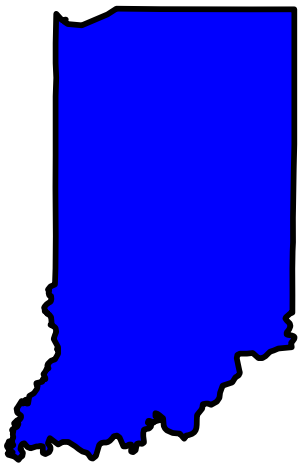

STATE MATCH

Indiana Academic Standards

English/Language Arts, Mathematics, Science, and Social Studies
Grades 8–12

and

ACT®

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

May 2007

About This Report

EXECUTIVE SUMMARY

(pp. 1–3)

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

SECTION A

(pp. 5–10)

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

SECTION B

(pp. 11–73)

All Indiana Academic Standards are listed here; each one highlighted is measured by ACT's EPAS tests and/or WorkKeys assessments. Indiana standards listed here are from the Indiana Academic Standards as presented on the Indiana Department of Education's website in April 2006. Underlined science content indicates that the content topics are included in, but not directly measured by, ACT's EPAS Science Tests.

SECTION C

(pp. 75–84)

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

SECTION D

(pp. 85–86)

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

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

ACT

Executive Summary

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

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

ACT'S TESTS MEASURE MANY IMPORTANT INDIANA ACADEMIC STANDARDS IN ENGLISH/LANGUAGE ARTS, MATHEMATICS, AND SCIENCE.

1. Match Results: Comparisons conducted by our content specialists show that ACT's Reading, English, Writing, Mathematics and Science tests and WorkKeys Reading for Information and Applied Mathematics measure many of Indiana's English/Language Arts, Mathematics, and Science Academic Standards. WorkKeys Locating Information measures some skills listed in three of Indiana's Social Studies courses (Objective match totals appear in Section A):

- English/Language Arts: 6 out of 7 Standards

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

- Mathematics: 69 out of 71 Standards

  Almost all of Indiana's Mathematics Standards are covered by ACT's Mathematics tests and WorkKeys Applied Mathematics assessment.

- Science: *Process* Standards: 3 out of 3
  (*Content* Standards: 5 out of 5)

  All of Indiana's Science standards are covered by ACT's Science tests and WorkKeys Locating Information assessment.

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

ACT

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™**

- Social Studies: 52 out of 242 Objectives

  Some of Indiana's Social Studies Standards from three social studies courses are covered by ACT's WorkKeys Locating Information assessment.

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

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

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

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

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

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

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

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

  Using thousands of student records and responses, content and measurement experts worked backwards to develop data-driven, empirically derived statements of what students typically know and are able to do in various score ranges on ACT's English, Reading, Writing, Mathematics, and Science

ACT

tests. These statements provide specific details about students' college readiness and can be used to identify next steps for improvement.

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

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

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

Section A: Number of Indiana Academic Standards Measured by EXPLORE, PLAN, the ACT, and WorkKeys

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

	Indiana Standards*	Number of Indiana Objectives within Each Standard Measured by ACT's tests	Aspects of Not-Measured Indiana Standards
Reading	1. Word Recognition, Fluency, and Vocabulary Development	8th: 2 out of 3 9th: 2 out of 3 10th: 3 out of 3 11th: 2 out of 3 12th: 2 out of 3	Use knowledge or Greek, Latin, Anglo-Saxon roots and word parts Understand historical events' influences on English Trace history of significant terms used in political science
	2. Comprehension	8th: 2 out of 6 9th: 1 out of 7 10th: 2 out of 4 11th: 4 out of 6 12th: 4 out of 6	Analyze differences of categories of informational materials Locate information Explain the use of simple mechanical device Contrast features of consumer materials Demonstrate use of technology Critique power of arguments
	3. Literary Response and Analysis	8th: 3 out of 7 9th: 6 out of 12 10th: 6 out of 12 11th: 2 out of 8 12th: 2 out of 9	Discuss purposes/characteristics Contrast first person, third person, omniscient points of view Compare reviews Articulate purposes of different forms of poetry Explain different forms of dramatic literature Evaluate philosophical arguments
Writing	4. Process	8th: 5 out of 9 9th: 5 out of 12 10th: 4 out of 12 11th: 7 out of 12 12th: 6 out of 12	Discuss ideas for writing Use note-taking, outlining Identify topics Use bibliography Use a computer Synthesize information
	5. Applications	8th: 2 out of 7 9th: 1 out of 8 10th: 1 out of 8 11th: 1 out of 8 12th: 1 out of 8	Write narratives, responses, reports, summaries, technical documents Use expanded vocabulary Write job applications Deliver multimedia presentations
	6. English Language Conventions	8th: 4 out of 7 9th: 2 out of 4 10th: 2 out of 4 11th: 2 out of 3 12th: 2 out of 3	Identify all parts of speech Present a lively style Apply appropriate manuscript conventions
Listening And Speaking	7. Skills, Strategies, and Applications	8th: 0 out of 14 9th: 0 out of 19 10th: 0 out of 19 11th: 0 out of 20 12th: 0 out of 20	Ask questions Use speaking techniques Deliver speeches Recite poems

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Table A-1. Number of Indiana English/Language Arts Academic Standards Measured by EXPLORE, PLAN, the ACT, and WorkKeys		
Indiana Standards*	**Number of Indiana Objectives within Each Standard Measured by ACT's tests**	**Aspects of Not-Measured Indiana Standards**
TOTALS 6 out of 7 Standards	8th: 18 out of 53 9th: 17 out of 65 10th: 18 out of 62 11th: 18 out of 60 12th: 17 out of 61	

*Refer to Indiana's English/Language Arts Academic Standards on pages 11–29.

Table A-2. Number of Indiana Mathematics Academic Standards Measured by EXPLORE, PLAN, the ACT, and WorkKeys			
Indiana Standards*		Number of Indiana Standards and Objectives Measured by ACT's tests	Aspects of Not-Measured Indiana Standards
Grade 8		Stds: 7 out of 7 Objs: 41 out of 50	Describe and justify simple constructions
Algebra I		Stds: 9 out of 9 Objs: 47 out of 54	Derive the quadratic formula by completing the square
Algebra II		Stds: 10 out of 10 Objs: 48 out of 54	Prove simple laws of logarithms
Geometry		Stds: 8 out of 8 Objs: 46 out of 53	Construct congruent segments and angles, angle bisectors, and parallel lines using a straight edge and compass
Integrated Mathematics I		Stds: 7 out of 7 Objs: 51 out of 81	Construct a scatterplot Construct a histogram
Integrated Mathematics II		Stds: 6 out of 7 Objs: 35 out of 53	Prove theorems related to circles
Integrated Mathematics III		Stds: 7 out of 7 Objs: 73 out of 87	Derive the quadratic formula by completing the square
PreCalculus		Stds: 8 out of 9 Objs: 43 out of 54	State, prove, and use DeMoivre's Theorem
TOTALS	**Grade 8**	Stds: 7 out of 7 Objs: 41 out of 50	
	High School	Stds: 55 out of 57 Objs: 341 out of 436	

*Refer to Indiana's Mathematics Academic Standards on pages 30–45.

Table A-3. Number of Indiana Science Academic Standards Measured by EXPLORE, PLAN, and the ACT		
Indiana Standards*	**Number of Indiana Objectives within Each Standard Measured by ACT's tests**	**Aspects of Not-Measured Indiana Standards**
2. Scientific Thinking	8th: 6 out of 10	Decide what degree of precision is adequate Estimate probabilities of outcomes Use technological devices to perform calculations
5. The Mathematical World	8th: 5 out of 10	Demonstrate extension of number line Illustrate how lines are helpful Describe a sample
7. Common Themes	8th: 1 out of 7	Use different models to represent same thing Explain systems Use technology Recognize how symmetry determines properties of objects
TOTALS 3 out of 3 Standards	8th: 12 out of 27	**Science Process Standards**
1. Nature of Science and Technology	8th: (1) out of (8)	Explain how expectation affects observation Provide examples of people who overcame bias Explain drawbacks, benefits, influences of technology Explain importance of accurate record keeping Explain why using human subjects requires subjects be fully informed Identify constraints taken into account on new design Explain complexity of technical issues Explain that humans help shape the future
3. The Physical Setting	8th: (20) out of (20)	
4. The Living Environment	8th: (9) out of (9)	
5. Principles	ES: (29) out of (29) B1: (47) out of (47) C1: (45) out of (45) CP: (31) out of (31) ENV: (34) out of (35) P1: (35) out of (35)	Recognize environmental legislation such as the Clean Air Act.

Table A-3. Number of Indiana Science Academic Standards Measured by EXPLORE, PLAN, and the ACT		
Indiana Standards*	**Number of Indiana Objectives within Each Standard Measured by ACT's tests**	**Aspects of Not-Measured Indiana Standards**
6. Historical Perspectives	8th: (4) out of (4) ES: (7) out of (7) B1: (4) out of (4) C1: (6) out of (7) CP: (11) out of (12) ENV: (2) out of (2) P1: (10) out of (10)	Explain that people create explanations for disease Describe how Lavoisier's naming system contributed to growth of chemistry
TOTALS 5 out of 5 Standards	8th: (34) out of (41) ES: (36) out of (36) B1: (51) out of (51) C1: (51) out of (52) CP: (42) out of (43) ENV: (36) out of (37) P1: (45) out of (45)	**Science Content Standards**

*Refer to Indiana's Science Academic Standards on pages 46–61.

Table A-4. Number of Indiana Social Studies Academic Standards Measured by WorkKeys Locating Information				
Indiana Courses*	Number of Indiana Objectives Measured by WorkKeys			Aspects of Not-Measured Indiana Standards
United States History	17	out of	78	
World Geography	18	out of	66	
World History and Civilization	17	out of	98	
TOTALS	52	out of	242	

*Refer to Indiana's Social Studies Academic Standards on pages 62–73.

English/Language Arts

INDIANA Grade 8 Reading
Academic Standards

Standard 1: Word Recognition, Fluency, and Vocabulary Development

Vocabulary and Concept Development

8.1.1. Analyze idioms and comparisons — such as analogies, metaphors, and similes — to infer the literal and figurative meanings of phrases.

8.1.2. Understand the influence of historical events on English word meaning and vocabulary expansion.

8.1.3. Verify the meaning of a word in its context, even when its meaning is not directly stated, through the use of definition, restatement, example, comparison, or contrast.

Standard 2: Comprehension

Structural Features of Informational and Technical Materials

8.2.1. Compare and contrast the features and elements of consumer materials to gain meaning from documents.

8.2.2. Analyze text that uses proposition (statement of argument) and support patterns.

Comprehension and Analysis of Grade-Level-Appropriate Text

8.2.3. Find similarities and differences between texts in the treatment, amount of coverage, or organization of ideas.

8.2.4. Compare the original text to a summary to determine whether the summary accurately describes the main ideas, includes important details, and conveys the underlying meaning.

8.2.5. Use information from a variety of consumer and public documents to explain a situation or decision and to solve a problem.

Expository (Informational) Critique

8.2.6. Evaluate the logic, internal consistency, and structural patterns of text.

Standard 3: Literary Response and Analysis

Structural Features of Literature

8.3.1. Determine and articulate the relationship between the purposes and characteristics of different forms of poetry (including ballads, lyrics, couplets, epics, elegies, odes, and sonnets).

Narrative Analysis of Grade-Level-Appropriate Text

8.3.2. Evaluate the structural elements of the plot, such as subplots, parallel episodes, and climax; the plot's development; and the way in which conflicts are (or are not) addressed and resolved.

8.3.3. Compare and contrast the motivations and reactions of literary characters from different historical eras confronting either similar situations and conflicts or similar hypothetical situations.

8.3.4. Analyze the importance of the setting to the mood, tone, and meaning of the text.

8.3.5. Identify and analyze recurring themes (such as good versus evil) that appear frequently across traditional and contemporary works.

8.3.6. Identify significant literary devices, such as metaphor, symbolism, dialect or quotations, and irony, which define a writer's style and use those elements to interpret the work.

Literary Criticism

8.3.7. Analyze a work of literature, showing how it reflects the heritage, traditions, attitudes, and beliefs of its author.

INDIANA Grade 8 Writing
Academic Standards

Standard 4: Process

Organization and Focus

8.4.1. Discuss ideas for writing, keep a list or notebook of ideas, and use graphic organizers to plan writing.

8.4.2. Create compositions that have a clear message, a coherent thesis (a statement of position on the topic), and end with a clear and well-supported conclusion.

8.4.3. Support theses or conclusions with analogies (comparisons), paraphrases, quotations, opinions from experts, and similar devices.

Research and Technology

8.4.4. Plan and conduct multiple-step information searches using computer networks.

8.4.5. Achieve an effective balance between researched information and original ideas.

8.4.6. Use a computer to create documents by using word-processing skills and publishing programs; develop simple databases and spreadsheets to manage information and prepare reports.

Evaluation and Revision

8.4.7. Review, evaluate, and revise writing for meaning and clarity.

8.4.8. Edit and proofread one's own writing, as well as that of others, using an editing checklist or set of rules, with specific examples of corrections of frequent errors.

8.4.9. Revise writing for word choice; appropriate organization; consistent point of view; and transitions among paragraphs, passages, and ideas.

Standard 5: Applications

8.5.1. Write biographies, autobiographies, and short stories that:

- tell about an incident, event, or situation, using well-chosen details.
- reveal the significance of, or the writer's attitude about, the subject.
- use narrative and descriptive strategies, including relevant dialogue, specific action, physical description, background description, and comparison or contrast of characters.

8.5.2. Write responses to literature that:

- demonstrate careful reading and insight into interpretations.
- connect response to the writer's techniques and to specific textual references.
- make supported inferences about the effects of a literary work on its audience.
- support judgments through references to the text, other works, other authors, or to personal knowledge.

8.5.3. Write research reports that:

- define a thesis (a statement of position on the topic).
- include important ideas, concepts, and direct quotations from significant information sources, including print reference materials and the Internet, and paraphrase and summarize all perspectives on the topic, as appropriate.
- use a variety of primary and secondary sources and distinguish the nature and value of each.
- organize and display information on charts, tables, maps, and graphs.
- document sources with reference notes and a bibliography.

8.5.4. Write persuasive compositions that:

- include a well-defined thesis that makes a clear and knowledgeable appeal.
- present detailed evidence, examples, and reasoning to support effective arguments and emotional appeals.
- provide details, reasons, and examples, arranging them effectively by anticipating and answering reader concerns and counterarguments.

8.5.5. Write technical documents that:

- identify the sequence of activities needed to design a system, operate a tool, or explain the bylaws of an organization's constitution or guidelines.
- include all the factors and variables that need to be considered.
- use formatting techniques, including headings and changing the fonts (typeface) to aid comprehension.

8.5.6. Write using precise word choices to make writing interesting and exact.

8.5.7. Write for different purposes and to a specific audience or person, adjusting tone and style as necessary.

Standard 6: English Language Conventions

Sentence Structure

8.6.1. Use correct and varied sentence types (simple, compound, complex, and compound-complex) and sentence openings to present a lively and effective personal style.

8.6.2. Identify and use parallelism (use consistent elements of grammar when compiling a list) in all writing to present items in a series and items juxtaposed for emphasis.

8.6.3. Use subordination, coordination, noun phrases that function as adjectives (*These gestures — acts of friendship — were noticed but not appreciated*.), and other devices to indicate clearly the relationship between ideas.

Grammar

8.6.4. Edit written manuscripts to ensure that correct grammar is used.

Punctuation

8.6.5. Use correct punctuation.

Capitalization

8.6.6. Use correct capitalization.

Spelling

8.6.7. Use correct spelling conventions.

INDIANA Grade 8 Listening And Speaking
Academic Standards

Standard 7: Skills, Strategies, and Applications

Comprehension

8.7.1. Paraphrase (restate) a speaker's purpose and point of view and ask questions concerning the speaker's content, delivery, and attitude toward the subject.

Organization and Delivery of Oral Communication

8.7.2. Match the message, vocabulary, voice modulation (changes in tone), expression, and tone to the audience and purpose.

8.7.3. Outline the organization of a speech, including an introduction; transitions, previews, and summaries; a logically developed body; and an effective conclusion.

8.7.4. Use precise language, action verbs, sensory details, appropriate and colorful modifiers (describing words, such as adverbs and adjectives), and the active (I recommend that you write drafts.) rather than the passive voice (The writing of drafts is recommended.) in ways that enliven oral presentations.

8.7.5. Use appropriate grammar, word choice, enunciation (clear speech), and pace (timing) during formal presentations.

8.7.6. Use audience feedback, including both verbal and nonverbal cues, to reconsider and modify the organizational

structure and/or to rearrange words and sentences for clarification of meaning.

Analysis and Evaluation of Oral and Media Communications

8.7.7. Analyze oral interpretations of literature, including language choice and delivery, and the effect of the interpretations on the listener.

8.7.8. Evaluate the credibility of a speaker, including whether the speaker has hidden agendas or presents slanted or biased material.

8.7.9. Interpret and evaluate the various ways in which visual image makers (such as graphic artists, illustrators, and news photographers) communicate information and affect impressions and opinions.

Speaking Applications

8.7.10. Deliver narrative (story) presentations, such as biographical or autobiographical information that:

- relate a clear incident, event, or situation, using well-chosen details.
- reveal the significance of the incident, event, or situation.
- use narrative and descriptive strategies to support the presentation, including relevant dialogue, specific action, physical description, background description, and comparison or contrast of characters.

8.7.11. Deliver oral responses to literature that:

- interpret a reading and provide insight.
- connect personal responses to the writer's techniques and to specific textual references.
- make supported inferences about the effects of a literary work on its audience.
- support judgments through references to the text, other works, other authors, or personal knowledge.

8.7.12. Deliver research presentations that:

- define a thesis (a position on the topic).
- research important ideas, concepts, and direct quotations from significant information sources and paraphrase and summarize important perspectives on the topic.
- use a variety of research sources and distinguish the nature and value of each.
- present information on charts, maps, and graphs.

8.7.13. Deliver persuasive presentations that:

- include a well-defined thesis (position on the topic).
- differentiate fact from opinion and support arguments with detailed evidence, examples, reasoning, and persuasive language.
- anticipate and effectively answer listener concerns and counterarguments through the inclusion and arrangement of details, reasons, examples, and other elements.
- maintain a reasonable tone.

8.7.14. Recite poems (of four to six stanzas), sections of speeches, or dramatic soliloquies (sections of plays in which characters speak out loud to themselves) using voice modulation, tone, and gestures expressively to enhance the meaning.

Standard 1: Word Recognition, Fluency, and Vocabulary Development

Vocabulary and Concept Development

9.1.1. Identify and use the literal and figurative meanings of words and understand the origins of words.

9.1.2. Distinguish between what words mean literally and what they imply and interpret what the words imply.

9.1.3. Use knowledge of Greek, Roman, and Norse mythology to understand the origin and meaning of new words.

Standard 2: Comprehension

Structural Features of Informational and Technical Materials

9.2.1. Analyze the structure and format of functional workplace documents, including the graphics and headers, and explain how authors use the features to achieve their purposes.

9.2.2. Prepare a bibliography of reference materials for a report using a variety of consumer, workplace, and public documents.

Comprehension and Analysis of Grade-Level-Appropriate Text

9.2.3. Generate relevant questions about readings on issues that can be researched.

9.2.4. Synthesize the content from several sources or works by a single author dealing with a single issue; paraphrase the ideas and connect them to other sources and related topics to demonstrate comprehension.

9.2.5. Demonstrate use of technology by following directions in technical manuals.

Expository (Informational) Critique

9.2.6. Critique the logic of functional documents by examining the sequence of information and procedures in anticipation of possible reader misunderstandings.

9.2.7. Evaluate an author's argument or defense of a claim by examining the relationship between generalizations and evidence, the comprehensiveness of evidence, and the way in which the author's intent affects the structure and tone of the text.

Standard 3: Literary Response and Analysis

Structural Features of Literature

9.3.1. Explain the relationship between the purposes and the characteristics of different forms of dramatic literature (including comedy, tragedy, and dramatic monologue).

9.3.2. Compare and contrast the presentation of a similar theme or topic across genres (different types of writing) to explain how the selection of genre shapes the theme or topic.

Narrative Analysis of Grade-Level-Appropriate Text

9.3.3. Analyze interactions between characters in a literary text and explain the way those interactions affect the plot.

9.3.4. Determine characters' traits by what the characters say about themselves in narration, dialogue, and soliloquy (when they speak out loud to themselves).

9.3.5. Compare works that express a universal theme and provide evidence to support the views expressed in each work.

9.3.6. Analyze and trace an author's development of time and sequence, including the use of complex literary devices, such as foreshadowing (providing clues to future events) or flashbacks (interrupting the sequence of events to include information about an event that happened in the past).

9.3.7. Recognize and understand the significance of various literary devices, including figurative language, imagery, allegory (the use of fictional figures and actions to express truths about human experiences), and symbolism (the use of a symbol to represent an idea or theme), and explain their appeal.

9.3.8. Interpret and evaluate the impact of ambiguities, subtleties, contradictions, and ironies in a text.

9.3.9. Explain how voice and the choice of a narrator affect characterization and the tone, plot, and credibility of a text.

9.3.10. Identify and describe the function of dialogue, soliloquies, asides, character foils, and stage designs in dramatic literature.

Literary Criticism

9.3.11. Evaluate the aesthetic qualities of style, including the impact of diction and figurative language on tone, mood, and theme.

9.3.12. Analyze the way in which a work of literature is related to the themes and issues of its historical period.

Standard 4: Process

Organization and Focus

9.4.1. Discuss ideas for writing with classmates, teachers, and other writers and develop drafts alone and collaboratively.

9.4.2. Establish a coherent thesis that conveys a clear perspective on the subject and maintain a consistent tone and focus throughout the piece of writing.

9.4.3. Use precise language, action verbs, sensory details, and appropriate modifiers.

Research and Technology

9.4.4. Use writing to formulate clear research questions and to compile information from primary and secondary print or Internet sources.

9.4.5. Develop the main ideas within the body of the composition through supporting evidence, such as scenarios, commonly held beliefs, hypotheses, and definitions.

9.4.6. Synthesize information from multiple sources, including almanacs, microfiche, news sources, in-depth field studies, speeches, journals, technical documents, and Internet sources.

9.4.7. Integrate quotations and citations into a written text while maintaining the flow of ideas.

9.4.8. Use appropriate conventions for documentation in text, notes, and bibliographies, following the formats in specific style manuals.

9.4.9. Use a computer to design and publish documents by using advanced publishing software and graphic programs.

Evaluation and Revision

9.4.10. Review, evaluate, and revise writing for meaning, clarity, content, and mechanics.

9.4.11. Edit and proofread one's own writing, as well as that of others, using an editing checklist with specific examples of corrections of frequent errors.

9.4.12. Revise writing to improve the logic and coherence of the organization and perspective, the precision of word choice, and the appropriateness of tone by taking into consideration the audience, purpose, and formality of the context.

