties include a sour taste, characteristic color changes with litmus and other acid/base indicators, and the tendency to react with bases to produce a salt and water.

Substrand 3: Energy

Standard 1. Kinds of energy

Waves involve the transfer of energy without the transfer of matter.

8.3.3.1.1. Explain how seismic waves transfer energy through the layers of the Earth and across its surface.

Strand 3: Earth and Space Science

Substrand 1: Earth Structure and Processes

Standard 1. Plate tectonics

The movement of tectonic plates results from interactions among the lithosphere, mantle and core.

8.3.1.1.1. Recognize that the Earth is composed of layers, and describe the properties of the layers, including the lithosphere, mantle and core.

8.3.1.1.2. Correlate the distribution of ocean trenches, mid-ocean ridges and mountain ranges to volcanic and seismic activity.

8.3.1.1.3. Recognize that major geological events, such as earthquakes, volcanic eruptions and mountain building, result from the slow movement of tectonic plates.

Standard 2. Earth's changing surface

Landforms are the result of the combination of constructive and destructive processes.

8.3.1.2.1. Explain how landforms result from the processes of crustal deformation, volcanic eruptions, weathering, erosion and deposition of sediment.

8.3.1.2.2. Explain the role of weathering, erosion and glacial activity in shaping Minnesota's current landscape.

Standard 3. Rock sequences and Earth history

Rocks and rock formations indicate evidence of the materials and conditions that produced them.

8.3.1.3.1. Interpret successive layers of sedimentary rocks and their fossils to infer relative ages of rock sequences, past geologic events, changes in environmental conditions, and the appearance and extinction of life forms.

8.3.1.3.2. Classify and identify rocks and minerals using characteristics including, but not limited to, density, hardness and streak for minerals; and texture and composition for rocks.

8.3.1.3.3. Relate rock composition and texture to physical conditions at the time of formation of igneous, sedimentary and metamorphic rock.

Substrand 2: Interdependence within the Earth System

Standard 1. Sources and transfer of energy

The sun is the principal external energy source for the Earth.

8.3.2.1.1. Explain how the combination of the Earth's tilted axis and revolution around the sun causes the progression of seasons.

8.3.2.1.2. Recognize that oceans have a major effect on global climate because water in the oceans holds a large amount of heat.

8.3.2.1.3. Explain how heating of the Earth's surface and atmosphere by the sun drives convection within the atmosphere and hydrosphere producing winds, ocean currents and the water cycle, as well as influencing global climate.

Standard 2. Weather and climate

Patterns of atmospheric movement influence global climate and local weather.

8.3.2.2.1. Describe how the composition and structure of the Earth's atmosphere affects energy absorption, climate, and the distribution of particulates and gases.

8.3.2.2.2. Analyze changes in wind direction, temperature, humidity and air pressure and relate them to fronts and pressure systems.

8.3.2.2.3. Relate global weather patterns to patterns in regional and local weather.

Standard 3. Materials cycles

Water, which covers the majority of the Earth's surface, circulates through the crust, oceans and atmosphere in what is known as the water cycle.

8.3.2.3.1. Describe the location, composition and use of major water reservoirs on the Earth, and the transfer of water among them.

8.3.2.3.2. Describe how the water cycle distributes materials and purifies water.

Substrand 3: The Universe

Standard 1. Solar system motion

The Earth is the third planet from the sun in a system that includes the moon, the sun, seven other planets and their moons, and smaller objects.

8.3.3.1.1. Recognize that the sun is a medium-sized star, one of billions of stars in the Milky Way galaxy, and the closest star to Earth.

8.3.3.1.2. Describe how gravity and inertia keep most objects in the solar system in regular and predictable motion.

8.3.3.1.3. Recognize that gravitational force exists between any two objects and describe how the masses of the objects and distance between them affect the force.

8.3.3.1.4. Compare and contrast the sizes, locations, and compositions of the planets and moons in our solar system.

8.3.3.1.5. Use the predictable motions of the Earth around its own axis and around the sun, and of the moon around the Earth, to explain day length, the phases of the moon, and eclipses.

Substrand 4: Human Interactions with Earth Systems

Standard 1. Interaction with the environment

In order to maintain and improve their existence, humans interact with and influence Earth systems.

8.3.4.1.1. Describe how mineral and fossil fuel resources have formed over millions of years, and explain why these resources are finite and non-renewable over human time frames.