Standard 5: Applications

9.5.1. Write biographical or autobiographical narratives or short stories that:

- describe a sequence of events and communicate the significance of the events to the audience.
- locate scenes and incidents in specific places.
- describe with specific details the sights, sounds, and smells of a scene and the specific actions, movements, gestures, and feelings of the characters; in the case of short stories or autobiographical narratives, use interior monologue (what the character says silently to self) to show the character's feelings.
- pace the presentation of actions to accommodate changes in time and mood.

9.5.2. Write responses to literature that:

- demonstrate a comprehensive grasp of the significant ideas of literary works.
- support important ideas and viewpoints through accurate and detailed references to the text or to other works.
- demonstrate an awareness of the author's style and an appreciation of the effects created.
- identify and assess the impact of ambiguities, nuances, and complexities within the text.

9.5.3. Write expository compositions, including analytical essays and research reports that:

- gather evidence in support of a thesis (position on the topic), including information on all relevant perspectives.
- communicate information and ideas from primary and secondary sources accurately and coherently.
- make distinctions between the relative value and significance of specific data, facts, and ideas.
- use a variety of reference sources, including word, pictorial, audio, and Internet sources, to locate information in support of topic.
- include visual aids by using technology to organize and record information on charts, data tables, maps, and graphs.
- anticipate and address readers' potential misunderstandings, biases, and expectations.
- use technical terms and notations accurately.

9.5.4. Write persuasive compositions that:

- organize ideas and appeals in a sustained and effective fashion with the strongest emotional appeal first and the least powerful one last.
- use specific rhetorical (communication) devices to support assertions, such as appealing to logic through reasoning; appealing to emotion or ethical belief; or relating a personal anecdote, case study, or analogy.
- clarify and defend positions with precise and relevant evidence, including facts, expert opinions, quotations, expressions of commonly accepted beliefs, and logical reasoning.
- address readers' concerns, counterclaims, biases, and expectations.

9.5.5. Write documents related to career development, including simple business letters and job applications that:

- present information purposefully and in brief to meet the needs of the intended audience.
- follow a conventional business letter, memorandum, or application format.

9.5.6. Write technical documents, such as a manual on rules of behavior for conflict resolution, procedures for conducting a meeting, or minutes of a meeting that:

- report information and express ideas logically and correctly.
- offer detailed and accurate specifications.
- include scenarios, definitions, and examples to aid comprehension.
- anticipate readers' problems, mistakes, and misunderstandings.

9.5.7. Use varied and expanded vocabulary, appropriate for specific forms and topics.

9.5.8. Write for different purposes and audiences, adjusting tone, style, and voice as appropriate.

Standard 6: English Language Conventions

Grammar and Mechanics of Writing

9.6.1. Identify and correctly use clauses, both main and subordinate; phrases, including gerund, infinitive, and participial; and the mechanics of punctuation, such as semicolons, colons, ellipses, and hyphens.

9.6.2. Demonstrate an understanding of sentence construction, including parallel structure, subordination, and the proper placement of modifiers, and proper English usage, including the use of consistent verb tenses.

Manuscript Form

9.6.3. Produce legible work that shows accurate spelling and correct use of the conventions of punctuation and capitalization.

9.6.4. Apply appropriate manuscript conventions — including title page presentation, pagination, spacing, and margins — and integration of source and support material by citing sources within the text, using direct quotations, and paraphrasing.

INDIANA Grade 9 Listening And Speaking

Academic Standards

Standard 7: Skills, Strategies, and Applications

Comprehension

9.7.1. Summarize a speaker's purpose and point of view and ask questions concerning the speaker's content, delivery, and attitude toward the subject.

Organization and Delivery of Oral Communication

9.7.2. Choose appropriate techniques for developing the introduction and conclusion in a speech, including the use of literary quotations, anecdotes (stories about a specific event), and references to authoritative sources.

9.7.3. Recognize and use elements of classical speech forms (including the introduction, transitions, body, and conclusion) in formulating rational arguments and applying the art of persuasion and debate.

9.7.4. Use props, visual aids, graphs, and electronic media to enhance the appeal and accuracy of presentations.

9.7.5. Produce concise notes for extemporaneous speeches (speeches delivered without a planned script).

9.7.6. Analyze the occasion and the interests of the audience and choose effective verbal and nonverbal techniques (including voice, gestures, and eye contact) for presentations.

Analysis and Evaluation of Oral and Media Communications

9.7.7. Make judgments about the ideas under discussion and support those judgments with convincing evidence.

9.7.8. Compare and contrast the ways in which media genres (including televised news, news magazines, documentaries, and online information) cover the same event.

9.7.9. Analyze historically significant speeches (such as Abraham Lincoln's "House Divided" speech or Winston Churchill's "We Will Never Surrender" speech) to find the rhetorical devices and features that make them memorable.

9.7.10. Assess how language and delivery affect the mood and tone of the oral communication and make an impact on the audience.

9.7.11. Evaluate the clarity, quality, effectiveness, and general coherence of a speaker's important points, arguments, evidence, organization of ideas, delivery, choice of words, and use of language.

9.7.12. Analyze the types of arguments used by the speaker, including argument by causation, analogy (comparison), authority, emotion, and logic.

9.7.13. Identify the artistic effects of a media presentation and evaluate the techniques used to create them (comparing, for example, Shakespeare's *Romeo and Juliet* with Franco Zefferelli's film version).

Speaking Applications

9.7.14. Deliver narrative (story) presentations that:

- narrate a sequence of events and communicate their significance to the audience.
- locate scenes and incidents in specific places.
- describe with specific details the sights, sounds, and smells of a scene and the specific actions, movements, gestures, and feelings of characters.
- time the presentation of actions to accommodate time or mood changes.

9.7.15. Deliver expository (informational) presentations that:

- provide evidence in support of a thesis and related claims, including information on all relevant perspectives.
- convey information and ideas from primary and secondary sources accurately and coherently.

- make distinctions between the relative value and significance of specific data, facts, and ideas.
- include visual aids by employing appropriate technology to organize and display information on charts, maps, and graphs.
- anticipate and address the listeners' potential misunderstandings, biases, and expectations.
- use technical terms and notations accurately.

9.7.16. Apply appropriate interviewing techniques:

- prepare and ask relevant questions.
- make notes of responses.
- use language that conveys maturity, sensitivity, and respect.
- respond correctly and effectively to questions.
- demonstrate knowledge of the subject or organization.
- compile and report responses.
- evaluate the effectiveness of the interview.

9.7.17. Deliver oral responses to literature that:

- advance a judgment demonstrating a comprehensive understanding of the significant ideas of works or passages.
- support important ideas and viewpoints through accurate and detailed references to the text and to other works.
- demonstrate awareness of the author's writing style and an appreciation of the effects created.
- identify and assess the impact of ambiguities, nuances, and complexities within the text.

9.7.18. Deliver persuasive arguments (including evaluation and analysis of problems and solutions and causes and effects) that:

- structure ideas and arguments in a coherent, logical fashion.
- contain speech devices that support assertions (such as by appeal to logic through reasoning; by appeal to emotion or ethical belief; or by use of personal anecdote, case study, or analogy).
- clarify and defend positions with precise and relevant evidence, including facts, expert opinions, quotations, expressions of commonly accepted beliefs, and logical reasoning.
- anticipate and address the listener's concerns and counterarguments.

9.7.19. Deliver descriptive presentations that:

- establish a clear point of view on the subject of the presentation.
- establish the presenter's relationship with the subject of the presentation (whether the presentation is made as an uninvolved observer or by someone who is personally involved).
- contain effective, factual descriptions of appearance, concrete images, shifting perspectives, and sensory details.

INDIANA Grade 10 Reading
Academic Standards

Standard 1: Word Recognition, Fluency, and Vocabulary Development

Vocabulary and Concept Development

10.1.1. Understand technical vocabulary in subject area reading.

10.1.2. Distinguish between what words mean literally and what they imply, and interpret what words imply.

10.1.3. Use the knowledge of Greek, Roman, and Norse mythology to understand the origin and meaning of new words (Wednesday/Odin, Thursday/Thor).

Standard 2: Comprehension

Structural Features of Informational and Technical Materials

10.2.1. Analyze the structure and format of various informational documents and explain how authors use the features to achieve their purposes.

Comprehension and Analysis of Grade-Level-Appropriate Text

10.2.2. Extend — through original analysis, evaluation, and elaboration — ideas presented in primary or secondary sources.

10.2.3. Demonstrate use of sophisticated technology by following technical directions.

Expository (Informational) Critique

10.2.4. Evaluate an author's argument or defense of a claim by examining the relationship between generalizations and evidence, the comprehensiveness of evidence, and the way in which the author's intent affects the structure and tone of the text.

Standard 3: Literary Response and Analysis

Structural Features of Literature

10.3.1. Analyze the purposes and the characteristics of different forms of dramatic literature (including comedy, tragedy, and dramatic monologue).

10.3.2. Compare and contrast the presentation of a similar theme or topic across genres (different types of writing) to explain how each genre shapes the author's presentation of the theme or topic.

Narrative Analysis of Grade-Level-Appropriate Text

10.3.3. Evaluate interactions between characters in a literary text and explain the way those interactions affect the plot.

10.3.4. Analyze characters' traits by what the characters say about themselves in narration, dialogue, and soliloquy (when they speak out loud to themselves).

10.3.5. Compare works that express a universal theme and provide evidence to support the views expressed in each work.

10.3.6. Evaluate an author's development of time and sequence, including the use of complex literary devices, such as foreshadowing (providing clues to future events) or flashbacks (interrupting the sequence of events to include information about an event that happened in the past).

10.3.7. Evaluate the significance of various literary devices, including figurative language, imagery, allegory (the use of fictional figures and actions to express truths about human experiences), and symbolism (the use of a symbol to represent an idea or theme), and explain their appeal.

10.3.8. Interpret and evaluate the impact of ambiguities, subtleties, contradictions, ironies, and inconsistencies in a text.

10.3.9. Explain how voice and the choice of a narrator affect characterization and the tone, plot, and credibility of a text.

10.3.10. Identify and describe the function of dialogue, soliloquies, asides, character foils, and stage designs in dramatic literature.

Literary Criticism

10.3.11. Evaluate the aesthetic qualities of style, including the impact of diction and figurative language on tone, mood, and theme.

10.3.12. Analyze the way in which a work of literature is related to the themes and issues of its historical period.

INDIANA Grade 10 Writing
Academic Standards

Standard 4: Process

Organization and Focus

10.4.1. Discuss ideas for writing with classmates, teachers, and other writers and develop drafts alone and collaboratively.

10.4.2. Establish a coherent thesis that conveys a clear perspective on the subject and maintain a consistent tone and focus throughout the piece of writing.

10.4.3. Use precise language, action verbs, sensory details, appropriate modifiers, and the active (I will always remember my first trip to the city) rather than the passive voice (My first trip to the city will always be remembered).

Research and Technology

10.4.4. Use clear research questions and suitable research methods, including texts, electronic resources, and personal interviews, to compile and present evidence from primary and secondary print or Internet sources.

10.4.5. Develop main ideas within the body of the composition through supporting evidence, such as scenarios, commonly held beliefs, hypotheses, and definitions.

10.4.6. Synthesize information from multiple sources. Identify complexities and inconsistencies in the information and the different perspectives found in each medium, including almanacs, microfiche, news sources, in-depth field

studies, speeches, journals, technical documents, and Internet sources.

10.4.7. Integrate quotations and citations into a written text while maintaining the flow of ideas.

10.4.8. Use appropriate conventions for documentation in text, notes, and bibliographies following the formats in different style manuals.

10.4.9. Use a computer to design and publish documents by using advanced publishing software and graphic programs.

Evaluation and Revision

10.4.10. Review, evaluate, revise, edit, and proofread writing using an editing checklist.

10.4.11. Apply criteria developed by self and others to evaluate the mechanics and content of writing.

10.4.12. Provide constructive criticism to other writers with suggestions for improving organization, tone, style, clarity, and focus; edit and revise in response to peer reviews of own work.

Standard 5: Applications

10.5.1. Write biographical or autobiographical narratives or short stories that:

- describe a sequence of events and communicate the significance of the events to the audience.
- locate scenes and incidents in specific places.
- describe with specific details the sights, sounds, and smells of a scene and the specific actions, movements, gestures, and feelings of the characters; in the case of short stories or autobiographical narratives, use interior monologue (what the character says silently to self) to show the character's feelings.
- pace the presentation of actions to accommodate changes in time and mood.

10.5.2. Write responses to literature that:

- demonstrate a comprehensive grasp of the significant ideas of literary works.
- support important ideas and viewpoints through accurate and detailed references to the text or to other works.
- demonstrate awareness of the author's style and an appreciation of the effects created.
- identify and assess the impact of ambiguities, nuances, and complexities within the text.
- extend writing by changing mood, plot, characterization, or voice.

10.5.3. Write expository compositions, including analytical essays and research reports that:

- gather evidence in support of a thesis (position on the topic), including information on all relevant perspectives.
- communicate information and ideas from primary and secondary sources accurately and coherently.
- make distinctions between the relative value and significance of specific data, facts, and ideas.
- use a variety of reference sources, including word, pictorial, audio, and Internet sources to locate information in support of a topic.
- include visual aids by using technology to organize and record information on charts, maps, and graphs.
- anticipate and address readers' potential misunderstandings, biases, and expectations.
- use technical terms and notations correctly.

10.5.4. Write persuasive compositions that:

- organize ideas and appeals in a sustained and effective fashion with the strongest emotional appeal first and the least powerful one last.
- use specific rhetorical (communication) devices to support assertions, such as appealing to logic through reasoning; appealing to emotion or ethical belief; or relating a personal anecdote, case study, or analogy.
- clarify and defend positions with precise and relevant evidence, including facts, expert opinions, quotations, expressions of commonly accepted beliefs, and logical reasoning.
- address readers' concerns, counterclaims, biases, and expectations.

10.5.5. Write business letters that:

- provide clear and purposeful information and address the intended audience appropriately.
- show appropriate use of vocabulary, tone, and style that takes into account the intended audience's knowledge about and interest in the topic and the nature of the audience's relationship to the writer.
- emphasize main ideas or images.
- follow a conventional style with page formats, fonts (typeface), and spacing that contribute to the documents' readability and impact.

10.5.6. Write technical documents, such as a manual on rules of behavior for conflict resolution, procedures for conducting a meeting, or minutes of a meeting that:

- report information and express ideas logically and correctly.
- offer detailed and accurate specifications.
- include scenarios, definitions, and examples to aid comprehension.
- anticipate readers' problems, mistakes, and misunderstandings.

10.5.7. Use varied and expanded vocabulary, appropriate for specific forms and topics.

10.5.8. Write for different purposes and audiences, adjusting tone, style, and voice as appropriate.

Standard 6: English Language Conventions

Grammar and Mechanics of Writing

10.6.1. Identify and correctly use clauses, both main and subordinate; phrases, including gerund, infinitive, and participial; and the mechanics of punctuation, such as semicolons, colons, ellipses, and hyphens.

10.6.2. Demonstrate an understanding of sentence construction, including parallel structure, subordination, and the proper placement of modifiers, and proper English usage, including the use of consistent verb tenses.

Manuscript Form

10.6.3. Produce legible work that shows accurate spelling and correct use of the conventions of punctuation and capitalization.

10.6.4. Apply appropriate manuscript conventions — including title page presentation, pagination, spacing, and margins — and integration of source and support material by citing sources within the text, using direct quotations, and paraphrasing.

INDIANA Grade 10 Listening And Speaking
Academic Standards

Standard 7: Skills, Strategies, and Applications

Comprehension

10.7.1. Summarize a speaker's purpose and point of view and ask questions concerning the speaker's content, delivery, and attitude toward the subject.

Organization and Delivery of Oral Communication

10.7.2. Choose appropriate techniques for developing the introduction and conclusion in a speech, including the use of literary quotations, anecdotes (stories about a specific event), or references to authoritative sources.

10.7.3. Recognize and use elements of classical speech forms (including the introduction, first and second transitions, body, and conclusion) in formulating rational arguments and applying the art of persuasion and debate.

10.7.4. Use props, visual aids, graphs, and electronic media to enhance the appeal and accuracy of presentations.

10.7.5. Produce concise notes for extemporaneous speeches (speeches delivered without a planned script).

10.7.6. Analyze the occasion and the interests of the audience and choose effective verbal and nonverbal techniques (including voice, gestures, and eye contact) for presentations.

Analysis and Evaluation of Oral and Media Communications

10.7.7. Make judgments about the ideas under discussion and support those judgments with convincing evidence.

10.7.8. Compare and contrast the ways in which media genres (including televised news, news magazines, documentaries, and online information) cover the same event.

10.7.9. Analyze historically significant speeches (such as Franklin Delano Roosevelt's "Day of Infamy" speech) to find the rhetorical devices and features that make them memorable.

10.7.10. Assess how language and delivery affect the mood and tone of the oral communication and make an impact on the audience.

10.7.11. Evaluate the clarity, quality, effectiveness, and general coherence of a speaker's important points, arguments, evidence, organization of ideas, delivery, choice of words, and use of language.

10.7.12. Analyze the types of arguments used by the speaker, including argument by causation, analogy (comparison), authority, emotion, and logic.

10.7.13. Identify the artistic effects of a media presentation and evaluate the techniques used to create them (for example, compare Shakespeare's *Henry V* with Kenneth Branagh's 1990 film version).

Speaking Applications

10.7.14. Deliver narrative (story) presentations that:

- narrate a sequence of events and communicate their significance to the audience.
- locate scenes and incidents in specific places.
- describe with specific details the sights, sounds, and smells of a scene and the specific actions, movements, gestures, and feelings of characters.
- time the presentation of actions to accommodate time or mood changes.

10.7.15. Deliver expository (informational) presentations that:

- provide evidence in support of a thesis and related claims, including information on all relevant perspectives.
- convey information and ideas from primary and secondary sources accurately and coherently.
- make distinctions between the relative value and significance of specific data, facts, and ideas.
- include visual aids by employing appropriate technology to organize and display information on charts, maps, and graphs.
- anticipate and address the listeners' potential misunderstandings, biases, and expectations.
- use technical terms and notations correctly.

10.7.16. Apply appropriate interviewing techniques:

- prepare and ask relevant questions.
- make notes of responses.
- use language that conveys maturity, sensitivity, and respect.
- respond correctly and effectively to questions.
- demonstrate knowledge of the subject or organization.
- compile and report responses.
- evaluate the effectiveness of the interview.

10.7.17. Deliver oral responses to literature that:

- advance a judgment demonstrating a comprehensive understanding of the significant ideas of works or passages.

- support important ideas and viewpoints through accurate and detailed references to the text and to other works.
- demonstrate awareness of the author's writing style and an appreciation of the effects created.
- identify and assess the impact of ambiguities, nuances, and complexities within the text.

10.7.18. Deliver persuasive arguments (including evaluation and analysis of problems and solutions and causes and effects) that:

- structure ideas and arguments in a coherent, logical fashion.
- contain speech devices that support assertions (such as by appeal to logic through reasoning; by appeal to emotion or ethical belief; or by use of personal anecdote, case study, or analogy).
- clarify and defend positions with precise and relevant evidence, including facts, expert opinions, quotations, expressions of commonly accepted beliefs, and logical reasoning.
- anticipate and address the listeners' concerns and counterarguments.

10.7.19. Deliver descriptive presentations that:

- establish a clear point of view on the subject of the presentation.
- establish the relationship with the subject of the presentation (whether the presentation is made as an uninvolved observer or by someone who is personally involved).
- contain effective, factual descriptions of appearance, concrete images, shifting perspectives, and sensory details.

INDIANA Grade 11 Reading
Academic Standards

Standard 1: Word Recognition, Fluency, and Vocabulary Development

Vocabulary and Concept Development

11.1.1. Trace the history of significant terms used in political science and history.

11.1.2. Apply knowledge of Greek, Latin, and Anglo-Saxon roots and word parts to draw inferences about the meaning of scientific and mathematical terminology.

11.1.3. Analyze the meaning of analogies encountered, analyzing specific comparisons as well as relationships and inferences.

Standard 2: Comprehension

Structural Features of Informational and Technical Materials

11.2.1. Analyze both the features and the rhetorical (persuasive) devices of different types of public documents, such as policy statements, speeches, or debates, and the way in which authors use those features and devices.

Comprehension and Analysis of Grade-Level-Appropriate Text

11.2.2. Analyze the way in which clarity of meaning is affected by the patterns of organization, repetition of the main ideas, organization of language, and word choice in the text.

11.2.3. Verify and clarify facts presented in several types of expository texts by using a variety of consumer, workplace, and public documents.

11.2.4. Make reasonable assertions about an author's arguments by using elements of the text to defend and clarify interpretations.

11.2.5. Analyze an author's implicit and explicit assumptions and beliefs about a subject.

Expository (Informational) Critique

11.2.6. Critique the power, validity, and truthfulness of arguments set forth in public documents; their appeal to both friendly and hostile audiences; and the extent to which the arguments anticipate and address reader concerns and counterclaims.

Standard 3: Literary Response and Analysis

Structural Features of Literature

11.3.1. Analyze characteristics of subgenres, types of writings such as satire, parody, allegory, and pastoral that are used in poetry, prose, plays, novels, short stories, essays, and other basic genres.

Narrative Analysis of Grade-Level-Appropriate Text

11.3.2. Analyze the way in which the theme or meaning of a selection represents a view or comment on life, using textual evidence to support the claim.

11.3.3. Analyze the ways in which irony, tone, mood, the author's style, and the "sound" of language achieve specific rhetorical (persuasive) or aesthetic (artistic) purposes or both.

11.3.4. Analyze ways in which poets use imagery, personification, figures of speech, and sounds to evoke readers' emotions.

11.3.5. Analyze recognized works of literature (American, British, world) representing a variety of genres and traditions that:

- trace the development of the major periods of literature.
- contrast the major themes, styles, and trends in different periods.
- evaluate the influences (philosophical, political, religious, ethical, and social) of the historical period for a given novel that shaped the characters, plot, and setting.

11.3.6. Analyze the way in which authors have used archetypes (models or patterns) drawn from myth and tradition in literature, film, political speeches, and religious writings.

Literary Criticism

11.3.7. Analyze the clarity and consistency of political assumptions in a selection of literary works or essays on a topic.

11.3.8. Analyze the philosophical arguments presented in literary works to determine whether the authors' positions have contributed to the quality of each work and the credibility of the characters.

INDIANA Grade 11 Writing
Academic Standards

Standard 4: Process

Organization and Focus

11.4.1. Discuss ideas for writing with classmates, teachers, and other writers.

11.4.2. Demonstrate an understanding of the elements of discourse, such as purpose, speaker, audience, and form, when completing narrative, expository, persuasive, or descriptive writing assignments.

11.4.3. Use point of view, characterization, style, and related elements for specific narrative and aesthetic (artistic) purposes.

11.4.4. Structure ideas and arguments in a sustained and persuasive way and support them with precise and relevant examples.

11.4.5. Enhance meaning using rhetorical devices, including the extended use of parallelism, repetition, and analogy and the issuance of a call for action.

11.4.6. Use language in creative and vivid ways to establish a specific tone.

Research and Technology

11.4.7. Develop presentations using clear research questions and creative and critical research strategies, such

as conducting field studies, interviews, and experiments; researching oral histories; and using Internet sources.

11.4.8. Use systematic strategies to organize and record information, such as anecdotal scripting or annotated bibliographies.

11.4.9. Use a computer to integrate databases, pictures and graphics, and spreadsheets into word-processed documents.

Evaluation and Revision

11.4.10. Review, evaluate, and revise writing for meaning, clarity, achievement of purpose, and mechanics.

11.4.11. Edit and proofread one's own writing, as well as that of others, using an editing checklist.

11.4.12. Revise text to highlight the individual voice, improve sentence variety and style, and enhance subtlety of meaning and tone in ways that are consistent with the purpose, audience, and form of writing.

Standard 5: Applications

11.5.1. Write fictional, autobiographical, or biographical narratives that:

- narrate a sequence of events and communicate their significance to the audience.
- locate scenes and incidents in specific places.
- describe with specific details the sights, sounds, and smells of a scene and the specific actions, movements, gestures, and feelings of the characters; in the case of autobiography or fiction, use interior monologue (what the character says silently to self) to show the character's feelings.
- pace the presentation of actions to accommodate changes in time and mood.

11.5.2. Write responses to literature that:

- demonstrate a comprehensive understanding of the significant ideas in works or passages.
- analyze the use of imagery, language, universal themes, and unique aspects of the text.
- support important ideas and viewpoints through accurate and detailed references to the text and to other works.
- demonstrate an understanding of the author's style and an appreciation of the effects created.
- identify and assess the impact of perceived ambiguities, nuances, and complexities within the text.

11.5.3. Write reflective compositions that:

- explore the significance of personal experiences, events, conditions, or concerns by using rhetorical strategies, including narration, description, exposition, and persuasion.
- draw comparisons between specific incidents and broader themes that illustrate the writer's important beliefs or generalizations about life.
- maintain a balance in describing individual events and relating those incidents to more general and abstract ideas.

11.5.4. Write historical investigation reports that:

- use exposition, narration, description, argumentation, or some combination of rhetorical strategies to support the main argument.
- analyze several historical records of a single event, examining critical relationships between elements of the topic.
- explain the perceived reason or reasons for the similarities and differences in historical records with information derived from primary and secondary sources to support or enhance the presentation.
- include information from all relevant perspectives and take into consideration the validity and reliability of sources.
- include a formal bibliography.

11.5.5. Write job applications and résumés that:

- provide clear and purposeful information and address the intended audience appropriately.
- use varied levels, patterns, and types of language to achieve intended effects and aid comprehension.
- modify the tone to fit the purpose and audience.
- follow the conventional style for that type of document (a résumé or cover letter of application) and use page formats, fonts (typeface), and spacing that contribute to the readability and impact of the document

11.5.6. Use varied and extended vocabulary, appropriate for specific forms and topics.

11.5.7. Use precise technical or scientific language when appropriate for topic and audience.

11.5.8. Deliver multimedia presentations that:

- combine text, images, and sound and draw information from many sources, including television broadcasts, videos, films, newspapers, magazines, CD-ROMs, the Internet, and electronic media-generated images.
- select an appropriate medium for each element of the presentation.
- use the selected media skillfully, editing appropriately, and monitoring for quality.
- test the audience's response and revise the presentation accordingly.

Standard 6: English Language Conventions

11.6.1. Demonstrate control of grammar, diction, paragraph and sentence structure, and an understanding of English usage.

11.6.2. Produce writing that shows accurate spelling and correct punctuation and capitalization.

11.6.3. Apply appropriate manuscript conventions in writing — including title page presentation, pagination, spacing, and margins — and integration of source and support material by citing sources within the text, using direct quotations, and paraphrasing.

Standard 7: Skills, Strategies, and Applications

Comprehension

11.7.1. Summarize a speaker's purpose and point of view and ask questions to draw interpretations of the speaker's content and attitude toward the subject.

Organization and Delivery of Oral Communication

11.7.2. Use rhetorical questions (questions asked for effect without an expected answer), parallel structure, concrete images, figurative language, characterization, irony, and dialogue to achieve clarity, force, and artistic effect.

11.7.3. Distinguish between and use various forms of logical arguments, including:

- inductive arguments (arguments that demonstrate something that is highly likely, such as *All of these pears are from that basket and all of these pears are ripe, so all of the pears in the basket are ripe.*) and deductive arguments (arguments that are necessary conclusions based on the evidence, such as *If all men are mortal and he is a man, then he is mortal.*).
- syllogisms and analogies (assumptions that if two things are similar in some ways then they are probably similar in others).

11.7.4. Use logical, ethical, and emotional appeals that enhance a specific tone and purpose.

11.7.5. Use appropriate rehearsal strategies to pay attention to performance details, achieve command of the text, and create skillful artistic staging.

11.7.6. Use effective and interesting language, including informal expressions for effect, Standard English for clarity, and technical language for specificity.

11.7.7. Use research and analysis to justify strategies for gesture, movement, and vocalization, including pronunciation, enunciation, and the use of dialect.

11.7.8. Evaluate when to use different kinds of effects (including visuals, music, sound, and graphics) to create effective productions.

Analysis and Evaluation of Oral and Media Communications

11.7.9. Analyze strategies used by the media to inform, persuade, entertain, and transmit culture (including advertising; perpetuating stereotypes; and using visual representations, special effects, and language).

11.7.10. Analyze the impact of the media on the democratic process (including exerting influence on elections, creating images of leaders, and shaping attitudes) at the local, state, and national levels.

11.7.11. Interpret and evaluate the various ways in which events are presented and information is communicated by visual image-makers (such as graphic artists, documentary filmmakers, illustrators, and news photographers).

11.7.12. Critique a speaker's use of words and language in relation to the purpose of an oral communication and the impact the words may have on the audience.

11.7.13. Identify logical fallacies used in oral addresses including *ad hominem* (appealing to the audience's feelings or prejudices), false causality (falsely identifying the causes of some effect), red herring (distracting attention from the real issue), overgeneralization, and the bandwagon effect (attracting the audience based on the show rather than the substance of the presentation).

11.7.14. Analyze the four basic types of persuasive speech (propositions of fact, value, problem, and policy) and understand the similarities and differences in their patterns of organization and the use of persuasive language, reasoning, and proof.

11.7.15. Analyze the techniques used in media messages for a particular audience and evaluate their effectiveness (for example, Orson Welles' radio broadcast *War of the Worlds*).

Speaking Applications

11.7.16. Deliver reflective presentations that:

- explore the significance of personal experiences, events, conditions, or concerns, using appropriate speech strategies, including narration, description, exposition, and persuasion.
- draw comparisons between the specific incident and broader themes to illustrate beliefs or generalizations about life.
- maintain a balance between describing the incident and relating it to more general, abstract ideas.

11.7.17. Deliver oral reports on historical investigations that:

- use exposition, narration, description, persuasion, or some combination of those to support the thesis (the position on the topic).
- analyze several historical records of a single event, examining each perspective on the event.
- describe similarities and differences between research sources, using information derived from primary and secondary sources to support the presentation.
- include information on all relevant perspectives and consider the validity (accuracy and truthfulness) and reliability (consistency) of sources.

11.7.18. Deliver oral responses to literature that:

- demonstrate a comprehensive understanding of the significant ideas of literary works and make assertions about the text that are reasonable and supportable.
- present an analysis of the imagery, language, universal themes, and unique aspects of the text through the use of speech strategies, including narration, description, persuasion, exposition, or a combination of those strategies.
- support important ideas and viewpoints through specific references to the text and to other works.

- demonstrate an awareness of the author's style and an appreciation of the effects created.
- identify and assess the impact of ambiguities, nuances, and complexities within the text.

11.7.19. Deliver multimedia presentations that:

- combine text, images, and sound by incorporating information from a wide range of media, including films, newspapers, magazines, CD-ROMs, online information, television, videos, and electronic media-generated images.
- select an appropriate medium for each element of the presentation.
- use the selected media skillfully, editing appropriately and monitoring for quality.
- test the audience's response and revise the presentation accordingly.

11.7.20. Recite poems, selections from speeches, or dramatic soliloquies with attention to performance details to achieve clarity, force, and aesthetic effect and to demonstrate an understanding of the meaning (for example, stage a presentation of Hamlet's soliloquy "To Be or Not to Be").

Standard 1: Word Recognition, Fluency, and Vocabulary Development

Vocabulary and Concept Development

12.1.1. Understand unfamiliar words that refer to characters or themes in literature or historical events.

12.1.2. Apply knowledge of Greek, Latin, and Anglo-Saxon roots and word parts to draw inferences about new words that have been created in the fields of science and math (gene splicing, genetic engineering).

12.1.3. Analyze the meaning of analogies encountered, analyzing specific comparisons as well as relationships and inferences.

Standard 2: Comprehension

Structural Features of Informational and Technical Materials

12.2.1. Analyze both the features and the rhetorical (persuasive) devices of different types of public documents, such as policy statements, speeches, or debates, and the way in which authors use those features and devices.

Comprehension and Analysis of Grade-Level-Appropriate Text

12.2.2. Analyze the way in which clarity of meaning is affected by the patterns of organization, repetition of the main ideas, organization of language, and word choice in the text.

12.2.3. Verify and clarify facts presented in several types of expository texts by using a variety of consumer, workplace, public, and historical documents.

12.2.4. Make reasonable assertions about an author's arguments by using hypothetical situations or elements of the text to defend and clarify interpretations.

12.2.5. Analyze an author's implicit and explicit assumptions and beliefs about a subject.

Expository (Informational) Critique

12.2.6. Critique the power, validity, and truthfulness of arguments set forth in public documents; their appeal to both friendly and hostile audiences; and the extent to which the arguments anticipate and address reader concerns and counterclaims.

Standard 3: Literary Response and Analysis

Structural Features of Literature

12.3.1. Evaluate characteristics of subgenres, types of writing such as satire, parody, allegory, and pastoral that are used in poetry, prose, plays, novels, short stories, essays, and other basic genres.

Narrative Analysis of Grade-Level-Appropriate Text

12.3.2. Evaluate the way in which the theme or meaning of a selection represents a view or comment on life, using textual evidence to support the claim.

12.3.3. Analyze the ways in which irony, tone, mood, the author's style, and the "sound" of language achieve specific rhetorical (persuasive) or aesthetic (artistic) purposes or both.

12.3.4. Analyze ways in which poets use imagery, personification, figures of speech, and sounds to evoke readers' emotions.

12.3.5. Analyze recognized works of literature (American, British, world) representing a variety of genres and traditions that:

- trace the development of literature.
- contrast the major themes, styles, and trends in each period.
- evaluate the influences (philosophical, political, religious, ethical, and social) of the historical period for a given novel that shaped the characters, plot, and setting.

12.3.6. Evaluate the way in which authors have used archetypes (models or patterns) drawn from myth and tradition in literature, film, political speeches, and religious writings.

12.3.7. Analyze recognized works of world literature from a variety of authors that:

- contrast the major literary forms, techniques, and characteristics from different major literary periods, such as Homeric Greece, Medieval, Romantic, Neoclassic, or the Modern Period.
- relate literary works and authors to the major themes and issues of their literary period.
- evaluate the influences (philosophical, political, religious, ethical, and social) of the historical period for a given novel that shaped the characters, plot, and setting.

Literary Criticism

12.3.8. Evaluate the clarity and consistency of political assumptions in a selection of literary works or essays on a topic.

12.3.9. Evaluate the philosophical arguments presented in literary works and the use of dialogue to reveal character to determine whether the authors' positions have contributed to the quality of each work and the credibility of the characters.

Standard 4: Process

Organization and Focus

12.4.1. Engage in conversations with peers and the teacher to plan writing, to evaluate how well writing achieves its purposes, and to explain personal reaction to the task.

12.4.2. Demonstrate an understanding of the elements of discourse, such as purpose, speaker, audience, and form, when completing narrative, expository, persuasive, or descriptive writing assignments.

12.4.3. Use point of view, characterization, style, and related elements for specific narrative and aesthetic (artistic) purposes.

12.4.4. Structure ideas and arguments in a sustained and persuasive way and support them with precise and relevant examples.

12.4.5. Enhance meaning using rhetorical devices, including the extended use of parallelism, repetition, and analogy and the issuance of a call for action.

12.4.6. Use language in creative and vivid ways to establish a specific tone.

Research and Technology

12.4.7. Develop presentations using clear research questions and creative and critical research strategies, such as conducting field studies, interviews, and experiments; researching oral histories; and using Internet sources.

12.4.8. Use systematic strategies to organize and record information, such as anecdotal scripting or creating annotated bibliographies.

12.4.9. Use technology for all aspects of creating, revising, editing, and publishing.

Evaluation and Revision

12.4.10. Accumulate, review, and evaluate written work to determine its strengths and weaknesses and to set goals as a writer.

12.4.11. Revise, edit, and proofread one's own writing, as well as that of others, using an editing checklist.

12.4.12. Further develop unique writing style and voice, improve sentence variety, and enhance subtlety of meaning and tone in ways that are consistent with the purpose, audience, and form of writing.

Standard 5: Applications

12.5.1. Write fictional, autobiographical, or biographical narratives that:

- narrate a sequence of events and communicate their significance to the audience.
- locate scenes and incidents in specific places.
- describe with specific details the sights, sounds, and smells of a scene and the specific actions, movements, gestures, and feelings of the characters; in the case of autobiography or fiction, use interior monologue (what the character says silently to self) to show the character's feelings.
- pace the presentation of actions to accommodate changes in time and mood.

12.5.2. Write responses to literature that:

- demonstrate a comprehensive understanding of the significant ideas in works or passages.
- analyze the use of imagery, language, universal themes, and unique aspects of the text.
- support important ideas and viewpoints through accurate and detailed references to the text and to other works.
- demonstrate an understanding of the author's style and an appreciation of the effects created.
- identify and assess the impact of perceived ambiguities, nuances, and complexities within the text.

12.5.3. Write reflective compositions that:

- explore the significance of personal experiences, events, conditions, or concerns by using rhetorical strategies, including narration, description, exposition, and persuasion.
- draw comparisons between specific incidents and broader themes that illustrate the writer's important beliefs or generalizations about life.
- maintain a balance in describing individual events and relating those incidents to more general and abstract ideas.

12.5.4. Write historical investigation reports that:

- use exposition, narration, description, argumentation, or some combination of rhetorical strategies to support the main argument.
- analyze several historical records of a single event, examining critical relationships between elements of the topic.
- explain the perceived reason or reasons for the similarities and differences in historical records with information derived from primary and secondary sources to support or enhance the presentation.
- include information from all relevant perspectives and take into consideration the validity and reliability of sources.
- include a formal bibliography.

12.5.5. Write job applications and résumés that:

- provide clear and purposeful information and address the intended audience appropriately.
- use varied levels, patterns, and types of language to achieve intended effects and aid comprehension.
- modify the tone to fit the purpose and audience.
- follow the conventional style for that type of document (a résumé or cover letter of application) and use page formats, fonts (typefaces), and spacing that contribute to the readability and impact of the document.

12.5.6. Use varied and extended vocabulary, appropriate for specific forms and topics.

12.5.7. Use precise technical or scientific language when appropriate for topic and audience.

12.5.8. Deliver multimedia presentations that:

- combine text, images, and sound and draw information from many sources, including television broadcasts, videos, films, newspapers, magazines, CD-ROMs, the Internet, and electronic media-generated images.
- select an appropriate medium for each element of the presentation.
- use the selected media skillfully, editing appropriately, and monitoring for quality.
- test the audience's response and revise the presentation accordingly.

Standard 6: English Language Conventions

12.6.1. Demonstrate control of grammar, diction, and paragraph and sentence structure, as well as an understanding of English usage.

12.6.2. Produce writing that shows accurate spelling and correct punctuation and capitalization.

12.6.3. Apply appropriate manuscript conventions in writing — including title page presentation, pagination, spacing, and margins — and integration of source and support material by citing sources within the text, using direct quotations, and paraphrasing.

INDIANA Grade 12 Listening And Speaking
Academic Standards

Standard 7: Skills, Strategies, and Applications

Comprehension

12.7.1. Summarize a speaker's purpose and point of view, discuss, and ask questions to draw interpretations of the speaker's content and attitude toward the subject.

Organization and Delivery of Oral Communication

12.7.2. Use rhetorical questions (questions asked for effect without an expected answer), parallel structure, concrete images, figurative language, characterization, irony, and dialogue to achieve clarity, force, and artistic effect.

12.7.3. Distinguish between and use various forms of logical arguments, including:

- inductive arguments (arguments that demonstrate something that is highly likely, such as *All of these pears are from that basket and all of these pears are ripe, so all of the pears in the basket are ripe*.) and deductive arguments (arguments that are necessary conclusions based on the evidence, such as *If all men are mortal and he is a man, then he is mortal.*).
- syllogisms and analogies (assumptions that if two things are similar in some ways then they are probably similar in others.)

12.7.4. Use logical, ethical, and emotional appeals that enhance a specific tone and purpose.

12.7.5. Use appropriate rehearsal strategies to pay attention to performance details, achieve command of the text, and create skillful artistic staging.

12.7.6. Use effective and interesting language, including informal expressions for effect, Standard English for clarity, and technical language for specificity.

12.7.7. Use research and analysis to justify strategies for gesture, movement, and vocalization, including pronunciation, enunciation, and the use of dialect.

12.7.8. Evaluate when to use different kinds of effects (including visuals, music, sound, and graphics) to create effective productions.

Analysis and Evaluation of Oral and Media Communications

12.7.9. Analyze strategies used by the media to inform, persuade, entertain, and transmit culture (including advertising; perpetuating stereotypes; and using visual representations, special effects, and language).

12.7.10. Analyze the impact of the media on the democratic process (including exerting influence on elections, creating images of leaders, and shaping attitudes) at the local, state, and national levels.

12.7.11. Interpret and evaluate the various ways in which events are presented and information is communicated by visual image-makers (such as graphic artists, documentary filmmakers, illustrators, and news photographers).

12.7.12. Critique a speaker's use of words and language in relation to the purpose of an oral communication and the impact the words may have on the audience.

12.7.13. Identify logical fallacies used in oral addresses including *ad hominem* (appealing to the audience's feelings or prejudices), false causality (falsely identifying the causes of some effect), red herring (distracting attention from the real issue), overgeneralization, and the bandwagon effect (attracting the audience based on the show rather than the substance of the presentation).

12.7.14. Analyze the four basic types of persuasive speech (propositions of fact, value, problem, and policy) and understand the similarities and differences in their patterns of organization and the use of persuasive language, reasoning, and proof.

12.7.15. Analyze the techniques used in media messages for a particular audience to evaluate effectiveness, and infer the speaker's character (using, for example, the Duke of Windsor's abdication speech).

Speaking Applications

12.7.16. Deliver reflective presentations that:

- explore the significance of personal experiences, events, conditions, or concerns, using appropriate speech strategies, including narration, description, exposition, and persuasion.

- draw comparisons between the specific incident and broader themes and to illustrate beliefs or generalizations about life.
- maintain a balance between describing the incident and relating it to more general, abstract ideas.

12.7.17. Deliver oral reports on historical investigations that:

- use exposition, narration, description, persuasion, or some combination of those to support the thesis (the position on the topic).
- analyze several historical records of a single event, examining each perspective on the event.
- describe similarities and differences between research sources, using information derived from primary and secondary sources to support the presentation.
- include information on all relevant perspectives and consider the validity (accuracy and truthfulness) and reliability (consistency) of sources.

12.7.18. Deliver oral responses to literature that:

- demonstrate a comprehensive understanding of the significant ideas of literary works and make assertions about the text that are reasonable and supportable.
- present an analysis of the imagery, language, universal themes, and unique aspects of the text through the use of speech strategies, including narration, description, persuasion, exposition, or a combination of those strategies.
- support important ideas and viewpoints through specific references to the text and to other works.
- demonstrate an awareness of the author's style and an appreciation of the effects created.
- identify and assess the impact of ambiguities, nuances, and complexities within the text.

12.7.19. Deliver multimedia presentations that:

- combine text, images, and sound by incorporating information from a wide range of media, including films, newspapers, magazines, CD-ROMs, online information, television, videos, and electronic media-generated images.
- select an appropriate medium for each element of the presentation.
- use the selected media skillfully, editing appropriately, and monitoring for quality.
- test the audience's response and revise the presentation accordingly.

12.7.20. Recite poems, selections from speeches, or dramatic soliloquies with attention to performance details to achieve clarity, force, and aesthetic effect and to demonstrate an understanding of the meaning (for example, stage a presentation of Hamlet's soliloquy "To Be or Not to Be" or Portia's soliloquy "The Quality of Mercy Is Not Strained" from *The Merchant of Venice.*

INDIANA Grade 8 Mathematics
Academic Standards

Standard 1: Number Sense

8.1.1. Read, write, compare, and solve problems using decimals in scientific notation.

8.1.2. Know that every rational number is either a terminating or repeating decimal and that every irrational number is a nonrepeating decimal.

8.1.3. Understand that computations with an irrational number and a rational number (other than zero) produce an irrational number.

8.1.4. Understand and evaluate negative integer exponents.

8.1.5. Use the laws of exponents for integer exponents.

8.1.6. Use the inverse relationship between squaring and finding the square root of a perfect square integer.

8.1.7. Calculate and find approximations of square roots.

Standard 2: Computation

8.2.1. Add, subtract, multiply, and divide rational numbers (integers, fractions, and terminating decimals) in multi-step problems.

8.2.2. Solve problems by computing simple and compound interest.

8.2.3. Use estimation techniques to decide whether answers to computations on a calculator are reasonable.

8.2.4. Use mental arithmetic to compute with common fractions, decimals, powers, and percents.

Standard 3: Algebra and Functions

8.3.1. Write and solve linear equations and inequalities in one variable, interpret the solution or solutions in their context, and verify the reasonableness of the results.

8.3.2. Solve systems of two linear equations using the substitution method and identify approximate solutions graphically.

8.3.3. Interpret positive integer powers as repeated multiplication and negative integer powers as repeated division or multiplication by the multiplicative inverse.

8.3.4. Use the correct order of operations to find the values of algebraic expressions involving powers.

8.3.5. Identify and graph linear functions and identify lines with positive and negative slope.

8.3.6. Find the slope of a linear function given the equation and write the equation of a line given the slope and any point on the line.

8.3.7. Demonstrate an understanding of rate as a measure of one quantity with respect to another quantity.

8.3.8. Demonstrate an understanding of the relationships among tables, equations, verbal expressions, and graphs of linear functions.

8.3.9. Represent simple quadratic functions using verbal descriptions, tables, graphs, and formulas and translate among these representations.

8.3.10. Graph functions of the form $y = nx^2$ and $y = nx^3$ and describe the similarities and differences in the graphs.