8.3.4.1.2. Recognize that land and water use practices can affect natural processes and that natural processes interfere and interact with human systems.

MINNESOTA Grades 9–12 Science Academic Standards

Strand 1: Nature of Science and Engineering

Substrand 1: The Practice of Science

Standard 1. Understandings about science

Science is a way of knowing about the natural world and is characterized by empirical criteria, logical argument and skeptical review.

9.1.1.1.1. Explain the implications of the assumption that the rules of the universe are the same everywhere and these rules can be discovered by careful and systematic investigation.

9.1.1.1.2. Understand that scientists conduct investigations for a variety of reasons, including: to discover new aspects of the natural world, to explain observed phenomena, to test the conclusions of prior investigations, or to test the predictions of current theories.

9.1.1.1.3. Explain how the traditions and norms of science define the bounds of professional scientific practice and reveal instances of scientific error or misconduct.

9.1.1.1.4. Explain how societal and scientific ethics impact research practices.

9.1.1.1.5. Identify sources of bias and explain how bias might influence the direction of research and the interpretation of data.

9.1.1.1.6. Describe how changes in scientific knowledge generally occur in incremental steps that include and build on earlier knowledge.

9.1.1.1.7. Explain how scientific and technological innovations—as well as new evidence—can challenge portions of, or entire accepted theories and models including, but not limited to: cell theory, atomic theory, theory of evolution, plate tectonic theory, germ theory of disease, and the big bang theory.

Standard 2. Scientific inquiry and investigation

Scientific inquiry uses multiple interrelated processes to investigate and explain the natural world.

9.1.1.2.1. Formulate a testable hypothesis, design and conduct an experiment to test the hypothesis, analyze the data, consider alternative explanations and draw conclusions supported by evidence from the investigation.

9.1.1.2.2. Evaluate the explanations proposed by others by examining and comparing evidence, identifying faulty reasoning, pointing out statements that go beyond the scientifically acceptable evidence, and suggesting alternative scientific explanations.

9.1.1.2.3. Identify the critical assumptions and logic used in a line of reasoning to judge the validity of a claim.

9.1.1.2.4. Use primary sources or scientific writings to identify and explain how different types of questions and their associated methodologies are used by scientists for investigations in different disciplines.

Substrand 2: The Practice of Engineering

Standard 1. Understandings about engineering

Engineering is a way of addressing human needs by applying science concepts and mathematical techniques to develop new products, tools, processes and systems.

9.1.2.1.1. Understand that engineering designs and products are often continually checked and critiqued for alternatives, risks, costs and benefits, so that subsequent designs are refined and improved.

9.1.2.1.2. Recognize that risk analysis is used to determine the potential positive and negative consequences of using a new technology or design, including the evaluation of causes and effects of failures.

9.1.2.1.3. Explain and give examples of how, in the design of a device, engineers consider how it is to be manufactured, operated, maintained, replaced and disposed of.

Standard 2. Engineering design

Engineering design is an analytical and creative process of devising a solution to meet a need or solve a specific problem.

9.1.2.2.1. Identify a problem and the associated constraints on possible design solutions.

9.1.2.2.2. Develop possible solutions to an engineering problem and evaluate them using conceptual, physical and mathematical models to determine the extent to which the solutions meet the design specifications.

Substrand 3: Interactions Among Science, Technology, Engineering, Mathematics and Society

Standard 1. Systems

Natural and designed systems are made up of components that act within a system and interact with other systems.

9.1.3.1.1. Describe a system, including specifications of boundaries and subsystems, relationships to other systems, and identification of inputs and expected outputs.

9.1.3.1.2. Identify properties of a system that are different from those of its parts but appear because of the interaction of those parts.

9.1.3.1.3. Describe how positive and/or negative feedback occur in systems.

Standard 2. Careers and contributions in science and engineering

Men and women throughout the history of all cultures, including Minnesota American Indian tribes and communities, have been involved in engineering design and scientific inquiry.

9.1.3.2.1. Provide examples of how diverse cultures, including natives from all of the Americas, have contributed scientific and mathematical ideas and technological inventions.

9.1.3.2.2. Analyze possible careers in science and engineering in terms of education requirements, working practices and rewards.

Standard 3. Mutual influence of science, engineering and society

Science and engineering operate in the context of society and both influence and are influenced by this context.

9.1.3.3.1. Describe how values and constraints affect science and engineering.

9.1.3.3.2. Communicate, justify and defend the procedures and results of a scientific inquiry or engineering design project using verbal, graphic, quantitative, virtual or written means.