Standard 4: Geometry

8.4.1. Identify and describe basic properties of geometric shapes: altitudes, diagonals, angle and perpendicular bisectors, central angles, radii, diameters, and chords.

8.4.2. Perform simple constructions, such as bisectors of segments and angles, copies of segments and angles, and perpendicular segments. Describe and justify the constructions.

8.4.3. Identify properties of three-dimensional geometric objects (e.g., diagonals of rectangular solids) and describe how two or more figures intersect in a plane or in space.

8.4.4. Draw the translation (slide), rotation (turn), reflection (flip), and dilation (stretches and shrinks) of shapes.

8.4.5. Use the Pythagorean Theorem and its converse to solve problems in two and three dimensions.

Standard 5: Measurement

8.5.1. Convert common measurements for length, area, volume, weight, capacity, and time to equivalent measurements within the same system.

8.5.2. Solve simple problems involving rates and derived measurements for attributes such as velocity and density.

8.5.3. Solve problems involving scale factors, area, and volume using ratio and proportion.

8.5.4. Use formulas for finding the perimeter and area of basic two-dimensional shapes and the surface area and volume of basic three-dimensional shapes, including rectangles, parallelograms, trapezoids, triangles, circles, prisms, cylinders, spheres, cones, and pyramids.

8.5.5. Estimate and compute the area of irregular two-dimensional shapes and the volume of irregular three-dimensional objects by breaking them down into more basic geometric objects.

Standard 6: Data Analysis and Probability

8.6.1. Identify claims based on statistical data and, in simple cases, evaluate the reasonableness of the claims. Design a study to investigate the claim.

8.6.2. Identify different methods of selecting samples, analyzing the strengths and weaknesses of each method, and the possible bias in a sample or display.

8.6.3. Understand the meaning of, and be able to identify or compute the minimum value, the lower quartile, the median, the upper quartile, the interquartile range, and the maximum value of a data set.

8.6.4. Analyze, interpret, and display single- and two-variable data in appropriate bar, line, and circle graphs; stem-and-leaf plots; and box-and-whisker plots and explain which types of display are appropriate for various data sets.

8.6.5. Represent two-variable data with a scatterplot on the coordinate plane and describe how the data points are distributed. If the pattern appears to be linear, draw a line that appears to best fit the data and write the equation of that line

8.6.6. Understand and recognize equally likely events.

8.6.7. Find the number of possible arrangements of several objects by using the Basic Counting Principle.

Standard 7: Problem Solving

8.7.1. Analyze problems by identifying relationships, telling relevant from irrelevant information, identifying missing information, sequencing and prioritizing information, and observing patterns.

8.7.2. Make and justify mathematical conjectures based on a general description of a mathematical question or problem.

8.7.3. Decide when and how to divide a problem into simpler parts.

8.7.4. Apply strategies and results from simpler problems to solve more complex problems.

8.7.5. Make and test conjectures using inductive reasoning.

8.7.6. Express solutions clearly and logically using the appropriate mathematical terms and notation. Support solutions with evidence in both verbal and symbolic work.

8.7.7 Recognize the relative advantages of exact and approximate solutions to problems and give answers to a specified degree of accuracy.

8.7.8 Select and apply appropriate methods for estimating results of rational-number computations.

8.7.9 Use graphing to estimate solutions and check the estimates with analytic approaches.

8.7.10. Make precise calculations and check the validity of the results in the context of the problem.

8.7.11. Decide whether a solution is reasonable in the context of the original situation.

8.7.12 Note the method of finding the solution and show a conceptual understanding of the method by solving similar problems.

INDIANA Algebra I (A1)
Academic Standards

Standard 1: Operations with Real Numbers

A1.1.1. Compare real number expressions.

A1.1.2. Simplify square roots using factors.

A1.1.3. Understand and use the distributive, associative, and commutative properties.

A1.1.4. Use the laws of exponents for rational exponents.

A1.1.5. Use dimensional (unit) analysis to organize conversions and computations.

Standard 2: Linear Equations and Inequalities

A1.2.1. Solve linear equations.

A1.2.2. Solve equations and formulas for a specified variable.

A1.2.3. Find solution sets of linear inequalities when possible numbers are given for the variable.

A1.2.4. Solve linear inequalities using properties of order.

A1.2.5. Solve combined linear inequalities.

A1.2.6. Solve word problems that involve linear equations, formulas, and inequalities.

Standard 3: Relations and Functions

A1.3.1. Sketch a reasonable graph for a given relationship.

A1.3.2. Interpret a graph representing a given situation.

A1.3.3. Understand the concept of a function, decide if a given relation is a function, and link equations to functions.

A1.3.4. Find the domain and range of a relation.

Standard 4: Graphing Linear Equations and Inequalities

A1.4.1. Graph a linear equation.

A1.4.2. Find the slope, x-intercept, and y-intercept of a line given its graph, its equation, or two points on the line.

A1.4.3. Write the equation of a line in slope-intercept form. Understand how the slope and y-intercept of the graph are related to the equation.

A1.4.4. Write the equation of a line given appropriate information.

A1.4.5. Write the equation of a line that models a data set and use the equation (or the graph of the equation) to make predictions. Describe the slope of the line in terms of the data, recognizing that the slope is the rate of change.

A1.4.6. Graph a linear inequality in two variables.

Standard 5: Pairs of Linear Equations and Inequalities

A1.5.1. Use a graph to estimate the solution of a pair of linear equations in two variables.

A1.5.2. Use a graph to find the solution set of a pair of linear inequalities in two variables.

A1.5.3. Understand and use the substitution method to solve a pair of linear equations in two variables.

A1.5.4. Understand and use the addition or subtraction method to solve a pair of linear equations in two variables.

A1.5.5. Understand and use multiplication with the addition or subtraction method to solve a pair of linear equations in two variables.

A1.5.6. Use pairs of linear equations to solve word problems.

Standard 6: Polynomials

A1.6.1. Add and subtract polynomials.

A1.6.2. Multiply and divide monomials.

A1.6.3. Find powers and roots of monomials (only when the answer has an integer exponent).

A1.6.4. Multiply polynomials.

A1.6.5. Divide polynomials by monomials.

A1.6.6. Find a common monomial factor in a polynomial.

A1.6.7. Factor the difference of two squares and other quadratics.

A1.6.8. Understand and describe the relationships among the solutions of an equation, the zeros of a function, the x-intercepts of a graph, and the factors of a polynomial expression.

Standard 7: Algebraic Fractions

A1.7.1. Simplify algebraic ratios.

A1.7.2. Solve algebraic proportions.

Standard 8: Quadratic, Cubic, and Radical Equations

A1.8.1. Graph quadratic, cubic, and radical equations.

A1.8.2. Solve quadratic equations by factoring.

A1.8.3. Solve quadratic equations in which a perfect square equals a constant.

A1.8.4. Complete the square to solve quadratic equations.

A1.8.5. Derive the quadratic formula by completing the square.

A1.8.6. Solve quadratic equations using the quadratic formula.

A1.8.7. Use quadratic equations to solve word problems.

A1.8.8. Solve equations that contain radical expressions.

A1.8.9. Use graphing technology to find approximate solutions of quadratic and cubic equations.

Standard 9: Mathematical Reasoning and Problem Solving

A1.9.1. Use a variety of problem-solving strategies, such as drawing a diagram, making a chart, guess-and-check, solving a simpler problem, writing an equation, and working backwards.

A1.9.2. Decide whether a solution is reasonable in the context of the original situation.

A1.9.3. Use the properties of the real number system and the order of operations to justify the steps of simplifying functions and solving equations.

A1.9.4. Understand that the logic of equation solving begins with the assumption that the variable is a number that satisfies the equation and that the steps taken when solving equations create new equations that have, in most cases, the same solution set as the original. Understand that similar logic applies to solving systems of equations simultaneously.

A1.9.5. Decide whether a given algebraic statement is true always, sometimes, or never (statements involving linear or quadratic expressions, equations, or inequalities).

A1.9.6. Distinguish between inductive and deductive reasoning, identifying and providing examples of each.

A1.9.7. Identify the hypothesis and conclusion in a logical deduction.

A1.9.8. Use counterexamples to show that statements are false, recognizing that a single counterexample is sufficient to prove a general statement false.

Standard 1: Number Sense and Computation

IM1.1.1. Compare real number expressions.

IM1.1.2. Simplify square roots using factors.

IM1.1.3. Understand and use the distributive, associative, and commutative properties.

IM1.1.4. Use the laws of exponents for rational exponents.

IM1.1.5. Use dimensional (unit) analysis to organize conversions and computations.

Standard 2: Algebra and Functions

IM1.2.1. Solve linear equations.

IM1.2.2. Solve equations and formulas for a specified variable.

IM1.2.3. Find solution sets of linear inequalities when possible numbers are given for the variable.

IM1.2.4. Solve linear inequalities using properties of order.

IM1.2.5. Solve word problems that involve linear equations, formulas, and inequalities.

IM1.2.6. Sketch a reasonable graph for a given relationship.

IM1.2.7. Interpret a graph representing a given situation.

IM1.2.8. Understand the concept of a function, decide if a given relation is a function, and link equations to functions.

IM1.2.9. Find the domain and range of a relation.

IM1.2.10 Graph a linear equation.

IM1.2.11. Find the slope, x-intercept, and y-intercept of a line given its graph, its equation, or two points on the line.

IM1.2.12. Write the equation of a line in slope-intercept form. Understand how the slope and y-intercept of the graph are related to the equation.

IM1.2.13. Write the equation of a line given appropriate information.

IM1.2.14. Write the equation of a line that models a data set and use the equation (or the graph of the equation) to make predictions. Describe the slope of the line in terms of the data, recognizing that the slope is the rate of change.

IM1.2.15. Use a graph to estimate the solution of a pair of linear equations in two variables.

IM1.2.16. Understand and use the substitution method to solve a pair of linear equations in two variables.

IM1.2.17. Understand and use the addition or subtraction method to solve a pair of linear equations in two variables.

IM1.2.18. Understand and use multiplication with the addition or subtraction method to solve a pair of linear equations in two variables.

IM1.2.19. Use pairs of linear equations to solve word problems.

IM1.2.20. Add and subtract polynomials.

IM1.2.21. Multiply and divide monomials.

IM1.2.22. Find powers and roots of monomials (only when the answer has an integer exponent).

IM1.2.23. Multiply polynomials.

IM1.2.24. Divide polynomials by monomials.

IM1.2.25. Understand and describe the relationships among the solutions of an equation, the zeros of a function, the x-intercepts of a graph, and the factors of a polynomial expression.

IM1.2.26. Graph quadratic, cubic, and radical equations.

IM1.2.27. Solve quadratic equations using the quadratic formula.

IM1.2.28. Use quadratic equations to solve word problems.

IM1.2.29. Use graphing technology to find approximate solutions of quadratic and cubic equations.

IM1.2.30. Graph exponential functions.

IM1.2.31. Solve word problems involving applications of exponential functions to growth and decay.

Standard 3: Geometry and Measurement

IM1.3.1. Identify and describe convex, concave, and regular polygons.

IM1.3.2. Apply transformations (slides, flips, turns, expansions, and contractions) to polygons to determine congruence, similarity, symmetry, and tessellations. Know that images formed by slides, flips, and turns are congruent to the original shape.

IM1.3.3. Find and use measures of sides, perimeters, and areas of polygons. Relate these measures to each other using formulas.

IM1.3.4. Use properties of congruent and similar quadrilaterals to solve problems involving lengths and areas.

IM1.3.5. Find and use measures of sides, perimeters, and areas of quadrilaterals. Relate these measures to each other using formulas.

IM1.3.6. Prove and use the Pythagorean Theorem.

IM1.3.7. Describe relationships between the faces, edges, and vertices of polyhedra.

IM1.3.8. Describe symmetries of geometric solids.

Standard 4: Data Analysis and Statistics

IM1.4.1. Construct a line plot.

IM1.4.2. Find measures of central tendency for a set of data.

IM1.4.3. Find skewness and symmetry from a graph of data.

IM1.4.4. Construct a histogram using a graphing calculator.

IM1.4.5. Identify clusters, gaps, and outliers for a set of data.

IM1.4.6. Find a linear transformation.

IM1.4.7. Construct a stem-and-leaf plot using a graphing calculator.

IM1.4.8. Find the mean absolute deviation for a set of data.

IM1.4.9. Find the standard deviation and describe its properties.

IM1.4.10. Construct a frequency table for a set of data.

IM1.4.11. Summarize and interpret sets of data using center and variability.

IM1.4.12. Construct a scatterplot from a set of data.

IM1.4.13. Calculate the sum of squared differences for a set of data.

IM1.4.14. Plot the least square regression line from a set of data.

IM1.4.15. Compare sets of data using scatterplots and the line $y = x$, and interpret these comparisons for real-world data.

IM1.4.16. Recognize patterns in tables and graphs that are modeled by linear equations.

Standard 5: Probability

IM1.5.1. Design and use simulations in order to estimate answers related to probability.

IM1.5.2. Use empirical (experimental) and theoretical probabilities.

IM1.5.3. Understand independent events.

IM1.5.4. Use the Law of Large Numbers to understand situations involving chance.

IM1.5.5. Understand the concept of a probability distribution. Understand how an approximate probability can be constructed using simulation involving chance.

Standard 6: Discrete Mathematics

IM1.6.1. Construct vertex-edge graph models involving relationships among a finite number of elements.

IM1.6.2. Construct digraphs.

IM1.6.3. Use Euler paths and circuits to solve real-world problems.

IM1.6.4. Develop the skill of algorithmic problem solving: designing, using, and analyzing systematic procedures for problem solving.

IM1.6.5. Use a recursion function to describe an exponential function.

IM1.6.6. Use a variety of recursion equations to describe a function.

IM1.6.7. Use a recursion function to describe a fractal.

IM1.6.8. Use an adjacency matrix to describe a vertex-edge graph.

IM1.6.9. Perform row and column sums for matrix equations.

Standard 7: Mathematical Reasoning and Problem Solving

IM1.7.1. Use a variety of problem-solving strategies, such as drawing a diagram, making a chart, guess-and-check, solving a simpler problem, writing an equation, and working backwards.

IM1.7.2. Decide whether a solution is reasonable in the context of the original situation.

IM1.7.3. Use the properties of the real number system and the order of operations to justify the steps of simplifying functions and solving equations.

IM1.7.4. Understand that the logic of equation solving begins with the assumption that the variable is a number that satisfies the equation and that the steps taken when solving equations create new equations that have, in most cases, the same solution set as the original. Understand that similar logic applies to solving systems of equations simultaneously.

IM1.7.5. Decide whether a given algebraic statement is true always, sometimes, or never (statements involving linear or quadratic expressions, equations, and inequalities).

IM1.7.6. Distinguish between inductive and deductive reasoning, identifying and providing examples of each.

IM1.7.7. Use counterexamples to show that statements are false, recognizing that a single counterexample is sufficient to prove a general statement false.

INDIANA Integrated Mathematics II (IM2)

Academic Standards

Standard 1: Algebra and Functions

IM2.1.1. Graph a linear inequality in two variables.

IM2.1.2. Interpret given situations as functions in graphs, formulas, and words.

IM2.1.3. Find a linear equation that models a data set using the median fit method and use the model to make predictions.

IM2.1.4. Graph quadratic functions. Apply transformations to quadratic functions. Find and interpret the zeros and maximum or minimum value of quadratic functions.

Standard 2: Geometry and Measurement

IM2.2.1. Find the lengths and midpoints of line segments in one- or two-dimensional coordinate systems.

IM2.2.2. Construct congruent segments and angles, angle bisectors, and parallel and perpendicular lines using a straight edge and compass, explaining and justifying the process used.

IM2.2.3. Find measures of interior and exterior angles of polygons, justifying the method used.

IM2.2.4. Identify and describe triangles that are right, acute, obtuse, scalene, isosceles, equilateral, and equiangular.

IM2.2.5. Define, identify, and construct altitudes, medians, angle bisectors, and perpendicular bisectors.

IM2.2.6. Use properties of congruent and similar triangles to solve problems involving lengths and areas.

IM2.2.7. Find measures of sides, perimeters, and areas of triangles. Relate these measures to each other using formulas.

IM2.2.8. Prove, understand, and apply the inequality theorems: triangle inequality, inequality in one triangle, and the hinge theorem.

IM2.2.9. State and apply the relationships that exist when the altitude is drawn to the hypotenuse of a right triangle.

IM2.2.10. Use special right triangles (30°-60° and 45°-45°) to solve problems.

IM2.2.11. Define and use the trigonometric functions (sine, cosine, tangent, cotangent, secant, cosecant) in terms of angles of right triangles.

IM2.2.12. Know and use the relationship $\sin^2 x + \cos^2 x = 1$.

IM2.2.13. Solve word problems involving right triangles.

IM2.2.14. Find the center of a given circle. Construct the circle that passes through three given points (not in a straight line).

IM2.2.15. Define and identify relationships among: radius, diameter, arc, measure of an arc, chord, secant, and tangent.

IM2.2.16. Prove theorems related to circles.

IM2.2.17. Construct tangents to circles and circumscribe and inscribe circles.

IM2.2.18. Define, find, and use measures of arcs and related angles (central, inscribed, and intersections of secants and tangents).

IM2.2.19. Define and identify congruent and concentric circles.

IM2.2.20. Define, find, and use measures of circumference, arc length, and areas of circles and sectors. Use these measures to solve problems.

IM2.2.21. Describe sets of points on spheres: chords, tangents, and great circles.

Standard 3: Data Analysis and Statistics

IM2.3.1. Describe the association between two variables by interpreting a scatterplot.

IM2.3.2. Interpret correlation coefficients.

IM2.3.3. Make predictions from the least squares regression line or its equation.

IM2.3.4. Understand that a correlation between two variables does not necessarily imply one directly causes the other.

IM2.3.5. Understand the effects of outliers on correlation coefficients, on the least squares regression line, and on the interpretations of correlation coefficients and regression lines in real-life contexts.

Standard 4: Probability

IM2.4.1 Construct a probability distribution by simulation and use it to understand and analyze the probabilistic situation.

IM2.4.2. Explore the geometric, or waiting-time, distribution.

IM2.4.3. Understand fundamental concepts of probability (e.g., independent events, multiplication rule, and expected value).

IM2.4.4. Understand and apply counting principles to compute combinations and permutations.

IM2.4.5. Use the basic counting principle, combinations, and permutations to compute probabilities.

Standard 5: Discrete Mathematics

IM2.5.1. Experience in mathematical modeling by building and using vertex-edge graph models to solve problems in a variety of real-world settings.

IM2.5.2. Develop the skill of algorithmic problem solving: designing, using, and analyzing systematic procedures for problem solving.

IM2.5.3. Optimize networks in different ways and in different contexts by finding minimal spanning trees, shortest paths, and Hamiltonian paths.

IM2.5.4. Use matrices to organize and display data in a variety of real-world settings.

IM2.5.5. Develop mathematical modeling skills by building matrix models and then apply the models to solve problems.

IM2.5.6. Apply matrix operations to solve problems (i.e., row sums, scalar multiplication, addition, subtraction, and matrix multiplication).

IM2.5.7. Use matrices and inverse matrices to answer questions that involve systems of linear equations.

IM2.5.8. Build and use matrix representations to model polygons, transformations, and computer animations.

Standard 6: Trigonometry

IM2.6.1. Explore properties and applications of the sine, cosine, and tangent ratios for the lengths of sides of right triangles.

Standard 7: Mathematical Reasoning and Problem Solving

IM2.7.1. Use the properties of the real number system and the order of operations to justify the steps of simplifying functions and solving equations.

IM2.7.2. Make conjectures about geometric ideas. Distinguish between information that supports a conjecture and the proof of a conjecture.

IM2.7.3. Write and interpret statements of the form "if – then" and "if and only if."

IM2.7.4. State, use, and examine the validity of the converse, inverse, and contrapositive of "if – then" statements.

IM2.7.5. Write geometric proofs, including proofs by contradiction and proofs involving coordinate geometry. Use and compare a variety of ways to present deductive proofs, such as flow charts, paragraphs, and two-column and indirect proofs.

IM2.7.6. Perform basic constructions, describing and justifying the procedures used. Distinguish between constructing and drawing geometric figures.

IM2.7.7. Decide if a given algebraic statement is true always, sometimes, or never (statements involving quadratic expressions).

IM2.7.8. Understand that the logic of equation solving begins with the assumption that the variable is a number that satisfies the equation and that the steps taken when solving equations create new equations that have, in most cases, the same solution as the original. Understand that similar logic applies to solving systems of equations simultaneously.

IM2.7.9. Use counterexamples to show that statements are false.

INDIANA Geometry (G)
Academic Standards

Standard 1: Points, Lines, Angles, and Planes

G.1.1 Find the lengths and midpoints of line segments in one- or two-dimensional coordinate systems.

G.1.2 Construct congruent segments and angles, angle bisectors, and parallel and perpendicular lines using a straight edge and compass, explaining and justifying the process used.

G.1.3 Understand and use the relationships between special pairs of angles formed by parallel lines and transversals.

G.1.4 Use coordinate geometry to find slopes, parallel lines, perpendicular lines, and equations of lines.

Standard 2: Polygons

G.2.1 Identify and describe convex, concave, and regular polygons.

G.2.2 Find measures of interior and exterior angles of polygons, justifying the method used.

G.2.3 Use properties of congruent and similar polygons to solve problems.

G.2.4 Apply transformations (slides, flips, turns, expansions, and contractions) to polygons to determine congruence, similarity, symmetry, and tessellations. Know that images formed by slides, flips, and turns are congruent to the original shape.

G.2.5 Find and use measures of sides, perimeters, and areas of polygons. Relate these measures to each other using formulas.

G.2.6 Use coordinate geometry to prove properties of polygons such as regularity, congruence, and similarity.

Standard 3: Quadrilaterals

G.3.1 Describe, classify, and understand relationships among the quadrilaterals square, rectangle, rhombus, parallelogram, trapezoid, and kite.

G.3.2 Use properties of congruent and similar quadrilaterals to solve problems involving lengths and areas.

G.3.3 Find and use measures of sides, perimeters, and areas of quadrilaterals. Relate these measures to each other using formulas.

G.3.4 Use coordinate geometry to prove properties of quadrilaterals, such as regularity, congruence, and similarity.

Standard 4: Triangles

G.4.1 Identify and describe triangles that are right, acute, obtuse, scalene, isosceles, equilateral, and equiangular.

G.4.2 Define, identify, and construct altitudes, medians, angle bisectors, and perpendicular bisectors.

G.4.3 Construct triangles congruent to given triangles.

G.4.4 Use properties of congruent and similar triangles to solve problems involving lengths and areas.

G.4.5 Prove and apply theorems involving segments divided proportionally.

G.4.6 Prove that triangles are congruent or similar and use the concept of corresponding parts of congruent triangles.

G.4.7 Find and use measures of sides, perimeters, and areas of triangles. Relate these measures to each other using formulas.

G.4.8 Prove, understand, and apply the inequality theorems: triangle inequality, inequality in one triangle, and the hinge theorem.

G.4.9 Use coordinate geometry to prove properties of triangles such as regularity, congruence, and similarity.

Standard 5: Right Triangles

G.5.1 Prove and use the Pythagorean Theorem.

G.5.2 State and apply the relationships that exist when the altitude is drawn to the hypotenuse of a right triangle.

G.5.3 Use special right triangles (30°-60° and 45°-45° to solve problems.

G.5.4 Define and use the trigonometric functions (sine, cosine, tangent, cotangent, secant, cosecant) in terms of angles of right triangles.

G.5.5 Know and use the relationship $\sin^2 x + \cos^2 x = 1$.

G.5.6 Solve word problems involving right triangles.

Standard 6: Circles

G.6.1 Find the center of a given circle. Construct the circle that passes through three given points (not in a straight line).

G.6.2 Define and identify relationships among: radius, diameter, arc, measure of an arc, chord, secant, and tangent.

G.6.3 Prove theorems related to circles.

G.6.4 Construct tangents to circles and circumscribe and inscribe circles.

G.6.5 Define, find, and use measures of arcs and related angles (central, inscribed, and intersections of secants and tangents).

G.6.6 Define and identify congruent and concentric circles.

G.6.7 Define, find, and use measures of circumference, arc length, and areas of circles and sectors. Use these measures to solve problems.

G.6.8 Find the equation of a circle in the coordinate plane in terms of its center and radius.

Standard 7: Polyhedra and Other Solids

G.7.1 Describe and make regular and nonregular polyhedra.

G.7.2 Describe the polyhedron that can be made from a given net (or pattern). Describe the net for a given polyhedron.

G.7.3 Describe relationships between the faces, edges, and vertices of polyhedra.

G.7.4 Describe symmetries of geometric solids.

G.7.5 Describe sets of points on spheres: chords, tangents, and great circles.

G.7.6 Identify and know properties of congruent and similar solids.

G.7.7 Find and use measures of sides, volumes of solids, and surface areas of solids. Relate these measures to each other using formulas.

Standard 8: Mathematical Reasoning and Problem Solving

G.8.1 Use a variety of problem-solving strategies, such as drawing a diagram, making a chart, guess-and-check, solving a simpler problem, writing an equation, and working backwards.

G.8.2 Decide whether a solution is reasonable in the context of the original situation.

G.8.3 Make conjectures about geometric ideas. Distinguish between information that supports a conjecture and the proof of a conjecture.

G.8.4 Write and interpret statements of the form "if – then" and "if and only if."

G.8.5 State, use, and examine the validity of the converse, inverse, and contrapositive of "if – then" statements.

G.8.6 Identify and give examples of undefined terms, axioms, and theorems, and inductive and deductive proofs.

G.8.7 Construct logical arguments, judge their validity, and give counterexamples to disprove statements.

G.8.8 Write geometric proofs, including proofs by contradiction and proofs involving coordinate geometry. Use and compare a variety of ways to present deductive proofs, such as flow charts, paragraphs, and two-column and indirect proofs.

G.8.9 Perform basic constructions, describing and justifying the procedures used. Distinguish between constructing and drawing geometric figures.

INDIANA Algebra II (A2)
Academic Standards

Standard 1: Relations and Functions

A2.1.1. Recognize and graph various types of functions, including polynomial, rational, and algebraic functions.

A2.1.2. Use function notation. Add, subtract, multiply, and divide pairs of functions.

A2.1.3. Understand composition of functions and combine functions by composition.

A2.1.4. Graph relations and functions with and without graphing technology.

A2.1.5. Find the zeros of a function.

A2.1.6. Solve an inequality by examining the graph.

A2.1.7. Graph functions defined piece-wise.

A2.1.8. Interpret given situations as functions in graphs, formulas, and words.

Standard 2: Linear Absolute Value Equations and Inequalities

A2.2.1. Graph absolute value equations and inequalities.

A2.2.2. Use substitution, elimination, and matrices to solve systems of two or three linear equations in two or three variables.

A2.2.3. Use systems of linear equations and inequalities to solve word problems.

A2.2.4. Find a linear equation that models a data set using the median fit method and use the model to make predictions.

Standard 3: Quadratic Equations and Functions

A2.3.1. Define complex numbers and perform basic operations with them.

A2.3.2. Understand how real and complex numbers are related, including plotting complex numbers as points in the plane.

A2.3.3. Solve quadratic equations in the complex number system.

A2.3.4. Graph quadratic functions. Apply transformations to quadratic functions. Find and interpret the zeros and maximum or minimum value of quadratic functions.

A2.3.5. Solve word problems using quadratic equations.

A2.3.6. Solve equations that contain radical expressions.

A2.3.7. Solve pairs of equations, one quadratic and one linear or both quadratic.

Standard 4: Conic Sections

A2.4.1. Write the equations of conic sections (circle, ellipse, parabola, and hyperbola).

A2.4.2. Graph conic sections.

Standard 5: Polynomials

A2.5.1. Understand the binomial theorem and use it to expand binomial expressions raised to positive integer powers.

A2.5.2. Divide polynomials by others of lower degree.

A2.5.3. Factor polynomials completely and solve polynomial equations by factoring.

A2.5.4. Use graphing technology to find approximate solutions for polynomial equations.

A2.5.5. Use polynomial equations to solve word problems.

A2.5.6. Write a polynomial equation given its solutions.

A2.5.7. Understand and describe the relationships among the solutions of an equation, the zeros of a function, the x-intercepts of a graph, and the factors of a polynomial expression.

Standard 6: Algebraic Fractions

A2.6.1. Understand and use negative and fractional exponents.

A2.6.2. Add, subtract, multiply, divide, and simplify algebraic fractions.

A2.6.3. Simplify complex fractions.

A2.6.4. Solve equations involving algebraic fractions.

A2.6.5. Solve word problems involving fractional equations.

A2.6.6. Solve problems of direct, inverse, and joint variation.

Standard 7: Logarithmic and Exponential Functions

A2.7.1. Graph exponential functions.

A2.7.2. Prove simple laws of logarithms.

A2.7.3. Understand and use the inverse relationship between exponents and logarithms.

A2.7.4. Solve logarithmic and exponential equations and inequalities.

A2.7.5. Use the definition of logarithms to convert logarithms from one base to another.

A2.7.6. Use the properties of logarithms to simplify logarithmic expressions and to find their approximate values.

A2.7.7. Use calculators to find decimal approximations of natural and common logarithmic numeric expressions.

A2.7.8. Solve word problems involving applications of exponential functions to growth and decay.

Standard 8: Sequences and Series

A2.8.1. Define arithmetic and geometric sequences and series.

A2.8.2. Find specified terms of arithmetic and geometric sequences.

A2.8.3. Find partial sums of arithmetic and geometric series.

A2.8.4. Solve word problems involving applications of sequences and series.

Standard 9: Counting Principles and Probability

A2.9.1. Understand and apply counting principles to compute combinations and permutations.

A2.9.2. Use the basic counting principle, combinations, and permutations to compute probabilities.

Standard 10: Mathematical Reasoning and Problem Solving

A2.10.1. Use a variety of problem-solving strategies, such as drawing a diagram, guess-and-check, solving a simpler problem, writing an equation, and working backwards.

A2.10.2. Decide whether a solution is reasonable in the context of the original situation.

A2.10.3. Decide if a given algebraic statement is true always, sometimes, or never (statements involving rational or radical expressions or logarithmic or exponential functions).

A2.10.4. Use the properties of number systems and the order of operations to justify the steps of simplifying functions and solving equations.

A2.10.5. Understand that the logic of equation solving begins with the assumption that the variable is a number that satisfies the equation and that the steps taken when solving equations create new equations that have, in most cases, the same solution set as the original. Understand that similar logic applies to solving systems of equations simultaneously.

A2.10.6. Use counterexamples to show that statements are false.

Standard 1: Algebra and Functions

IM3.1.1. Solve combined linear inequalities.

IM3.1.2. Use a graph to find the solution set of a pair of linear inequalities in two variables.

IM3.1.3. Find a common monomial factor in a polynomial.

IM3.1.4. Factor the difference of two squares and other quadratics.

IM3.1.5. Simplify algebraic ratios.

IM3.1.6. Solve algebraic proportions.

IM3.1.7. Solve quadratic equations by factoring.

IM3.1.8. Solve quadratic equations in which a perfect square equals a constant.

IM3.1.9. Complete the square to solve quadratic equations.

IM3.1.10. Derive the quadratic formula by completing the square.

IM3.1.11. Solve equations that contain radical expressions.

IM3.1.12. Recognize and graph various types of functions, including polynomial, rational, and algebraic functions.

IM3.1.13. Use function notation. Add, subtract, multiply, and divide pairs of functions.

IM3.1.14 Understand composition of functions and combine functions by composition

IM3.1.15. Graph relations and functions with and without graphing technology.

IM3.1.16. Find the zeros of a function.

IM3.1.17. Solve an inequality by examining the graph.

IM3.1.18. Graph functions defined piece-wise.

IM3.1.19. Graph absolute value equations and inequalities.

IM3.1.20. Use substitution, elimination, and matrices to solve systems of two or three equations in two or three variables.

IM3.1.21. Use systems of linear equations and inequalities to solve word problems.

IM3.1.22. Define complex numbers and perform basic operations with them.

IM3.1.23. Understand how real and complex numbers are related, including plotting complex numbers as points in the plane.

IM3.1.24. Solve quadratic equations in the complex number system.

IM3.1.25. Solve word problems using quadratic equations.

IM3.1.26. Solve equations that contain radical expressions.

IM3.1.27. Solve pairs of equations, one quadratic and one linear or both quadratic.

IM3.1.28. Write the equations of conic sections (circle, ellipse, parabola, and hyperbola).

IM3.1.29. Graph conic sections.

IM3.1.30. Understand the binomial theorem and use it to expand binomial expressions raised to positive integer powers.

IM3.1.31. Divide polynomials by others of lower degree.

IM3.1.32. Factor polynomials completely and solve polynomials by factoring.

IM3.1.33. Use graphing technology to find approximate solutions for polynomial equations.

IM3.1.34. Use polynomial equations to solve word problems.

IM3.1.35. Write a polynomial equation given its solutions.

IM3.1.36. Understand and describe the relationships among the solutions of an equation, the zeros of a function, the x-intercepts of a graph, and the factors of a polynomial expression.

IM3.1.37. Understand and use negative and fractional exponents.

IM3.1.38. Add, subtract, multiply, divide, and simplify algebraic fractions.

IM3.1.39. Simplify complex fractions.

IM3.1.40. Solve equations involving algebraic fractions.

IM3.1.41. Solve word problems involving fractional equations.

IM3.1.42. Solve problems of direct, inverse, and joint variation.

IM3.1.43. Prove simple laws of logarithms.

IM3.1.44. Understand and use the inverse relationship between exponents and logarithms.

IM3.1.45. Solve logarithmic and exponential equations and inequalities.

IM3.1.46. Use the definition of logarithms to convert logarithms from one base to another.

IM3.1.47. Use the properties of logarithms to simplify logarithmic expressions and to find their approximate values.

IM3.1.48. Use calculators to find decimal approximations of natural and common logarithmic numeric expressions.

IM3.1.49. Solve word problems involving applications of exponential functions to growth and decay.

IM3.1.50. Define arithmetic and geometric sequences and series.

IM3.1.51. Find specified terms of arithmetic and geometric sequences.

IM3.1.52. Find partial sums of arithmetic and geometric series.

IM3.1.53. Solve word problems involving applications of sequences and series.

Standard 2: Geometry and Measurement

IM3.2.1. Understand and use the relationships between special pairs of angles formed by parallel lines and transversals.

IM3.2.2. Use coordinate geometry to find slopes, parallel lines, perpendicular lines, and equations of lines.

IM3.2.3. Use properties of congruent and similar polygons to solve problems.

IM3.2.4. Use coordinate geometry to prove properties of polygons such as regularity, congruence, and similarity.

IM3.2.5. Describe, classify, and understand relationships among the quadrilaterals square, rectangles, rhombus, parallelogram, trapezoid, and kite.

IM3.2.6. Use coordinate geometry to prove properties of quadrilaterals such as regularity, congruence, and similarity.

IM3.2.7. Construct triangles congruent to given triangles.

IM3.2.8. Prove and apply theorems involving segments divided proportionally.

IM3.2.9. Prove that triangles are congruent or similar and use the concept of corresponding parts of congruent triangles.

IM3.2.10. Use coordinate geometry to prove properties of triangles such as regularity, congruence, and similarity.

IM3.2.11. Find the equation of a circle in the coordinate plane in terms of its center and radius.

IM3.2.12. Describe and make regular and nonregular polyhedra.

IM3.2.13. Describe the polyhedron that can be made from a given net (or pattern). Describe the net for a given polygon.

IM3.2.14. Identify and know properties of congruent and similar solids.

IM3.2.15. Find and use measures of sides, volumes of solids, and surface areas of solids. Relate these measures to each other using formulas.

Standard 3: Data Analysis and Statistics

IM3.3.1. Understand and apply basic ideas related to the design and interpretation of surveys, such as background information, random sampling, and bias.

IM3.3.2. Construct simulated sampling distributions of sample proportions and use sampling distributions to identify which proportions are likely to be found in a sample of a given size.

IM3.3.3. Construct and interpret margin of error and confidence intervals for population proportions.

IM3.3.4. Understand the standard deviation as a measure of variability in a distribution.

Standard 4: Probability

IM3.4.1. Understand and apply the Addition Rule for mutually exclusive events.

Standard 5: Discrete Mathematics

IM3.5.1. Use iteration and recursion as tools to represent, analyze, and solve problems involving sequential change.

IM3.5.2. Explore function iteration and, in the process, informally introduce function composition.

IM3.5.3. Understand and apply recursion equations, particularly combined recursion equations of the form $A_n = rA_{n-1} + b$.

Standard 6: Trigonometry

IM3.6.1. Find the measures of sides and angles in triangles using the Law of Sines.

IM3.6.2. Find the measures of sides and angles in triangles using the Law of Cosines.

IM3.6.3. Compare and contrast families of trigonometric functions.

Standard 7: Mathematical Reasoning and Problem Solving

IM3.7.1. Understand that the logic of equation solving begins with the assumption that the variable is a number that satisfies the equation and that the steps taken when solving equations create new equations that have, in most cases, the same solution set as the original. Understand that similar logic applies to solving systems of equations simultaneously.

IM3.7.2. Decide whether a given algebraic statement is true always, sometimes, or never (statements involving rational or radical expressions or logarithmic or exponential functions).

IM3.7.3. Distinguish between inductive and deductive reasoning, identifying and providing examples of each.

IM3.7.4. Identify the hypothesis and conclusion in a logical deduction.

IM3.7.5. Use counterexamples to show that statements are false, recognizing that a single counterexample is sufficient to prove a general statement false.

IM3.7.6. Use the properties of number systems and the order of operations to justify the steps of simplifying functions and solving equations.

IM3.7.7. Identify and give examples of undefined terms, axioms, and theorems, and inductive and deductive proofs.

IM3.7.8. Construct logical arguments, judge their validity, and give counterexamples to disprove statements.

INDIANA Pre-Calculus (PC)
Academic Standards

Standard 1: Relations and Functions

PC.1.1. Recognize and graph various types of functions, including polynomial, rational, algebraic, and absolute value functions. Use paper and pencil methods and graphing calculators.

PC.1.2. Find domain, range, intercepts, zeros, asymptotes, and points of discontinuity of functions. Use paper and pencil methods and graphing calculators.

PC.1.3. Model and solve word problems using functions and equations.

PC.1.4. Define, find, and check inverse functions.

PC.1.5. Describe the symmetry of the graph of a function.

PC.1.6. Decide if functions are even or odd.

PC.1.7. Apply transformations to functions.

PC.1.8. Understand curves defined parametrically and draw their graphs.

PC.1.9. Compare relative magnitudes of functions and their rates of change.

PC.1.10. Write the equations of conic sections in standard form (completing the square and using translations as necessary), in order to find the type of conic section and to find its geometric properties (foci, asymptotes, eccentricity, etc.).

Standard 2: Logarithmic and Exponential Functions

PC.2.1. Solve word problems involving applications of logarithmic and exponential functions.

PC.2.2. Find the domain, range, intercepts, and asymptotes of logarithmic and exponential functions.

PC.2.3. Draw and analyze graphs of logarithmic and exponential functions.

PC.2.4. Define, find, and check inverse functions of logarithmic and exponential functions.

Standard 3: Trigonometry in Triangles

PC.3.1. Solve word problems involving right and oblique triangles.

PC.3.2. Apply the laws of sines and cosines to solving problems.

PC.3.3. Find the area of a triangle given two sides and the angle between them.

Standard 4: Trigonometric Functions

PC.4.1. Define sine and cosine using the unit circle.

PC.4.2. Convert between degree and radian measures.

PC.4.3. Learn exact sine, cosine, and tangent values for 0, $\pi/2$, $\pi/3$, $\pi/4$, $\pi/6$, and multiples of π. Use those values to find other trigonometric values.

PC.4.4. Solve word problems involving applications of trigonometric functions.

PC.4.5. Define and graph trigonometric functions (i.e., sine, cosine, tangent, cotangent, secant, cosecant).

PC.4.6. Find domain, range, intercepts, periods, amplitudes, and asymptotes of trigonometric functions.

PC.4.7. Draw and analyze graphs of translations of trigonometric functions, including period, amplitude, and phase shift.

PC.4.8. Define and graph inverse trigonometric functions.

PC.4.9. Find values of trigonometric and inverse trigonometric functions.

PC.4.10. Know that the tangent of the angle that a line makes with the x-axis is equal to the slope of the line.

PC.4.11. Make connections between right triangle ratios, trigonometric functions, and circular functions.

Standard 5: Trigonometric Identities and Equations

PC.5.1. Know the basic trigonometric identity $\cos^2 x + \sin^2 x = 1$ and prove that it is equivalent to the Pythagorean Theorem.

PC.5.2. Use basic trigonometric identities to verify other identities and simplify expressions.

PC.5.3. Understand and use the addition formulas for sines, cosines, and tangents.

PC.5.4. Understand and use the half-angle and double-angle formulas for sines, cosines, and tangents.

PC.5.5. Solve trigonometric equations.

PC.5.6. Solve word problems involving applications of trigonometric equations.

Standard 6: Polar Coordinates and Complex Numbers

PC.6.1. Define polar coordinates and relate polar coordinates to Cartesian coordinates.

PC.6.2. Represent equations given in rectangular coordinates in terms of polar coordinates.

PC.6.3. Graph equations in the polar coordinate plane.

PC.6.4. Define complex numbers, convert complex numbers to trigonometric form, and multiply complex numbers in trigonometric form.

PC.6.5. State, prove, and use De Moivre's Theorem.

Standard 7: Sequences and Series

PC.7.1. Understand and use summation notation.

PC.7.2. Find sums of infinite geometric series.

PC.7.3. Prove and use the sum formulas for arithmetic series and for finite and infinite geometric series.

PC.7.4. Use recursion to describe a sequence.

PC.7.5. Understand and use the concept of limit of a sequence or function as the independent variable approaches infinity or a number. Decide whether simple sequences converge or diverge.

PC.7.6. Solve word problems involving applications of sequences and series.

Standard 8: Data Analysis

PC.8.1. Find linear models using the median fit and least squares regression methods. Decide which model gives a better fit.

PC.8.2. Calculate and interpret the correlation coefficient. Use the correlation coefficient and residuals to evaluate a "best-fit" line.

PC.8.3. Find a quadratic, exponential, logarithmic, power, or sinusoidal function to model a data set and explain the parameters of the model.

Standard 9: Mathematical Reasoning and Problem Solving

PC.9.1. Use a variety of problem-solving strategies, such as drawing a diagram, guess-and-check, solving a simpler problem, examining simpler problems, and working backwards.

PC.9.2. Decide whether a solution is reasonable in the context of the original situation.

PC.9.3. Decide if a given algebraic statement is true always, sometimes, or never (statements involving rational or radical expressions, trigonometric, logarithmic or exponential functions).

PC.9.4. Use the properties of number systems and order of operations to justify the steps of simplifying functions and solving equations.

PC.9.5. Understand that the logic of equation solving begins with the assumption that the variable is a number that satisfies the equation, and that the steps taken when solving equations create new equations that have, in most cases, the same solution set as the original. Understand that similar logic applies to solving systems of equations simultaneously.

PC.9.6. Define and use the mathematical induction method of proof.

INDIANA Grade 8 Science
Academic Standards

Standard 1: The Nature of Science and Technology

The Scientific View of the World

8.1.1. Recognize that and describe how scientific knowledge is subject to modification as new information challenges prevailing theories and as a new theory leads to looking at old observations in a new way.

8.1.2. Recognize and explain that some matters cannot be examined usefully in a scientific way.

Scientific Inquiry

8.1.3. Recognize and describe that if more than one variable changes at the same time in an experiment, the outcome of the experiment may not be attributable to any one of the variables.

The Scientific Enterprise

8.1.4. Explain why accurate record keeping, openness, and replication are essential for maintaining an investigator's credibility with other scientists and society.

8.1.5. Explain why research involving human subjects requires that potential subjects be fully informed about the risks and benefits associated with the research and that they have the right to refuse to participate.

Technology and Science

8.1.6. Identify the constraints that must be taken into account as a new design is developed, such as gravity and the properties of the materials to be used.

8.1.7. Explain why technology issues are rarely simple and one-sided because contending groups may have different values and priorities.

8.1.8. Explain that humans help shape the future by generating knowledge, developing new technologies, and communicating ideas to others.

Standard 2: Scientific Thinking

Computation and Estimation

8.2.1. Estimate distances and travel times from maps and the actual size of objects from scale drawings.

8.2.2. Determine in what units, such as seconds, meters, grams, etc., an answer should be expressed based on the units of the inputs to the calculation.

Manipulation and Observation

8.2.3. Use proportional reasoning to solve problems.

8.2.4. Use technological devices, such as calculators and computers, to perform calculations.

8.2.5. Use computers to store and retrieve information in topical, alphabetical, numerical, and keyword files and create simple files of students' own devising.

Communication

8.2.6. Write clear, step-by-step instructions (procedural summaries) for conducting investigations, operating something, or following a procedure.

8.2.7. Participate in group discussions on scientific topics by restating or summarizing accurately what others have said, asking for clarification or elaboration, and expressing alternative positions.

8.2.8. Use tables, charts, and graphs in making arguments and claims in, for example, oral and written presentations about lab or fieldwork.

Critical Response Skills

8.2.9. Explain why arguments are invalid if based on very small samples of data, biased samples, or samples for which there was no control sample.

8.2.10. Identify and criticize the reasoning in arguments in which fact and opinion are intermingled or the conclusions do not follow logically from the evidence given, an analogy is not apt, no mention is made of whether the control group is very much like the experimental group, or all members of a group are implied to have nearly identical characteristics that differ from those of other groups.