9.1.3.3.3. Describe how scientific investigations and engineering processes require multi-disciplinary contributions and efforts.

Standard 4. The role of mathematics and technology in science and engineering

Science, technology, engineering and mathematics rely on each other to enhance knowledge and understanding.

9.1.3.4.1. Describe how technological problems and advances often create a demand for new scientific knowledge, improved mathematics and new technologies.

9.1.3.4.2. Determine and use appropriate safety procedures, tools, computers and measurement instruments in science and engineering contexts.

9.1.3.4.3. Select and use appropriate numeric, symbolic, pictorial, or graphical representation to communicate scientific ideas, procedures and experimental results.

9.1.3.4.4. Relate the reliability of data to consistency of results, identify sources of error, and suggest ways to improve data collection and analysis.

9.1.3.4.5. Demonstrate how unit consistency and dimensional analysis can guide the calculation of quantitative solutions and verification of results.

9.1.3.4.6. Analyze the strengths and limitations of physical, conceptual, mathematical and computer models used by scientists and engineers.

Strand 2: Physical Science

Substrand 1: Matter

Standard 1. Properties and structure of matter

The structure of the atom determines chemical properties of elements.

9.2.1.1.1. Describe the relative charges, masses, and locations of the protons, neutrons, and electrons in an atom of an element.

9.2.1.1.2. Describe how experimental evidence led Dalton, Rutherford, Thompson, Chadwick and Bohr to develop increasingly accurate models of the atom.

9.2.1.1.3. Explain the arrangement of the elements on the Periodic Table, including the relationships among elements in a given column or row.

9.2.1.1.4. Explain that isotopes of an element have different numbers of neutrons and that some are unstable and emit particles and/or radiation.

Standard 2. Changes in matter

Chemical reactions involve the rearrangement of atoms as chemical bonds are broken and formed through transferring or sharing of electrons and the absorption or release of energy.

9.2.1.2.1. Describe the role of valence electrons in the formation of chemical bonds.

9.2.1.2.2. Explain how the rearrangement of atoms in a chemical reaction illustrates the law of conservation of mass.

9.2.1.2.3. Describe a chemical reaction using words and symbolic equations.

9.2.1.2.4. Relate exothermic and endothermic chemical reactions to temperature and energy changes.

Substrand 2: Motion

Standard 2. Forces

An object's mass and the forces on it affect the motion of an object.

9.2.2.2.1. Recognize that inertia is the property of an object that causes it to resist changes in motion.

9.2.2.2.2. Explain and calculate the acceleration of an object subjected to a set of forces in one dimension ($F = ma$).

9.2.2.2.3. Demonstrate that whenever one object exerts force on another, a force equal in magnitude and opposite in direction is exerted by the second object back on the first object.

9.2.2.2.4. Use Newton's universal law of gravitation to describe and calculate the attraction between massive objects based on the distance between them.

Substrand 3: Energy

Standard 2. Energy transformations

Energy can be transformed within a system or transferred to other systems or the environment, but is always conserved.

9.2.3.2.1. Identify the energy forms and explain the transfers of energy involved in the operation of common devices.

9.2.3.2.2. Calculate and explain the energy, work and power involved in energy transfers in a mechanical system.

9.2.3.2.3. Describe how energy is transferred through sound waves and how pitch and loudness are related to wave properties of frequency and amplitude.

9.2.3.2.4. Explain and calculate current, voltage and resistance, and describe energy transfers in simple electric circuits.

9.2.3.2.5. Describe how an electric current produces a magnetic force, and how this interaction is used in motors and electromagnets to produce mechanical energy.

9.2.3.2.6. Compare fission and fusion in terms of the reactants, the products and the conversion from matter into energy.

9.2.3.2.7. Describe the properties and uses of forms of electromagnetic radiation from radio frequencies through gamma radiation.

Substrand 4: Human Interactions with Physical Systems

Standard 1. Interaction with the environment

There are benefits, costs and risks to different means of generating and using energy.

9.2.4.1.1. Compare local and global environmental and economic advantages and disadvantages of generating electricity using various sources or energy.

9.2.4.1.2. Describe the trade-offs involved when technological developments impact the way we use energy, natural resources, or synthetic materials.