Standard 3: The Physical Setting

The Universe

8.3.1. Explain that large numbers of chunks of rock orbit the sun and some of this rock interacts with Earth.

Earth and the Processes That Shape It

8.3.2. Explain that the slow movement of material within Earth results from heat flowing out of the deep interior and the action of gravitational forces on regions of different density.

8.3.3. Explain that the solid crust of Earth, including both the continents and the ocean basins, consists of separate plates that ride on a denser, hot, gradually deformable layer of earth. Understand that the crust sections move very slowly, pressing against one another in some places, pulling apart in other places. Further understand that ocean-floor plates may slide under continental plates, sinking deep into Earth, and that the surface layers of these plates may fold, forming mountain ranges.

8.3.4. Explain that earthquakes often occur along the boundaries between colliding plates, and molten rock from below creates pressure that is released by volcanic eruptions, helping to build up mountains. Understand that

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under the ocean basins, molten rock may well up between separating plates to create new ocean floor. Further understand that volcanic activity along the ocean floor may form undersea mountains, which can thrust above the ocean's surface to become islands.

8.3.5. Explain that everything on or anywhere near Earth is pulled toward Earth's center by a gravitational force.

8.3.6. Understand and explain that the benefits of Earth's resources, such as fresh water, air, soil, and trees, are finite and can be reduced by using them wastefully or by deliberately or accidentally destroying them.

8.3.7. Explain that the atmosphere and the oceans have a limited capacity to absorb wastes and recycle materials naturally.

Matter and Energy

8.3.8. Explain that all matter is made up of atoms which are far too small to see directly through an optical microscope. Understand that the atoms of any element are similar but are different from atoms of other elements. Further understand that atoms may stick together in well-defined molecules or may be packed together in large arrays. Also understand that different arrangements of atoms into groups comprise all substances.

8.3.9. Demonstrate, using drawings and models, the movement of atoms in a solid, liquid, and gaseous state. Explain that atoms and molecules are perpetually in motion.

8.3.10. Explain that increased temperature means that atoms have a greater average energy of motion and that most gases expand when heated.

8.3.11. Describe how groups of elements can be classified based on similar properties, including highly reactive metals, less reactive metals, highly reactive nonmetals, less reactive nonmetals, and some almost completely nonreactive gases.

8.3.12. Explain that no matter how substances within a closed system interact with one another, or how they combine or break apart, the total mass of the system remains the same. Understand that the atomic theory explains the conservation of matter: if the number of atoms stays the same no matter how they are rearranged, then their total mass stays the same.

8.3.13. Explain that energy cannot be created or destroyed but only changed from one form into another.

8.3.14. Describe how heat can be transferred through materials by the collision of atoms, or across space by radiation, or if the material is fluid, by convection currents that are set up in it that aid the transfer of heat.

8.3.15. Identify different forms of energy that exist in nature.

Forces of Nature

8.3.16. Explain that every object exerts gravitational force on every other object and that the force depends on how much mass the objects have and how far apart they are.

8.3.17. Explain that the sun's gravitational pull holds Earth and the other planets in their orbits, just as the planets' gravitational pull keeps their moons in orbit around them.

8.3.18. Investigate and explain that electric currents and magnets can exert force on each other.

8.3.19. Investigate and compare series and parallel circuits.

8.3.20. Compare the differences in power consumption in different electrical devices.

Standard 4: The Living Environment

Diversity of Life

8.4.1. Differentiate between inherited traits, such as hair color or flower color, and acquired skills, such as manners.

8.4.2. Describe that in some organisms, such as yeast or bacteria, all genes come from a single parent, while in those that have sexes, typically half of the genes come from each parent.

8.4.3. Recognize and describe that new varieties of cultivated plants, such as corn and apples, and domestic animals, such as dogs and horses, have resulted from selective breeding for particular traits.

Interdependence of Life and Evolution

8.4.4. Describe how matter is transferred from one organism to another repeatedly and between organisms and their physical environment.

8.4.5. Explain that energy can be transferred from one form to another in living things.

8.4.6. Describe how animals get their energy from oxidizing their food and releasing some of this energy as heat.

8.4.7. Recognize and explain that small genetic differences between parents and offspring can accumulate in successive generations so that descendants are very different from their ancestors.

8.4.8. Describe how environmental conditions affect the survival of individual organisms and how entire species may prosper in spite of the poor survivability or bad fortune of individuals.

Human Identity

8.4.9. Recognize and describe that fossil evidence is consistent with the idea that human beings evolved from earlier species.

Standard 5: The Mathematical World

Numbers

8.5.1. Understand and explain that a number must be written with an appropriate number of significant figures (determined by the measurements from which the number is derived).

Shapes and Symbolic Relationships

8.5.2. Show that an equation containing a variable may be true for just one value of the variable.

8.5.3. Demonstrate that mathematical statements can be used to describe how one quantity changes when another changes.

8.5.4. Illustrate how graphs can show a variety of possible relationships between two variables.

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8.5.5. Illustrate that it takes two numbers to locate a point on a map or any other two-dimensional surface.

Reasoning and Uncertainty

8.5.6. Explain that a single example can never prove that something is always true, but it could prove that something is not always true.

8.5.7. Recognize and describe the danger of making over-generalizations when inventing a general rule based on a few observations.

8.5.8. Explain how estimates can be based on data from similar conditions in the past or on the assumption that all the possibilities are known.

8.5.9. Compare the mean, median, and mode of a data set.

8.5.10. Explain how the comparison of data from two groups involves comparing both their middles and the spreads.

Standard 6: Historical Perspectives

8.6.1. Understand and explain that Antoine Lavoisier's work was based on the idea that when materials react with each other, many changes can take place, but that in every case the total amount of matter afterward is the same as before. Note that Lavoisier successfully tested the concept of conservation of matter by conducting a series of experiments in which he carefully measured the masses of all the substances involved in various chemical reactions, including the gases used and those given off.

8.6.2. Understand and describe that the accidental discovery that minerals containing uranium darken photographic film, as light does, led to the discovery of radioactivity.

8.6.3. Understand that and describe how in their laboratory in France, Marie Curie and her husband, Pierre Curie, isolated two new elements that were the source of most of the radioactivity of uranium ore. Note that they named one radium because it gave off powerful invisible rays, and the other polonium in honor of Madame Curie's country of birth, Poland. Also note that Marie Curie was the first scientist ever to win the Nobel Prize in two different fields, in physics, shared with her husband, and later in chemistry.

8.6.4. Describe how the discovery of radioactivity as a source of Earth's heat energy made it possible to understand how Earth can be several billion years old and still have a hot interior.

Standard 7: Common Themes

Systems

8.7.1. Explain that a system usually has some properties that are different from those of its parts but appear because of the interaction of those parts.

8.7.2. Explain that even in some very simple systems, it may not always be possible to predict accurately the result of changing some part or connection.

Models and Scale

8.7.3. Use technology to assist in graphing and with simulations that compute and display results of changing factors in models.

8.7.4. Explain that as the complexity of any system increases, gaining an understanding of it depends on summaries, such as averages and ranges, and on descriptions of typical examples of that system.

Constancy and Change

8.7.5. Observe and describe that a system may stay the same because nothing is happening or because things are happening that counteract one another.

8.7.6. Recognize that and describe how symmetry may determine properties of many objects, such as molecules, crystals, organisms, and designed structures.

8.7.7. Illustrate how things, such as seasons or body temperature, occur in cycles.

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Standard 1: Principles of Earth and Space Science

The Universe

ES.1.1. Understand and discuss the nebular theory concerning the formation of solar systems. Include in the discussion the roles of planetesimals and protoplanets.

ES.1.2. Differentiate between the different types of stars found on the Hertzsprung-Russell Diagram. Compare and contrast the evolution of stars of different masses. Understand and discuss the basics of the fusion processes that are the source of energy of stars.

ES.1.3. Compare and contrast the differences in size, temperature, and age between our sun and other stars.

ES.1.4. Describe Hubble's law. Identify and understand that the Big Bang theory is the most widely accepted theory explaining the formation of the universe.

ES.1.5. Understand and explain the relationship between planetary systems, stars, multiple-star systems, star clusters, galaxies, and galactic groups in the universe.

ES.1.6. Discuss how manned and unmanned space vehicles can be used to increase our knowledge and understanding of the universe.

ES.1.7. Describe the characteristics and motions of the various kinds of objects in our solar system, including planets, satellites, comets, and asteroids. Explain that Kepler's laws determine the orbits of the planets.

ES.1.8. Discuss the role of sophisticated technology, such as telescopes, computers, space probes, and particle accelerators, in making computer simulations and mathematical models in order to form a scientific account of the universe.

ES.1.9. Recognize and explain that the concept of conservation of energy is at the heart of advances in fields as diverse as the study of nuclear particles and the study of the origin of the universe.

Earth

ES.1.10. Recognize and describe that earth sciences address planet-wide interacting systems, including the oceans, the air, the solid earth, and life on Earth, as well as interactions with the Solar System.

ES.1.11. Examine the structure, composition, and function of Earth's atmosphere. Include the role of living organisms in the cycling of atmospheric gases.

ES.1.12. Describe the role of photosynthetic plants in changing Earth's atmosphere.

ES.1.13. Explain the importance of heat transfer between and within the atmosphere, land masses, and oceans.

ES.1.14. Understand and explain the role of differential heating and the role of Earth's rotation on the movement of air around the planet.

ES.1.15. Understand and describe the origin, life cycle, behavior, and prediction of weather systems.

ES.1.16. Investigate the causes of severe weather, and propose appropriate safety measures that can be taken in the event of severe weather.

ES.1.17. Describe the development and dynamics of climatic changes over time, such as the cycles of glaciation.

ES.1.18. Demonstrate the possible effects of atmospheric changes brought on by things such as acid rain, smoke, volcanic dust, greenhouse gases, and ozone depletion.

ES.1.19. Identify and discuss the effects of gravity on the waters of Earth. Include both the flow of streams and the movement of tides.

ES.1.20. Describe the relationship among ground water, surface water, and glacial systems.

ES.1.21. Identify the various processes that are involved in the water cycle.

ES.1.22. Compare the properties of rocks and minerals and their uses.

Processes That Shape Earth

ES.1.23. Explain motions, transformations, and locations of materials in Earth's lithosphere and interior. For example, describe the movement of the plates that make up Earth's crust and the resulting formation of earthquakes, volcanoes, trenches, and mountains.

ES.1.24. Understand and discuss continental drift, sea-floor spreading, and plate tectonics. Include evidence that supports the movement of the plates, such as magnetic stripes on the ocean floor, fossil evidence on separate continents, and the continuity of geological features.

ES.1.25. Investigate and discuss the origin of various landforms, such as mountains and rivers, and how they affect and are affected by human activities.

ES.1.26. Differentiate among the processes of weathering, erosion, transportation of materials, deposition, and soil formation.

ES.1.27. Illustrate the various processes that are involved in the rock cycle and discuss how the total amount of material stays the same through formation, weathering, sedimentation, and reformation.

ES.1.28. Discuss geologic evidence, including fossils and radioactive dating, in relation to Earth's past.

ES.1.29. Recognize and explain that in geologic change, the present arises from the materials of the past in ways that can be explained according to the same physical and chemical laws.

Standard 2: Historical Perspectives of Earth and Space Science

ES.2.1. Understand and explain that Claudius Ptolemy, an astronomer living in the second century, devised a powerful mathematical model of the universe based on constant motion in perfect circles and circles on circles. Further understand that with the model, he was able to predict the motions of the sun, moon, and stars, and even of the irregular "wandering stars" now called planets.

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ES.2.2. Understand that and describe how in the sixteenth century the Polish astronomer Nicholas Copernicus suggested that all those same motions outlined by Ptolemy could be explained by imagining that Earth was turning on its axis once a day and orbiting around the sun once a year. Note that this explanation was rejected by nearly everyone because it violated common sense and required the universe to be unbelievably large. Also understand that Copernicus's ideas flew in the face of belief, universally held at the time, that Earth was at the center of the universe.

ES.2.3. Understand that and describe how Johannes Kepler, a German astronomer who lived at about the same time as Galileo, used the unprecedented precise observational data of the Danish astronomer Tycho Brahe. Know that Kepler showed mathematically that Copernicus's idea of a sun-centered system worked better than any other system if uniform circular motion was replaced with variable-speed, but predictable, motion along off-center ellipses.

ES.2.4. Explain that by using the newly invented telescope to study the sky, Galileo made many discoveries that supported the ideas of Copernicus. Recognize that it was Galileo who found the moons of Jupiter, sunspots, craters and mountains on the moon, the phases of Venus, and many more stars than were visible to the unaided eye.

ES.2.5. Explain that the idea that Earth might be vastly older than most people believed made little headway in science until the work of Lyell and Hutton.

ES.2.6. Describe that early in the twentieth century the German scientist Alfred Wegener reintroduced the idea of moving continents, adding such evidence as the underwater shapes of the continents, the similarity of life forms and land forms in corresponding parts of Africa and South America, and the increasing separation of Greenland and Europe. Also know that very few contemporary scientists adopted his theory because Wegener was unable to propose a plausible mechanism for motion.

ES.2.7. Explain that the theory of plate tectonics was finally accepted by the scientific community in the 1960s when further evidence had accumulated in support of it. Understand that the theory was seen to provide an explanation for a diverse array of seemingly unrelated phenomena and there was a scientifically sound physical explanation of how such movement could occur.

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Standard 1: Principles of Biology

Molecules and Cells

B.1.1. Recognize that and explain how the many cells in an individual can be very different from one another, even though they are all descended from a single cell and thus have essentially identical genetic instructions. Understand that different parts of the genetic instructions are used in different types of cells and are influenced by the cell's environment and past history.

B.1.2. Explain that every cell is covered by a membrane that controls what can enter and leave the cell. Recognize that in all but quite primitive cells, a complex network of proteins provides organization and shape. In addition, understand that flagella and/or cilia may allow some Protista, some Monera, and some animal cells to move.

B.1.3. Know and describe that within the cell are specialized parts for the transport of materials, energy capture and release, protein building, waste disposal, information feedback, and movement. In addition to these basic cellular functions common to all cells, understand that most cells in multicellular organisms perform some special functions that others do not.

B.1.4. Understand and describe that the work of the cell is carried out by the many different types of molecules it assembles, such as proteins, lipids, carbohydrates, and nucleic acids.

B.1.5. Demonstrate that most cells function best within a narrow range of temperature and acidity. Note that extreme changes may harm cells, modifying the structure of their protein molecules and therefore, some possible functions.

B.1.6. Show that a living cell is composed mainly of a small number of chemical elements – carbon, hydrogen, nitrogen, oxygen, phosphorous, and sulfur. Recognize that carbon can join to other carbon atoms in chains and rings to form large and complex molecules.

B.1.7. Explain that complex interactions among the different kinds of molecules in the cell cause distinct cycles of activities, such as growth and division. Note that cell behavior can also be affected by molecules from other parts of the organism, such as hormones.

B.1.8. Understand and describe that all growth and development is a consequence of an increase in cell number, cell size, and/or cell products. Explain that cellular differentiation results from gene expression and/or environmental influence. Differentiate between mitosis and meiosis.

B.1.9. Recognize and describe that both living and nonliving things are composed of compounds, which are themselves made up of elements joined by energy-containing bonds, such as those in ATP.

B.1.10. Recognize and explain that macromolecules such as lipids contain high energy bonds as well.

Developmental and Organismal Biology

B.1.11. Describe that through biogenesis all organisms begin their life cycles as a single cell and that in multicellular organisms, successive generations of embryonic cells form by cell division.

B.1.12. Compare and contrast the form and function of prokaryotic and eukaryotic cells.

B.1.13. Explain that some structures in the modern eukaryotic cell developed from early prokaryotes, such as mitochondria, and in plants, chloroplasts.

B.1.14. Recognize and explain that communication and/or interaction are required between cells to coordinate their diverse activities.

B.1.15. Understand and explain that, in biological systems, structure and function must be considered together.

B.1.16. Explain how higher levels of organization result from specific complexing and interactions of smaller units and that their maintenance requires a constant input of energy as well as new material.

B.1.17. Understand that and describe how the maintenance of a relatively stable internal environment is required for the continuation of life and explain how stability is challenged by changing physical, chemical, and environmental conditions, as well as the presence of disease agents.

B.1.18. Explain that the regulatory and behavioral responses of an organism to external stimuli occur in order to maintain both short- and long-term equilibrium.

B.1.19. Recognize and describe that metabolism consists of the production, modification, transport, and exchange of materials that are required for the maintenance of life.

B.1.20. Recognize that and describe how the human immune system is designed to protect against microscopic organisms and foreign substances that enter from outside the body and against some cancer cells that arise within.

Genetics

B.1.21. Understand and explain that the information passed from parents to offspring is transmitted by means of genes which are coded in DNA molecules.

B.1.22. Understand and explain the genetic basis for Mendel's laws of segregation and independent assortment.

B.1.23. Understand that and describe how inserting, deleting, or substituting DNA segments can alter a gene. Recognize that an altered gene may be passed on to every cell that develops from it, and that the resulting features may help, harm, or have little or no effect on the offspring's success in its environment.

B.1.24. Explain that gene mutations can be caused by such things as radiation and chemicals. Understand that when they occur in sex cells, the mutations can be passed on to offspring; if they occur in other cells, they can be passed on to descendant cells only.

B.1.25. Explain that gene mutation in a cell can result in uncontrolled cell division, called cancer. Also know that exposure of cells to certain chemicals and radiation

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increases mutations and thus increases the chance of cancer.

B.1.26. Demonstrate how the genetic information in DNA molecules provides instructions for assembling protein molecules and that this is virtually the same mechanism for all life forms.

B.1.27. Explain that the similarity of human DNA sequences and the resulting similarity in cell chemistry and anatomy identify human beings as a unique species, different from all others. Likewise, understand that every other species has its own characteristic DNA sequence.

B.1.28. Illustrate that the sorting and recombination of genes in sexual reproduction results in a great variety of possible gene combinations from the offspring of any two parents. Recognize that genetic variation can occur from such processes as crossing over, jumping genes, and deletion and duplication of genes.

B.1.29. Understand that and explain how the actions of genes, patterns of inheritance, and the reproduction of cells and organisms account for the continuity of life, and give examples of how inherited characteristics can be observed at molecular and whole-organism levels – in structure, chemistry, or behavior.

Evolution

B.1.30. Understand and explain that molecular evidence substantiates the anatomical evidence for evolution and provides additional detail about the sequence in which various lines of descent branched off from one another.

B.1.31. Describe how natural selection provides the following mechanism for evolution: Some variation in heritable characteristics exists within every species, and some of these characteristics give individuals an advantage over others in surviving and reproducing. Understand that the advantaged offspring, in turn, are more likely than others to survive and reproduce. Also understand that the proportion of individuals in the population that have advantageous characteristics will increase.

B.1.32. Explain how natural selection leads to organisms that are well suited for survival in particular environments, and discuss how natural selection provides scientific explanation for the history of life on Earth as depicted in the fossil record and in the similarities evident within the diversity of existing organisms.

B.1.33. Describe how life on Earth is thought to have begun as simple, one-celled organisms about 4 billion years ago. Note that during the first 2 billion years, only single-cell microorganisms existed, but once cells with nuclei developed about a billion years ago, increasingly complex multicellular organisms evolved.

B.1.34. Explain that evolution builds on what already exists, so the more variety there is, the more there can be in the future. Recognize, however, that evolution does not necessitate long-term progress in some set direction.

B.1.35. Explain that the degree of kinship between organisms or species can be estimated from the similarity of their DNA sequences, which often closely matches their classification based on anatomical similarities. Know that amino acid similarities also provide clues to this kinship.

B.1.36. Trace the relationship between environmental changes and changes in the gene pool, such as genetic drift and isolation of sub-populations.

Ecology

B.1.37. Explain that the amount of life any environment can support is limited by the available energy, water, oxygen, and minerals, and by the ability of ecosystems to recycle the residue of dead organic materials. Recognize, therefore, that human activities and technology can change the flow and reduce the fertility of the land.

B.1.38. Understand and explain the significance of the introduction of species, such as zebra mussels, into American waterways, and describe the consequent harm to native species and the environment in general.

B.1.39. Describe how ecosystems can be reasonably stable over hundreds or thousands of years. Understand that if a disaster such as flood or fire occurs, the damaged ecosystem is likely to recover in stages that eventually result in a system similar to the original one.

B.1.40. Understand and explain that like many complex systems, ecosystems tend to have cyclic fluctuations around a state of rough equilibrium. However, also understand that ecosystems can always change with climate changes or when one or more new species appear as a result of migration or local evolution.

B.1.41. Recognize that and describe how human beings are part of Earth's ecosystems. Note that human activities can, deliberately or inadvertently, alter the equilibrium in ecosystems.

B.1.42. Realize and explain that at times, the environmental conditions are such that plants and marine organisms grow faster than decomposers can recycle them back to the environment. Understand that layers of energy-rich organic material thus laid down have been gradually turned into great coal beds and oil pools by the pressure of the overlying earth. Further understand that by burning these fossil fuels, people are passing most of the stored energy back into the environment as heat and releasing large amounts of carbon dioxide.

B.1.43. Understand that and describe how organisms are influenced by a particular combination of living and nonliving components of the environment.

B.1.44. Describe the flow of matter, nutrients, and energy within ecosystems.

B.1.45. Recognize that and describe how the physical or chemical environment may influence the rate, extent, and nature of the way organisms develop within ecosystems.

B.1.46. Recognize and describe that a great diversity of species increases the chance that at least some living things will survive in the face of large changes in the environment.

B.1.47. Explain, with examples, that ecology studies the varieties and interactions of living things across space while evolution studies the varieties and interactions of living things across time.

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Standard 2: Historical Perspectives of Biology

B.2.1. Explain that prior to the studies of Charles Darwin, the most widespread belief was that all known species were created at the same time and remained unchanged throughout history. Note that some scientists at the time believed that features an individual acquired during a lifetime could be passed on to its offspring, and the species could thereby gradually change to fit an environment better.

B.2.2. Explain that Darwin argued that only biologically inherited characteristics could be passed on to offspring. Note that some of these characteristics were advantageous in surviving and reproducing. Understand that the offspring would also inherit and pass on those advantages, and over generations the aggregation of these inherited advantages would lead to a new species.

B.2.3. Describe that the quick success of Darwin's book Origin of Species, published in 1859, came from the clear and understandable argument it made, including the comparison of natural selection to the selective breeding of animals in wide use at the time, and from the massive array of biological and fossil evidence it assembled to support the argument.

B.2.4. Explain that after the publication of Origin of Species, biological evolution was supported by the rediscovery of the genetics experiments of an Austrian monk, Gregor Mendel, by the identification of genes and how they are sorted in reproduction, and by the discovery that the genetic code found in DNA is the same for almost all organisms.

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Standard 1: Principles of Chemistry

Properties of Matter

C.1.1. Differentiate between pure substances and mixtures based on physical properties such as density, melting point, boiling point, and solubility.

C.1.2. Determine the properties and quantities of matter such as mass, volume, temperature, density, melting point, boiling point, conductivity, solubility, color, numbers of moles, and pH (calculate pH from the hydrogen-ion concentration), and designate these properties as either extensive or intensive.

C.1.3. Recognize indicators of chemical changes such as temperature change, the production of a gas, the production of a precipitate, or a color change.

C.1.4. Describe solutions in terms of their degree of saturation.

C.1.5. Describe solutions in appropriate concentration units (be able to calculate these units), such as molarity, percent by mass or volume, parts per million (ppm), or parts per billion (ppb).

C.1.6. Predict formulas of stable ionic compounds based on charge balance of stable ions.

C.1.7. Use appropriate nomenclature when naming compounds.

C.1.8. Use formulas and laboratory investigations to classify substances as metal or nonmetal, ionic or molecular, acid or base, and organic or inorganic.

The Nature of Chemical Change

C.1.9. Describe chemical reactions with balanced chemical equations.

C.1.10. Recognize and classify reactions of various types such as oxidation-reduction.

C.1.11. Predict products of simple reaction types including acid/base, electron transfer, and precipitation.

C.1.12. Demonstrate the principle of conservation of mass through laboratory investigations.

C.1.13. Use the principle of conservation of mass to make calculations related to chemical reactions. Calculate the masses of reactants and products in a chemical reaction from the mass of one of the reactants or products and the relevant atomic masses.

C.1.14. Use Avogadro's law to make mass-volume calculations for simple chemical reactions.

C.1.15. Given a chemical equation, calculate the mass, gas volume, and/or number of moles needed to produce a given gas volume, mass, and/or number of moles of product.

C.1.16. Calculate the percent composition by mass of a compound or mixture when given the formula.

C.1.17. Perform calculations that demonstrate an understanding of the relationship between molarity, volume, and number of moles of a solute in a solution.

C.1.18. Prepare a specified volume of a solution of given molarity.

C.1.19. Use titration data to calculate the concentration of an unknown solution.

C.1.20. Predict how a reaction rate will be quantitatively affected by changes of concentration.

C.1.21. Predict how changes in temperature, surface area, and the use of catalysts will qualitatively affect the rate of a reaction.

C.1.22. Use oxidation states to recognize electron transfer reactions and identify the substance(s) losing and gaining electrons in an electron transfer reaction.

C.1.23. Write a rate law for a chemical reaction using experimental data.

C.1.24. Recognize and describe nuclear changes.

C.1.25. Recognize the importance of chemical processes in industrial and laboratory settings, e.g., electroplating, electrolysis, the operation of voltaic cells, and such important applications as the refining of aluminum.

The Structure of Matter

C.1.26. Describe physical changes and properties of matter through sketches and descriptions of the involved materials.

C.1.27. Describe chemical changes and reactions using sketches and descriptions of the reactants and products.

C.1.28. Explain that chemical bonds between atoms in molecules, such as H_2, CH_4, NH_3, C_2H_4, N_2, Cl_2, and many large biological molecules are covalent.

C.1.29. Describe dynamic equilibrium.

C.1.30. Perform calculations that demonstrate an understanding of the gas laws. Apply the gas laws to relations between pressure, temperature, and volume of any amount of an ideal gas or any mixture of ideal gases.

C.1.31. Use kinetic molecular theory to explain changes in gas volumes, pressure, and temperature (Solve problems using $pV = nRT$).

C.1.32. Describe the possible subatomic particles within an atom or ion.

C.1.33. Use an element's location in the Periodic Table to determine its number of valence electrons, and predict what stable ion or ions an element is likely to form in reacting with other specified elements.

C.1.34. Use the Periodic Table to compare attractions that atoms have for their electrons and explain periodic properties, such as atomic size, based on these attractions.

C.1.35. Infer and explain physical properties of substances, such as melting points, boiling points,and solubility, based on the strength of molecular attractions.

C.1.36. Describe the nature of ionic, covalent, and hydrogen bonds and give examples of how they contribute to the formation of various types of compounds.

C.1.37. Describe that spectral lines are the result of transitions of electrons between energy levels and that

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these lines correspond to photons with a frequency related to the energy spacing between levels by using Planck's relationship (E = *hv*).

The Nature of Energy and Change

C.1.38. Distinguish between the concepts of temperature and heat.

C.1.39. Solve problems involving heat flow and temperature changes, using known values of specific heat and latent heat of phase change.

C.1.40. Classify chemical reactions and/or phase changes as exothermic or endothermic.

C.1.41. Describe the role of light, heat, and electrical energies in physical, chemical, and nuclear changes.

C.1.42. Describe that the energy release per gram of material is much larger in nuclear fusion or fission reactions than in chemical reactions. The change in mass (calculated by $E = mc^2$) is small but significant in nuclear reactions.

C.1.43. Calculate the amount of radioactive substance remaining after an integral number of half-lives have passed.

The Basic Structures and Reactions of Organic Chemicals

C.1.44. Convert between formulas and names of common organic compounds.

C.1.45. Recognize common functional groups and polymers when given chemical formulas and names.

Standard 2: Historical Perspectives of Chemistry

C.2.1 Explain that Antoine Lavoisier invented a whole new field of science based on a theory of materials, physical laws, and quantitative methods, with the conservation of matter at its core. Recognize that he persuaded a generation of scientists that his approach accounted for the experimental results better than other chemical systems.

C.2.2. Describe how Lavoisier's system for naming substances and describing their reactions contributed to the rapid growth of chemistry by enabling scientists everywhere to share their findings about chemical reactions with one another without ambiguity.

C.2.3. Explain that John Dalton's modernization of the ancient Greek ideas of element, atom, compound, and molecule strengthened the new chemistry by providing physical explanations for reactions that could be expressed in quantitative terms.

C.2.4. Explain how Frederich Wohler's synthesis of the simple organic compound urea from inorganic substances made it clear that living organisms carry out chemical processes not fundamentally different from inorganic chemical processes. Describe how this discovery led to the development of the huge field of organic chemistry, the industries based on it, and eventually to the field of biochemistry.

C.2.5. Explain how Arrhenius' discovery of the nature of ionic solutions contributed to the understanding of a broad class of chemical reactions.

C.2.6. Explain that the application of the laws of quantum mechanics to chemistry by Linus Pauling and others made possible an understanding of chemical reactions on the atomic level.

C.2.7. Describe how the discovery of the structure of DNA by James D. Watson and Francis Crick made it possible to interpret the genetic code on the basis of a sequence of "letters."

Standard 1: Principles of Integrated Chemistry – Physics

Structures and Properties of Matter

CP.1.1. Understand and explain that atoms have a positive nucleus (consisting of relatively massive positive protons and neutral neutrons) surrounded by negative electrons of much smaller mass, some of which may be lost, gained, or shared when interacting with other atoms.

CP.1.2. Realize that and explain how a neutral atom's atomic number and mass number can be used to determine the number of protons, neutrons, and electrons that make up an atom.

CP.1.3. Understand, and give examples to show, that isotopes of the same element have the same numbers of protons and electrons but differ in the numbers of neutrons.

CP.1.4. Know and explain that physical properties can be used to differentiate among pure substances, solutions, and heterogeneous mixtures.

Changes in Matter

CP.1.5. Distinguish among chemical and physical changes in matter by identifying characteristics of these changes.

CP.1.6. Understand and explain how an atom can acquire an unbalanced electrical charge by gaining or losing electrons.

CP.1.7. Identify the substances gaining and losing electrons in simple oxidation-reduction reactions.

CP.1.8. Know and explain that the nucleus of a radioactive isotope is unstable and may spontaneously decay, emitting particles and/or electromagnetic radiation.

CP.1.9. Show how the predictability of the nuclei decay rate allows radioactivity to be used for estimating the age of materials that contain radioactive substances.

CP.1.10. Understand that the Periodic Table is a listing of elements arranged by increasing atomic number, and use it to predict whether a selected atom would gain, lose, or share electrons as it interacts with other selected atoms.

CP.1.11. Understand and give examples to show that an enormous variety of biological, chemical, and physical phenomena can be explained by changes in the arrangement and motion of atoms and molecules.

CP.1.12. Realize and explain that because mass is conserved in chemical reactions, balanced chemical equations must be used to show that atoms are conserved.

CP.1.13. Explain that the rate of reactions among atoms and molecules depends on how often they encounter one another, which is in turn affected by the concentrations, pressures, and temperatures of the reacting materials.

CP.1.14. Understand and explain that catalysts are highly effective in encouraging the interaction of other atoms and molecules.

Energy Transformations

CP.1.15. Understand and explain that whenever the amount of energy in one place or form diminishes, the amount in other places or forms increases by the same amount.

CP.1.16. Explain that heat energy in a material consists of the disordered motions of its atoms or molecules.

CP.1.17. Know and explain that transformations of energy usually transform some energy into the form of heat, which dissipates by radiation or conduction into cooler surroundings.

CP.1.18. Recognize and describe the heat transfer associated with a chemical reaction or a phase change as either exothermic or endothermic, and understand the significance of the distinction.

CP.1.19. Understand and explain that the energy released whenever heavy nuclei split or light nuclei combine is roughly a million times greater than the energy absorbed or released in a chemical reaction. ($E = mc^2$)

CP.1.20. Realize and explain that the energy in a system is the sum of both potential energy and kinetic energy.

Motion

CP.1.21. Understand and explain that the change in motion of an object (acceleration) is proportional to the net force applied to the object and inversely proportional to the object's mass. ($a = \frac{F}{m}$)

CP.1.22. Recognize and explain that whenever one object exerts a force on another, an equal and opposite force is exerted back on it by the other object.

CP.1.23. Understand and explain that the motion of an object is described by its position, velocity, and acceleration.

CP.1.24. Recognize and explain that waves are described by their velocity, wavelength, frequency or period, and amplitude.

CP.1.25. Understand and explain that waves can superpose on one another, bend around corners, reflect off surfaces, be absorbed by materials they enter, and change direction when entering a new material.

CP.1.26. Realize and explain that all motion is relative to whatever frame of reference is chosen, for there is no absolute motionless frame from which to judge all motion.

Forces of Nature

CP.1.27. Recognize and describe that gravitational force is an attraction between masses and that the strength of the force is proportional to the masses and decreases rapidly as the square of the distance between the masses increases. ($F = G\frac{m_1 m_2}{r^2}$)

CP.1.28. Realize and explain that electromagnetic forces acting within and between atoms are vastly stronger than the gravitational forces acting between atoms.

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CP.1.29. Understand and explain that at the atomic level, electric forces between oppositely charged electrons and protons hold atoms and molecules together and thus, are involved in all chemical reactions.

CP.1.30. Understand and explain that in materials, there are usually equal proportions of positive and negative charges, making the materials as a whole electrically neutral. However, also know that a very small excess or deficit of negative charges will produce noticeable electric forces.

CP.1.31. Realize and explain that moving electric charges produce magnetic forces, and moving magnets produce electric forces.

Standard 2: Historical Perspectives of Integrated Chemistry – Physics

CP.2.1. Explain that Antoine Lavoisier invented a whole new field of science based on a theory of materials, physical laws, and quantitative methods, with the conservation of matter at its core. Recognize that he persuaded a generation of scientists that his approach accounted for the experimental results better than other chemical systems.

CP.2.2. Describe how Lavoisier's system for naming substances and describing their reactions contributed to the rapid growth of chemistry by enabling scientists everywhere to share their findings about chemical reactions with one another without ambiguity.

CP.2.3. Explain that John Dalton's modernization of the ancient Greek ideas of element, atom, compound, and molecule strengthened the new chemistry by providing physical explanations for reactions that could be expressed in quantitative terms.

CP.2.4. Explain that Isaac Newton created a unified view of force and motion in which motion everywhere in the universe can be explained by the same few rules. Note that his mathematical analysis of gravitational force and motion showed that planetary orbits had to be the very ellipses that Johannes Kepler had demonstrated two generations earlier.

CP.2.5. Describe that Newton's system was based on the concepts of mass, force, and acceleration, his three laws of motion relating them, and a physical law stating that the force of gravity between any two objects in the universe depends only upon their masses and the distance between them.

CP.2.6. Explain that the Newtonian model made it possible to account for such diverse phenomena as tides, the orbits of the planets and moons, the motion of falling objects, and Earth's equatorial bulge.

CP.2.7. Describe that among the surprising ideas of Albert Einstein's special relativity is that nothing can travel faster than the speed of light, which is the same for all observers no matter how they or the light source happen to be moving.

CP.2.8. Explain that the special theory of relativity is best known for stating that any form of energy has mass, and that matter itself is a form of energy. ($E = mc^2$)

CP.2.9. Describe that general relativity theory pictures Newton's gravitational force as a distortion of space and time.

CP.2.10. Explain that Marie and Pierre Curie made radium available to researchers all over the world, increasing the study of radioactivity and leading to the realization that one kind of atom may change into another kind, and so must be made up of smaller parts. Note that these parts were demonstrated by Ernest Rutherford, Niels Bohr, and other scientists to be a small, dense nucleus that contains protons and neutrons and is surrounded by a cloud of electrons.

CP.2.11. Explain that Rutherford and his colleagues discovered that the heavy radioactive element uranium spontaneously splits itself into a slightly lighter nucleus and a very light helium nucleus.

CP.2.12. Describe that later, Austrian and German scientists showed that when uranium is struck by neutrons, it splits into two nearly equal parts plus one or two extra neutrons. Note that Lise Meitner, an Austrian physicist, was the first to point out that if these fragments added up to less mass than the original uranium nucleus, then Einstein's special relativity theory predicted that a large amount of energy would be released. Also note that Enrico Fermi, an Italian working with colleagues in the United States, showed that the extra neutrons trigger more fissions and so create a sustained chain reaction in which a prodigious amount of energy is given off.

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Standard 1: Principles of Enviromental Science

Enviromental Systems

Env.1.1. Know and describe how ecosystems can be reasonably stable over hundreds or thousands of years. Consider as an example the ecosystem of the Great Plains prior to the advent of the horse in Native American Plains societies, from then until the advent of agriculture, and well into the present.

Env.1.2. Understand and describe that if a disaster occurs — such as flood or fire — the damaged ecosystem is likely to recover in stages that eventually result in a system similar to the original one.

Env.1.3. Understand and explain that ecosystems have cyclic fluctuations, such as seasonal changes or changes in population, as a result of migrations.

Env.1.4. Understand and explain that human beings are part of Earth's ecosystems and give examples of how human activities can, deliberately or inadvertently, alter ecosystems.

Env.1.5. Explain how the size and rate of growth of the human population in any location is affected by economic, political, religious, technological, and environmental factors, some of which are influenced by the size and rate of growth of the population.

Env.1.6. Describe and give examples about how the decisions of one generation both provide and limit the range of possibilities open to the next generation.

Env.1.7. Recognize and explain that in evolutionary change, the present arises from the materials of the past and in ways that can be explained, such as the formation of soil from rocks and dead organic matter.

Env.1.8. Recognize and describe the difference between systems in equilibrium and systems in disequilibrium.

Env.1.9. Diagram the cycling of carbon, nitrogen, phosphorus, and water.

Env.1.10. Identify and measure biological, chemical, and physical factors within an ecosystem.

Env.1.11. Locate, identify, and explain the role of the major Earth biomes and discuss how the abiotic and biotic factors interact within these ecosystems.

Env.1.12. Explain the process of succession, both primary and secondary, in terrestrial and aquatic ecosystems.

Flow of Matter and Energy

Env.1.13. Understand and describe how layers of energy-rich organic material have been gradually turned into great coal beds and oil pools by the pressure of the overlying earth. Recognize that by burning these fossil fuels, people are passing stored energy back into the environment as heat and releasing large amounts of carbon dioxide.

Env.1.14. Recognize and explain that the amount of life any environment can support is limited by the available energy, water, oxygen, and minerals, and by the ability of ecosystems to recycle organic materials from the remains of dead organisms.

Env.1.15. Describe how the chemical elements that make up the molecules of living things pass through food webs and are combined and recombined in different ways.

Env.1.16. Cite examples of how all fuels have advantages and disadvantages that society must question when considering the trade-offs among them, such as how energy use contributes to the rising standard of living in the industrially developing nations. However, explain that this energy use also leads to more rapid depletion of Earth's energy resources and to environmental risks associated with the use of fossil and nuclear fuels.

Env.1.17. Describe how decisions to slow the depletion of energy sources through efficient technology can be made at many levels, from personal to national, and they always involve trade-offs of economic costs and social values.

Env.1.18. Illustrate the flow of energy through various trophic levels of food chains and food webs within an ecosystem. Describe how each link in a food web stores some energy in newly made structures and how much of the energy is dissipated into the environment as heat. Understand that a continual input of energy from sunlight is needed to keep the process going.

Populations

Env.1.19. Demonstrate and explain how factors such as birth rate, death rate, and migration rate determine growth rates of populations.

Env.1.20. Demonstrate how resources, such as food supply, influence populations.

Natural Resources

Env.1.21. Differentiate between renewable and nonrenewable resources, and compare and contrast the pros and cons of using nonrenewable resources.

Env.1.22. Demonstrate a knowledge of the distribution of natural resources in the U.S. and the world, and explain how natural resources influence relationships among nations.

Env.1.23. Recognize and describe the role of natural resources in providing the raw materials for an industrial society.

Env.1.24. Give examples of the various forms and uses of fossil fuels and nuclear energy in our society.

Env.1.25. Recognize and describe alternative sources of energy provided by water, the atmosphere, and the sun.

Env.1.26. Identify specific tools and technologies used to adapt and alter environments and natural resources in order to meet human physical and cultural needs.

Env.1.27. Understand and describe the concept of integrated natural resource management and the values of managing natural resources as an ecological unit.

Env.1.28. Understand and describe the concept and the importance of natural and human recycling in conserving our natural resources.

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Env.1.29. Recognize and describe important environmental legislation, such as the Clean Air Act and the Clean Water Act.

Enviromental Hazards

Env.1.30. Describe how agricultural technology requires trade-offs between increased production and environmental harm and between efficient production and social values.

Env.1.31. Understand and explain that waste management includes considerations of quantity, safety, degradability, and cost. Also understand that waste management requires social and technological innovations because waste-disposal problems are political and economic as well as technical.

Env.1.32. Understand and describe how nuclear reactions release energy without the combustion products of burning fuels, but that the radioactivity of fuels and by-products poses other risks which may last for thousands of years.

Env.1.33. Identify natural Earth hazards, such as earthquakes and hurricanes, and identify the regions in which they occur as well as the short-term and long-term effects on the environment and on people.

Env.1.34. Differentiate between natural pollution and pollution caused by humans and give examples of each.

Env.1.35. Compare and contrast the beneficial and harmful effects of an environmental stressor, such as herbicides and pesticides, on plants and animals. Give examples of secondary effects on other environmental components.

Standard 2: Historical Perspectives of Enviromental Science

Env.2.1. Explain that Rachael Carson's book, *Silent Spring*, explained how pesticides were causing serious pollution and killing many organisms. Understand that it was the first time anyone had publicly shown how poisons affect anything in nature. Note in particular that the book detailed how the pesticide DDT had gotten into the food chain. Understand that as a result of *Silent Spring*, there are now hundreds of national, state, and local laws that regulate pesticides.

Env.2.2. Explain that Henry Cowles found the Indiana Dunes and Lake Michigan shoreline area a natural laboratory for developing important principles of plant succession.

Standard 1: Principles of Physics

Properties of Matter

P.1.1. Describe matter in terms of its fundamental constituents and be able to differentiate among those constituents.

P.1.2. Measure or determine the physical quantities including mass, charge, pressure, volume, temperature, and density of an object or unknown sample.

P.1.3. Describe and apply the kinetic molecular theory to the states of matter.

P.1.4. Employ correct units in describing common physical quantities.

The Relationships Between Motion and Force

P.1.5. Use appropriate vector and scalar quantities to solve kinematics and dynamics problems in one and two dimensions.

P.1.6. Describe and measure motion in terms of position, time, and the derived quantities of velocity and acceleration.

P.1.7. Use Newton's Laws (e.g., $F = ma$) together with the kinematic equations to predict the motion of an object.

P.1.8. Describe the nature of centripetal force and centripetal acceleration (including the formula $a = \frac{v^2}{r}$), and use these ideas to predict the motion of an object.

P.1.9. Use the conservation of energy and conservation of momentum laws to predict, both conceptually and quantitatively, the results of the interactions between objects.

P.1.10. Demonstrate an understanding of the inverse square nature of gravitational and electrostatic forces.

The Nature of Energy

P.1.11. Recognize energy in its different manifestations, such as kinetic (KE = $\frac{1}{2}mv^2$), gravitational potential (PE = mgh), thermal, chemical, nuclear, electromagnetic, or mechanical.

P.1.12. Use the law of conservation of energy to predict the outcome(s) of an energy transformation.

P.1.13. Use the concepts of temperature, thermal energy, transfer of thermal energy, and the mechanical equivalent of heat to predict the results of an energy transfer.

P.1.14. Explain the relation between energy (E) and power (P). Explain the definition of the unit of power, the watt.

Momentum and Energy

P.1.15. Distinguish between the concepts of momentum (using the formula $p = mv$) and energy.

P.1.16. Describe circumstances under which each conservation law may be used.

The Nature of Electricity and Magnetism

P.1.17. Describe the interaction between stationary charges using Coulomb's Law. Know that the force on a charged particle in an electrical field is qE, where E is the electric field at the position of the particle, and q is the charge of the particle.

P.1.18. Explain the concepts of electrical charge, electrical current, electrical potential, electric field, and magnetic field. Use the definitions of the coulomb, the ampere, the volt, the volt/meter, and the tesla.

P.1.19. Analyze simple arrangements of electrical components in series and parallel circuits. Know that any resistive element in a DC circuit dissipates energy, which heats the resistor. Calculate the power (rate of energy dissipation), using the formula Power = $IV = I^2R$.

P.1.20. Describe electric and magnetic forces in terms of the field concept and the relationship between moving charges and magnetic fields. Know that the magnitude of the force on a moving particle with charge q in a magnetic field is $qvB \sin a$, where v and B are the magnitudes of vectors v and B and a is the angle between v and B.

P.1.21. Explain the operation of electric generators and motors in terms of Ampere's law and Faraday's law.

The Behavior of Waves

P.1.22. Describe waves in terms of their fundamental characteristics of velocity, wavelength, frequency or period, and amplitude. Know that radio waves, light, and X-rays are different wavelength bands in the spectrum of electromagnetic waves, whose speed in a vacuum is approximately 3×10^8 m/s (186,000 miles/second).

P.1.23. Use the principle of superposition to describe the interference effects arising from propagation of several waves through the same medium.

P.1.24. Use the concepts of reflection, refraction, polarization, transmission, and absorption to predict the motion of waves moving through space and matter.

P.1.25. Use the concepts of wave motion to predict conceptually and quantitatively the various properties of a simple optical system.

P.1.26. Identify electromagnetic radiation as a wave phenomenon after observing refraction, reflection, and polarization of such radiation.