Strand 3: Earth and Space Science

Substrand 1: Earth Structure and Processes

Standard 1. Plate tectonics

The relationships among earthquakes, mountains, volcanoes, fossil deposits, rock layers and ocean features provide evidence for the theory of plate tectonics.

9.3.1.1.1. Compare and contrast the interaction of tectonic plates at convergent and divergent boundaries.

9.3.1.1.2. Use modern earthquake data to explain how seismic activity is evidence for the process of subduction.

9.3.1.1.3. Describe how the pattern of magnetic reversals and rock ages on both sides of a mid-ocean ridge provides evidence of sea-floor spreading.

9.3.1.1.4. Explain how the rock record provides evidence for plate movement.

9.3.1.1.5. Describe how experimental and observational evidence led to the theory of plate tectonics.

Standard 3. Rock sequences and Earth history

By observing rock sequences and using fossils to correlate the sequences at various locations, geologic events can be inferred and geologic time can be estimated.

9.3.1.3.1. Use relative dating techniques to explain how the structures of the Earth and life on Earth have changed over short and long periods of time.

9.3.1.3.2. Cite evidence from the rock record for changes in the composition of the global atmosphere as life evolved on Earth.

Substrand 2: Interdependence within the Earth System

Standard 1. Sources and transfer of energy

The Earth system has internal and external sources of energy, which produce heat and drive the motion of material in the oceans, atmosphere and solid earth.

9.3.2.1.1. Compare and contrast the energy sources of the Earth, including the sun, the decay of radioactive isotopes and gravitational energy.

9.3.2.1.2. Explain how the outward transfer of Earth's internal heat drives the convection circulation in the mantle to move tectonic plates.

Standard 2. Weather and climate

Global climate is determined by distribution of energy from the sun at the Earth's surface.

9.3.2.2.1. Explain how Earth's rotation, ocean currents, configuration of mountain ranges, and composition of the atmosphere influence the absorption and distribution of energy, which contributes to global climatic patterns.

9.3.2.2.2. Explain how evidence from the geologic record, including ice core samples, indicates that climate changes have occurred at varying rates over geologic time and continue to occur today.

Standard 3. Materials cycles

The cycling of materials through different reservoirs of the Earth's system is powered by the Earth's sources of energy.

9.3.2.3.1. Trace the cyclical movement of carbon, oxygen and nitrogen through the lithosphere, hydrosphere, atmosphere and biosphere.

Substrand 3: The Universe

Standard 2. Formation of the solar system

The solar system, sun, and Earth formed over billions of years.

9.3.3.2.1. Describe how the solar system formed from a nebular cloud of dust and gas 4.6 billion years ago.

9.3.3.2.2. Explain how the Earth evolved into its present habitable form through interactions among the solid earth, the oceans, the atmosphere and organisms.

9.3.3.2.3. Compare and contrast the environmental conditions that make life possible on Earth with conditions found on the other planets and moons of our solar system.

Standard 3. Age, scale and origin of the universe

The big bang theory states that the universe expanded from a hot, dense chaotic mass, after which chemical elements formed and clumped together to eventually form stars and galaxies.

9.3.3.3.1. Explain how evidence, including the Doppler shift of light from distant stars and cosmic background radiation, is used to understand the composition, early history and expansion of the universe.

9.3.3.3.2. Explain how gravitational clumping leads to nuclear fusion, producing energy and the chemical elements of a star.

Substrand 4: Human Interactions with Earth Systems

Standard 1. Interaction with the environment

People consider potential benefits, costs and risks to make decisions on how they interact with natural systems.

9.3.4.1.1. Analyze the benefits, costs, risks and tradeoffs associated with natural hazards, including the selection of land use and engineering mitigation.

9.3.4.1.2. Explain how human activity and natural processes are altering the hydrosphere, biosphere, lithosphere and atmosphere, including pollution, topography and climate.

Strand 4: Life Science

Substrand 1: Structure and Function in Living Systems

Standard 1. Levels of organization

Organisms use the interaction of cellular processes as well as tissues and organ systems to maintain homeostasis.

9.4.1.1.1. Explain how cell processes are influenced by internal and external factors, such as pH and temperature, and how cells and organisms respond to changes in their environment to maintain homeostasis.

9.4.1.1.2. Describe how the functions of individual organ systems are integrated to maintain homeostasis in an organism.

Standard 2. Cells

Cells and cell structures have specific functions that allow an organism to grow, survive and reproduce.

9.4.1.2.1. Recognize that cells are composed primarily of a few elements (carbon, hydrogen, oxygen, nitrogen, phosphorus, and sulfur), and describe the basic molecular structures and the primary functions of carbohydrates, lipids, proteins and nucleic acids.

9.4.1.2.2. Recognize that the work of the cell is carried out primarily by proteins, most of which are enzymes, and that protein function depends on the amino acid sequence and the shape it takes as a consequence of the interactions between those amino acids.

9.4.1.2.3. Describe how viruses, prokaryotic cells and eukaryotic cells differ in relative size, complexity and general structure.

9.4.1.2.4. Explain the function and importance of cell organelles for prokaryotic and/or eukaryotic cells as related to the basic cell processes of respiration, photosynthesis, protein synthesis and cell reproduction.

9.4.1.2.5. Compare and contrast passive transport (including osmosis and facilitated transport) with active transport, such as endocytosis and exocytosis.

9.4.1.2.6. Explain the process of mitosis in the formation of identical new cells and maintaining chromosome number during asexual reproduction.

Substrand 2: Interdependence Among Living Systems

Standard 1. Ecosystems

The interrelationship and interdependence of organisms generate dynamic biological communities in ecosystems.

9.4.2.1.1. Describe factors that affect the carrying capacity of an ecosystem and relate these to population growth.

9.4.2.1.2. Explain how ecosystems can change as a result of the introduction of one or more new species.

Standard 2. Flow of energy and matter

Matter cycles and energy flows through different levels of organization of living systems and the physical environment, as chemical elements are combined in different ways.

9.4.2.2.1. Use words and equations to differentiate between the processes of photosynthesis and respiration in terms of energy flow, beginning reactants and end products.

9.4.2.2.2. Explain how matter and energy is transformed and transferred among organisms in an ecosystem, and how energy is dissipated as heat into the environment.

Substrand 3: Evolution in Living Systems

Standard 1. Reproduction

Genetic information found in the cell provides information for assembling proteins, which dictate the expression of traits in an individual.

9.4.3.1.1. Explain the relationships among DNA, genes and chromosomes.

9.4.3.1.2. In the context of a monohybrid cross, apply the terms phenotype, genotype, allele, homozygous and heterozygous.

9.4.3.1.3. Describe the process of DNA replication and the role of DNA and RNA in assembling protein molecules.

Standard 2. Variation

Variation within a species is the natural result of new inheritable characteristics occurring from new combinations of existing genes or from mutations of genes in reproductive cells.

9.4.3.2.1. Use concepts from Mendel's laws of segregation and independent assortment to explain how sorting and recombination (crossing over) of genes during sexual reproduction (meiosis) increases the occurrence of variation in a species.

9.4.3.2.2. Use the processes of mitosis and meiosis to explain the advantages and disadvantages of asexual and sexual reproduction.

9.4.3.2.3. Explain how mutations like deletions, insertions, rearrangements or substitutions of DNA segments in gametes may have no effect, may harm, or rarely may be beneficial, and can result in genetic variation within a species.

Standard 3. Biological evolution

Evolution by natural selection is a scientific explanation for the history and diversity of life on Earth.

9.4.3.3.1. Describe how evidence led Darwin to develop the theory of natural selection and common descent to explain evolution.

9.4.3.3.2. Use scientific evidence, including the fossil record, homologous structures, and genetic and/or biochemical similarities, to show evolutionary relationships among species.

9.4.3.3.3. Recognize that artificial selection has led to offspring through successive generations that can be very different in appearance and behavior from their distant ancestors.

9.4.3.3.4. Explain why genetic variation within a population is essential for evolution to occur.

9.4.3.3.5. Explain how competition for finite resources and the changing environment promotes natural selection on offspring survival, depending on whether the offspring have characteristics that are advantageous or disadvantageous in the new environment.

9.4.3.3.6. Explain how genetic variation between two populations of a given species is due, in part, to different selective pressures acting independently on each population and how, over time, these differences can lead to the development of new species.

Substrand 4: Human Interactions with Living Systems

Standard 1. Interaction with the environment

Human activity has consequences on living organisms and ecosystems.

9.4.4.1.1. Describe the social, economic and ecological risks and benefits of biotechnology in agriculture and medicine.

9.4.4.1.2. Describe the social, economic and ecological risks and benefits of changing a natural ecosystem as a result of human activity.

9.4.4.1.3. Describe contributions from diverse cultures, including Minnesota American Indian tribes and communities, to the understanding of interactions among humans and living systems.

Standard 2. Health and disease

Personal and community health can be affected by the environment, body functions and human behavior.

9.4.4.2.1. Describe how some diseases can sometimes be predicted by genetic testing and how this affects parental and community decisions.

9.4.4.2.2. Explain how the body produces antibodies to fight disease and how vaccines assist this process.

9.4.4.2.3. Describe how the immune system sometimes attacks some of the body's own cells and how some allergic reactions are caused by the body's immune responses to usually harmless environmental substances.

9.4.4.2.4. Explain how environmental factors and personal decisions, such as water quality, air quality and smoking affect personal and community health.

9.4.4.2.5. Recognize that a gene mutation in a cell can result in uncontrolled cell division called cancer, and how exposure of cells to certain chemicals and radiation increases mutations and thus increases the chance of cancer.

MINNESOTA High School Chemistry

Academic Standards

Strand 1: Nature of Science and Engineering

Substrand 3: Interactions Among Science, Technology, Engineering, Mathematics and Society

Standard 3.

Developments in chemistry affect society and societal concerns affect the field of chemistry.

9C.1.3.3.1. Explain the political, societal, economic and environmental impact of chemical products and technologies.

Standard 4.

Physical and mathematical models are used to describe physical systems.

9C.1.3.4.1. Use significant figures and an understanding of accuracy and precision in scientific measurements to determine and express the uncertainty of a result.

Strand 2: Physical Science

Substrand 1: Matter

Standard 1.

The periodic table illustrates how patterns in the physical and chemical properties of elements are related to atomic structure.

9C.2.1.1.1. Explain the relationship of an element's position on the periodic table to its atomic number and electron configuration.

9C.2.1.1.2. Identify and compare trends on the periodic table, including reactivity and relative sizes of atoms and ions; use the trends to explain the properties of subgroups, including metals, nonmetals, alkali metals, alkaline earth metals, halogens and noble gases.

Standard 2.

Chemical and physical properties of matter result from the ability of atoms to form bonds.

9C.2.1.2.1. Explain how elements combine to form compounds through ionic and covalent bonding.

9C.2.1.2.2. Compare and contrast the structure, properties and uses of organic compounds, such as hydrocarbons, alcohols, sugars, fats and proteins.

9C.2.1.2.3. Use IUPAC (International Union of Pure and Applied Chemistry) nomenclature to write chemical formulas and name molecular and ionic compounds, including those that contain polyatomic ions.

9C.2.1.2.4. Determine the molar mass of a compound from its chemical formula and a table of atomic masses; convert

the mass of a molecular substance to moles, number of particles, or volume of gas at standard temperature and pressure.

9C.2.1.2.5. Determine percent composition, empirical formulas and molecular formulas of simple compounds.

9C.2.1.2.6. Describe the dynamic process by which solutes dissolve in solvents, and calculate concentrations, including percent concentration, molarity and parts per million.

9C.2.1.2.7. Explain the role of solubility of solids, liquids and gases in natural and designed systems.

Standard 3.

Chemical reactions describe a chemical change in which one or more reactants are transformed into one or more products.

9C.2.1.3.1. Classify chemical reactions as double replacement, single replacement, synthesis, decomposition or combustion.

9C.2.1.3.2. Use solubility and activity of ions to determine whether a double replacement or single replacement reaction will occur.

9C.2.1.3.3. Relate the properties of acids and bases to the ions they contain and predict the products of an acid-base reaction.

9C.2.1.3.4. Balance chemical equations by applying the laws of conservation of mass and constant composition.

9C.2.1.3.5. Use the law of conservation of mass to describe and calculate relationships in a chemical reaction, including molarity, mole/mass relationships, mass/volume relations, limiting reactants and percent yield.

9C.2.1.3.6. Describe the factors that affect the rate of a chemical reaction, including temperature, pressure, mixing, concentration, particle size, surface area and catalyst.

9C.2.1.3.7. Recognize that some chemical reactions are reversible and that not all chemical reactions go to completion.

Standard 4.

States of matter can be described in terms of motion of molecules and the properties and behavior of gases can be explained using the kinetic molecular theory.

9C.2.1.4.1. Use kinetic molecular theory to explain how changes in energy content affect the state of matter (solid, liquid and gaseous phases).

9C.2.1.4.2. Use the kinetic molecular theory to explain the behavior of gases and the relationship among temperature, pressure, volume and the number of particles.

MINNESOTA High School Physics

Academic Standards

Strand 1: Nature of Science and Engineering

Substrand 3: Interactions Among Science, Technology, Engineering, Mathematics and Society

Standard 3.

Developments in physics affect society and societal concerns affect the field of physics.

9P.1.3.3.1. Describe changes in society that have resulted from significant discoveries and advances in technology in physics.

Standard 4.

Physical and mathematical models are used to describe physical systems.

9P.1.3.4.1. Use significant figures and an understanding of accuracy and precision in scientific measurements to determine and express the uncertainty of a result.

Strand 2: Physical Science

Substrand 2: Motion

Standard 1.

Forces and inertia determine the motion of objects.

9P.2.2.1.1. Use vectors and free-body diagrams to describe force, position, velocity and acceleration of objects in two-dimensional space.

9P.2.2.1.2. Apply Newton's three laws of motion to calculate and analyze the effect of forces and momentum on motion.

9P.2.2.1.3. Use gravitational force to explain the motion of objects near Earth and in the universe.

Standard 2.

When objects change their motion or interact with other objects in the absence of frictional forces, the total amount of mechanical energy remains constant.

9P.2.2.2.1. Explain and calculate the work, power, potential energy and kinetic energy involved in objects moving under the influence of gravity and other mechanical forces.

9P.2.2.2.2. Describe and calculate the change in velocity for objects when forces are applied perpendicular to the direction of motion.

9P.2.2.2.3. Use conservation of momentum and conservation of energy to analyze an elastic collision of two solid objects in one-dimensional motion.

Substrand 3: Energy

Standard 1.

Sound waves are generated from mechanical oscillations of objects and travel through a medium.

9P.2.3.1.1. Analyze the frequency, period and amplitude of an oscillatory system.

9P.2.3.1.2. Describe how vibration of physical objects sets up transverse and/or longitudinal waves in gases, liquids and solid materials.

9P.2.3.1.3. Explain how interference, resonance, refraction and reflection affect sound waves.

9P.2.3.1.4. Describe the Doppler effect changes that occur in an observed sound as a result of the motion of a source of the sound relative to a receiver.

Standard 2.

Electrons respond to electric fields and voltages by moving through electrical circuits and this motion generates magnetic fields.

9P.2.3.2.1. Explain why currents flow when free charges are placed in an electric field, and how that forms the basis for electric circuits.

9P.2.3.2.2. Explain and calculate the relationship of current, voltage, resistance and power in series and parallel circuits.

9P.2.3.2.3. Describe how moving electric charges produce magnetic forces and moving magnets produce electric forces.

9P.2.3.2.4. Use the interplay of electric and magnetic forces to explain how motors, generators, and transformers work.

Standard 3.

Magnetic and electric fields interact to produce electromagnetic waves.

9P.2.3.3.1. Describe the nature of the magnetic and electric fields in a propagating electromagnetic wave.

9P.2.3.3.2. Explain and calculate how the speed of light and its wavelength change when the medium changes.

9P.2.3.3.3. Explain the refraction and/or total internal reflection of light in transparent media, such as lenses and optical fibers.

9P.2.3.3.4. Use properties of light, including reflection, refraction, interference, Doppler effect and the photoelectric effect, to explain phenomena and describe applications.

9P.2.3.3.5. Compare the wave model and particle model in explaining properties of light.

9P.2.3.3.6. Compare the wavelength, frequency and energy of waves in different regions of the electromagnetic spectrum and describe their applications.

Standard 4.

Heat energy is transferred between objects or regions that are at different temperatures by the processes of convection, conduction and radiation.

9P.2.3.4.1. Describe and calculate the quantity of heat transferred between solids and/or liquids, using specific heat, mass and change in temperature.

9P.2.3.4.2. Explain the role of gravity, pressure and density in the convection of heat by a fluid.

9P.2.3.4.3. Compare the rate at which objects at different temperatures will transfer thermal energy by electromagnetic radiation.

Section C: ACT's College Readiness Standards Included in Minnesota's Grade 8–12 Academic 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 Minnesota Academic Standards as they relate to ACT's College Readiness Standards. The ACT College Readiness Standards included in the Minnesota Academic 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 Minnesota Academic 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

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 EXPL: 13 PLAN: 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 ACT: 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>

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

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

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>

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

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

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 liquids 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

= Included in Minnesota Reading Standards ONLY
 = Included in Minnesota Science Standards