The Laws of Thermodynamics

P.1.27. Understand that the temperature of an object is proportional to the average kinetic energy of the molecules in it and that the thermal energy is the sum of all the microscopic potential and kinetic energies.

P.1.28. Describe the Laws of Thermodynamics, understanding that energy is conserved, heat does not move from a cooler object to a hotter one without the application of external energy, and that there is a lowest temperature, called absolute zero. Use these laws in calculations of the behavior of simple systems.

The Nature of Atomic and Subatomic Physics

P.1.29. Describe the nuclear model of the atom in terms of mass and spatial relationships of the electrons, protons, and neutrons.

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P.1.30. Explain that the nucleus, although it contains nearly all of the mass of the atom, occupies less than the proportion of the solar system occupied by the sun. Explain that the mass of a neutron or a proton is about 2,000 times greater than the mass of an electron.

P.1.31. Explain the role of the strong nuclear force in binding matter together.

P.1.32. Using the concept of binding energy per nucleon, explain why a massive nucleus that fissions into two medium-mass nuclei emits energy in the process.

P.1.33. Using the same concept, explain why two light nuclei that fuse into a more massive nucleus emit energy in the process.

P.1.34. Understand and explain the properties of radioactive materials, including half-life, types of emissions, and the relative penetrative powers of each type.

P.1.35. Describe sources and uses of radioactivity and nuclear energy.

Standard 2: Historical Perspectives of Physics

P.2.1. Explain that Isaac Newton created a unified view of force and motion in which motion everywhere in the universe can be explained by the same few rules. Note that his mathematical analysis of gravitational force and motion showed that planetary orbits had to be the very ellipses that Johannes Kepler had proposed two generations earlier.

P.2.2. Describe how Newton's system was based on the concepts of mass, force, and acceleration; his three laws of motion relating to them; and a physical law stating that the force of gravity between any two objects in the universe depends only upon their masses and the distance between them.

P.2.3. Explain that the Newtonian model made it possible to account for such diverse phenomena as tides, the orbits of the planets and moons, the motion of falling objects, and Earth's equatorial bulge.

P.2.4. Describe how the Scottish physicist James Clerk Maxwell used Ampere's law and Faraday's law to predict the existence of electromagnetic waves and predict that light was just such a wave. Also understand that these predictions were confirmed by Heinrich Hertz, whose confirmations thus made possible the fields of radio, television, and many other technologies.

P.2.5. Describe how among the surprising ideas of Albert Einstein's special relativity is that nothing can travel faster than the speed of light, which is the same for all observers no matter how they or the light source happen to be moving, and that the length of time interval is not the same for observers in relative motion.

P.2.6. Explain that the special theory of relativity ($E = mc^2$) is best known for stating that any form of energy has mass and that matter itself is a form of energy.

P.2.7. Describe how general relativity theory pictures Newton's gravitational force as a distortion of space and time.

P.2.8. Explain that Marie and Pierre Curie made radium available to researchers all over the world, increasing the study of radioactivity and leading to the realization that one kind of atom may change into another kind, and so must be made up of smaller parts. Note that these parts were demonstrated by Rutherford, Geiger, and Marsden to be small, dense nuclei that contain protons and neutrons and are surrounded by clouds of electrons.

P.2.9. Explain that Ernest Rutherford and his colleagues discovered that the radioactive element radon spontaneously splits itself into a slightly lighter nucleus and a very light helium nucleus.

P.2.10. Describe how later, Austrian and German scientists showed that when uranium is struck by neutrons, it splits into two nearly equal parts plus two or three extra neutrons. Note that Lise Meitner, an Austrian physicist, was the first to point out that if these fragments added up to less mass than the original uranium nucleus, then Einstein's special relativity theory predicted that a large amount of energy would be released. Also note that Enrico Fermi, an Italian working with colleagues in the United States, showed that the extra neutrons trigger more fissions and so create a sustained chain reaction in which a prodigious amount of energy is given off.

= Measured by the ACT Science Test and WorkKeys LI
_____ = Content sampled by the ACT Science Test and WorkKeys LI

INDIANA United States History
Academic Standards

Standard 1: Early National Development: 1775 to 1877

Students will trace and summarize key ideas, events, and developments from the Founding Era through the Civil War and Reconstruction, 1775 to 1877.

USH.1.1. Explain major ideas about government and key rights rooted in the colonial and founding periods, which are embedded in key documents. (Civics and Government)

USH.1.2. Explain major themes in the early national history of the United States.

USH.1.3. Review and summarize key events and developments in the following periods of United States history: Founding the Republic (1775–1801), Expansion and Reform (1801–1861), Civil War and Reconstruction (1850–1877).

USH.1.4. Investigate the impact of laws on the settlement and development of Indiana.

USH.1.5. Develop and explain timelines of different periods of United States history before 1900.

USH.1.6. Analyze statistical data to explain demographical changes in the United States during the nineteenth century.

USH.1.7. Interpret historical maps to explain the territorial expansion of the United States during the nineteenth century. (Geography)

USH.1.8. Identify issues pertaining to slavery, sectionalism, and nationalism before the Civil War and analyze the interests, perspectives, and points of view of those involved in the issue. (Civics and Government; Individuals, Society, and Culture)

Standard 2: Development of the Industrial United States: 1870 to 1900

Students will examine the political, economic, social, and cultural development of the United States during the period from 1870 to 1900.

USH.2.1. Identify and explain the importance of key events, people, and groups associated with industrialization and its impact on urbanization, immigration, farmers, the labor movement, social reform, and government regulation. (Economics; Civics and Government; Individuals, Society, and Culture)

USH.2.2. Describe the economic development by which the United States became a major industrial power in the world and identify the factors necessary for industrialization. (Economics)

USH.2.3. Explain the economic problems facing farmers during the late nineteenth century. (Economics)

USH.2.4. Explain how industrialization affected the environment and the emergence of a conservation movement. (Economics; Individuals, Society, and Culture)

USH.2.5. Analyze how new immigrant groups affected United States society and culture generally and Indiana particularly. (Individuals, Society, and Culture)

USH.2.6. Explain various perspectives on federal government policy about American Indians and migration of settlers to western territories. (Civics and Government; Geography; Individuals, Society, and Culture)

USH.2.7. Analyze and evaluate the majority and dissenting opinions of the following landmark decisions of the United States Supreme Court: *Civil Rights Cases* (1883), *Plessy v. Ferguson* (1896), and *United States v. Wong Kim Ark* (1898). (Civics and Government; Individuals, Society, and Culture)

USH.2.8. Construct and explain a timeline of major technological inventions during the second half of the nineteenth century.

USH.2.9. Identify the main ideas from primary sources, such as nineteenth-century political cartoons, about urban government, corruption, and social reform. (Civics and Government; Individuals, Society, and Culture)

USH.2.10. Compare primary sources from different perspectives about immigrant experiences in the urban setting. (Individuals, Society, and Culture)

USH.2.11. Consider the different perspectives on industrial development and social problems expressed in primary documents. (Individuals, Society, and Culture)

USH.2.12. Investigate historical data from a variety of sources and perspectives about historical issues involving African Americans, Asian Americans, Hispanic Americans, and American Indians. (Individuals, Society, and Culture)

Standard 3: Emergence of the Modern United States: 1897 to 1920

Students will examine the political, economic, social, and cultural development of the United States during the period from 1897 to 1920.

USH.3.1. Identify and explain the importance of key events and people in the emergence of the United States as a global power.

USH.3.2. Identify and explain the importance of key events, people, and groups associated with problems of industrial capitalism, urbanization, and political corruption.

USH.3.3. Explain the impact of Progressive ideas about political reform on the expansion of democracy in local and state governments, especially Indiana, and the federal government. (Civics and Government; Individuals, Society, and Culture)

USH.3.4. Explain the impact of the following ideas on society and culture in the United States and Indiana and describe the controversies that surrounded them: Progressivism, muckraking, women's suffrage, organized

labor, temperance, prohibition, socialism, square deal, and new nationalism. (Individuals, Society, and Culture)

USH.3.5. Explain the constitutional significance of the following landmark decisions of the United States Supreme Court: *Northern Securities Company v. United States* (1904), *Lochner v. New York* (1905), *Muller v. Oregon* (1908), *Schenck v. United States* (1919), and *Abrams v. United States* (1919). (Civics and Government; Individuals, Society, and Culture)

USH.3.6. Analyze "The Roosevelt Corollary to the Monroe Doctrine" (1904). Explain how it modified the Monroe Doctrine (1823) and justified a new direction in United States foreign policy. (Civics and Government)

USH.3.7. Analyze President Woodrow Wilson's "Fourteen Points" Address to Congress (1918) and explain how it differed from proposals by French and British leaders for a treaty to conclude World War I. (Civics and Government; Geography)

USH.3.8. Evaluate the positions of President Woodrow Wilson and his opponents, such as Senator Henry Cabot Lodge, in the debate over ratification of the Versailles Treaty and United States participation in the League of Nations. (Civics and Government)

USH.3.9. Create and explain a timeline of key events by which the United States became a world power.

USH.3.10. Locate on a world map the territories acquired by the United States during its emergence as an imperial power in the world and explain how these territories were acquired. (Civics and Government; Geography)

Standard 4: The Modern United States in Prosperity and Depression: 1920 to 1940

Students will examine the political, economic, social, and cultural development of the United States during the period from 1920 to 1940.

USH.4.1. Identify and explain the importance of key events, people, and groups in the period of prosperity before the Great Depression.

USH.4.2. Identify and explain the importance of key events, people, and groups in the period of the Great Depression.

USH.4.3. Compare and contrast the views of the Republican and Democratic parties during the 1920s and 1930s and analyze continuity and change of views within each party from the 1920s through the 1930s. (Civics and Government)

USH.4.4. Analyze the causes of economic prosperity in the 1920s and economic depression in the 1930s and describe the conflicts between business and labor. (Economics; Individuals, Society, and Culture)

USH.4.5. Investigate the ways life was changing on the farm and in the city in the United States generally and in Indiana during the 1920s due to technological development, with particular emphasis on the impact of the automobile industry. (Economics; Individuals, Society, and Culture)

USH.4.6. Explain the differing and changing perspectives about the role of the government in American society during the 1920s and 1930s by explaining the views of Presidents Harding, Coolidge, Hoover, and Roosevelt. (Civics and Government)

USH.4.7. Explain and evaluate the role of values, morals, and ethics in a changing society by examining issues associated with the Red Scare, Prohibition, Scopes Trial, the changing role of women, the Ku Klux Klan (especially in Indiana), and restrictions on immigration. (Individuals, Society, and Culture)

USH.4.8. Evaluate the constitutional significance of the following landmark decisions of the United States Supreme *Court: Gitlow v. New York* (1925), *Stromberg v. California* (1931), *Near v. Minnesota* (1931), *Schechter v. United States* (1935), *West Coast Hotel v. Parrish* (1937). (Civics and Government)

USH.4.9. Construct a timeline to show the origin and development of key ideas and events in the 1920s and 1930s.

Standard 5: The United States and World War II: 1939 to 1945

Students will examine the causes and course of World War II, the effects of the war on the United States society and culture, and the consequences for United States involvement in world affairs.

USH.5.1. Analyze the causes of World War II in Europe and in the Pacific region and explain the involvement of the United States in World War II.

USH.5.2. Identify and explain the importance of key events and people involved with the causes, course, and consequences of World War II.

USH.5.3. Explain how the United States mobilized its economic and military resources to achieve victory in World War II. (Economics; Civics and Government)

USH.5.4. Explain the constitutional significance of the following landmark decisions of the United States Supreme Court: *West Virginia State Board of Education v. Barnette* (1943), *Hirabayashi v. United States* (1943), *Korematsu v. United States* (1944). (Civics and Government; Individuals, Society, and Culture)

USH.5.5. Analyze the economic and social changes in American life brought about by the United States' involvement in World War II, including the roles and status of women and African Americans. (Economics, Individuals, Society, and Culture)

USH.5.6. Analyze President Roosevelt's State of the Union Message to Congress (1941), which is called "The Four Freedoms" message, to contrast civic and political values of the United States with those of Nazi Germany. (Civics and Government)

USH.5.7. Create timelines of key events from the beginning to the end of World War II in Europe and in the Pacific region.

USH.5.8. Investigate Hitler's "final solution" policy and the Allies' responses to the Holocaust.

USH.5.9. Use a variety of information sources, including primary documents and oral histories, to identify and analyze perspectives on issues related to World War II. (Individuals, Society, and Culture)

Standard 6: Postwar United States: 1945 to 1960

Students will examine the political, economic, social, and cultural development of the United States during the period from 1945 to 1960.

USH.6.1. Identify and explain the importance of key events, people, and groups related to the causes, conditions, and consequences of the Cold War.

USH.6.2. Identify and explain the importance of key events, people, and groups connected to domestic problems and policies during the presidential administrations of Truman and Eisenhower.

USH.6.3. Analyze President Truman's proclamation of a new foreign policy, the Truman Doctrine, in his Address to Congress (March 12, 1947) and evaluate his decision to contain expansion of Soviet power in the world. (Civics and Government)

USH.6.4. Analyze President Truman's announcement (June 27, 1950) that the United States would assist South Korea to oppose an invasion by North Korea and evaluate his decision to involve United States armed forces in the Korean War. (Civics and Government; Geography; Individuals, Society, and Culture)

USH.6.5. Analyze the causes, conditions, and consequences of the struggle for civil rights by African Americans. (Economics; Individuals, Society, and Culture)

USH.6.6. Analyze and interpret the main ideas in President Eisenhower's Farewell Address (1961). (Civics and Government)

USH.6.7. Explain the constitutional significance of the following landmark decisions of the United States Supreme Court: *Dennis v. United States* (1951), *Yates v. United States* (1957), and *Cooper v. Aaron* (1958). (Civics and Government; Individuals, Society, and Culture)

USH.6.8. Construct a timeline to show United States conflicts with other nations.

Standard 7: The United States in Troubled Times: 1960 to 1980

Students will examine the political, economic, social, and cultural development of the United States during the period from 1960 to 1980.

USH.7.1. Identify and explain the importance of key events, people, and groups associated with domestic problems and policies during the 1960s and 1970s.

USH.7.2. Analyze and interpret the main ideas of the "I Have a Dream" speech (1963) and the Letter from Birmingham City Jail (1963) by Reverend Martin Luther King, Jr. (Individuals, Society, and Culture)

USH.7.3. Identify and explain the importance of key events and people associated with foreign policy during the 1960s and 1970s. (Civics and Government; Individuals, Society, and Culture)

USH.7.4. Trace and explain the events that led the United States into and out of the Vietnam War.

USH.7.5. Recognize the changing relationship, as demonstrated in the Cuban Missile Crisis, the space race, the Vietnam War, and the SALT agreements, between the United States and the Soviet Union from 1960 to 1980. (Civics and Government)

USH.7.6. Analyze and explain the impact on American society and culture of the new immigration policies after 1965 that led to a new wave of immigration. (Individuals, Society, and Culture)

USH.7.7. Trace and explain the gains made by women and minorities during the 1960s and 1970s. (Individuals, Society, and Culture)

USH.7.8. Analyze Richard Nixon's decision to resign and explain the importance of this decision on constitutional grounds. (Civics and Government)

USH.7.9. Explain the constitutional significance of the following landmark decisions of the United States Supreme Court: *Heart of Atlanta Motel v. United States* (1964), *Reynolds v. Simms* (1964), *New York Times Company v. United States* (1971), *Roe v. Wade* (1973), and *United States v. Nixon* (1974). (Civics and Government)

USH.7.10. Construct timelines of major events and movements, such as the Civil Rights movement and the Vietnam War, in the 1960s and 1970s, and explain their causes and consequences.

Standard 8: The Contemporary United States: 1980 to the Present

Students will examine the political, economic, social, and cultural development of the United States during the period from 1980 to the present.

USH.8.1. Identify and explain the importance of key events and people associated with domestic problems and policies from 1980 to 2001.

USH.8.2. Identify and explain the importance of key events and people associated with foreign policy from 1980.

USH.8.3. Analyze and evaluate President Ronald Reagan's decision to confront and contest the Soviet Union and its satellite countries in foreign affairs (known as the Reagan Doctrine). (Civics and Government)

USH.8.4. Identify and explain the trends and events that led to the fall of the Soviet Union and the communist regimes of Soviet satellite nations in Europe and explain the role of the United States as a super-power in the post-Cold War world. (Civics and Government)

USH.8.5. Analyze and evaluate President Bill Clinton's decision to use United States armed forces against Yugoslavia to stop human rights abuses in Kosovo. (Civics and Government)

USH.8.6. Explain the constitutional significance of the following landmark decisions of the United States Supreme Court: *Westside Community School District v. Mergens* (1990), *Reno v. American Civil Liberties Union* (1997), *Mitchell v. Helms* (2000), and *Bush v. Gore* (2000). (Civics and Government)

USH.8.7. Analyze and evaluate the continuing grievances of racial and ethnic minority groups and their recurrent reference to core principles and values of constitutional democracy in the United States as justifications for their positions on issues of justice. (Civics and Government; Individuals, Society, and Culture)

USH.8.8. Analyze and evaluate debates about the rights of women and issues about the goals of the women's movement. (Individuals, Society, and Culture)

USH.8.9. Trace and explain demographic changes in the United States. (Individuals, Society, and Culture)

USH.8.10. Compare and contrast daily life in America before and after the arrival of computer technology. (Individuals, Society, and Culture)

Standard 9: Historical Research

Students will conduct historical research that includes forming research questions, developing a thesis, investigating a variety of primary and secondary sources, and presenting their findings with documentation.

USH.9.1. Locate and analyze primary and secondary sources presenting differing perspectives on events and issues of the past.

USH.9.2. Locate and use sources found at local and state libraries, archival collections, museums, historic sites, and electronic sites.

Standard 1: The World in Spatial Terms

Students will use maps, globes, atlases, and grid-referenced technologies, such as remote sensing, Geographic Information Systems (GIS), and Global Positioning Systems (GPS) to acquire and process information about people, places, and environments.

WG.1.1. Explain Earth's grid system and be able to locate places using degrees of latitude and longitude.

WG.1.2. Demonstrate that, as an attempt to represent the round Earth on flat paper, all maps distort, and be able to evaluate the distortion associated with any given projection.

WG.1.3. Use locational technology (remote sensing, Global Positioning Systems [GPS] and Geographic Information Systems [GIS]) to establish spatial relationships.

WG.1.4. Explain that maps contain spatial elements of point, line, area, and volume, each of which must be digitized differently for incorporation within a GIS.

WG.1.5. Ask geographic questions and obtain answers from a variety of sources, such as books, atlases, and other written materials; statistical source material; fieldwork and interviews; remote sensing; word processing; and GIS. Reach conclusions and give oral, written, graphic, and cartographic expression to conclusions.

WG.1.6. Give examples of how maps are often used to convey biased information, so that critical analysis of map sources is essential.

WG.1.7. Explain that people develop their own mental maps or personal perceptions of places in the world, that their experiences and culture influence their perceptions, and that these perceptions tend to influence their decision-making. (Individuals, Society, and Culture)

Standard 2: Places and Regions

Students will acquire a framework for thinking geographically, including the location and unique characteristics of places. They will identify the physical and human characteristics of places. They will understand that people create regions to interpret Earth's complexity and that culture and experience influence people's perception of places and regions.

WG.2.1. Name and locate the world's major bodies of water, major mountain ranges, major river systems, all countries, and major cities.

WG.2.2. Categorize characteristics of places in terms of whether they are physical (natural) or cultural (human). Know and apply the sub-categories of physical and cultural characteristics when describing any given place.

WG.2.3. Give examples of how places and regions change over time.

WG.2.4. Give examples and analyze ways in which people's changing views of places and regions reflect cultural change. (Individuals, Society, and Culture)

WG.2.5. Explain that the concept of "region" has been devised by people as a way of categorizing, interpreting, and ordering complex information about Earth. (Individuals, Society, and Culture)

WG.2.6. Give examples of how people create regions to help them understand Earth's complexity. (Individuals, Society, and Culture)

WG.2.7. Give examples of critical issues that may be region-specific and others that cross regional boundaries. (Individuals, Society, and Culture)

WG.2.8. Identify a region where natural disasters occur frequently, and give examples of how international efforts bring aid to this region. (Individuals, Society, and Culture; Civics and Government)

Standard 3: Physical Systems

Students will acquire a framework for thinking about Earth's physical systems: Earth/sun relationships, climate and related ecosystems, and land forms.

WG.3.1. Recall and apply knowledge concerning Earth/sun relationships, including "reasons for seasons" and time zones.

WG.3.2. Categorize elements of the natural environment as belonging to one of the four components of Earth's physical systems: atmosphere, lithosphere, biosphere, or hydrosphere.

WG.3.3. Explain the difference between weather and climate.

WG.3.4. Identify and account for the distribution pattern of the world's climates.

WG.3.5. Describe the world patterns of natural vegetation and biodiversity and their relations to world climate patterns.

WG.3.6. Integrate understandings concerning the physical processes that shape Earth's surface and result in existing land forms: plate tectonics, mountain building, erosion, and deposition.

WG.3.7. Give specific examples, in terms of places where they occur, of the physical processes that shape Earth's surface.

WG.3.8. Map with precision the occurrence of earthquakes on Earth over a given period (at least several months), and draw conclusions concerning regions of tectonic instability.

WG.3.9. Explain the safety measures people can take in the event of an earthquake, tornado, or hurricane and map the occurrence of each of these natural hazards in the United States over a given period of time. (Civics and Government; Individuals, Society, and Culture)

WG.3.10. Use a variety of means to research the sources of different types of pollution in the local community and design measures that can be taken to reduce each type of pollution. (Economics; Civics and Government; Individuals, Society, and Culture)

Standard 4: Human Systems

Students will identify and analyze the human activities that shape Earth's surface, including population numbers, distribution and growth rates, rural and urban land use, ways of making a living, cultural patterns, and economic and political systems. Using grid-based technology, such as remote sensing and GIS wherever possible, they will map the distribution of various human phenomena and look for spatial patterns that the maps reveal.

WG.4.1. Explain the concept of population dynamics and, through maps, establish world patterns of population distribution, density, and growth. Relate population growth rates to health statistics, food supply, or other measures of well-being. Understand that patterns differ not only among countries but also among regions within a single country. (Economics; Civics and Government; Individuals, Society, and Culture)

WG.4.2. Develop maps of human migration and settlement patterns at different times in history and compare to the present. (Civics and Government; History; Individuals, Society, and Culture)

WG.4.3. Hypothesize about the impact of push/pull factors on human migration in selected regions and about the changes in these factors over time. (Economics; Civics and Government; History; Individuals, Society, and Culture)

WG.4.4. Describe the worldwide trend toward urbanization and be able to graph this trend. (Individuals, Society, and Culture)

WG.4.5. Explain that the internal structure of cities varies in different regions of the world and give examples. (Individuals, Society, and Culture)

WG.4.6. Analyze the changing structure and functions of cities over time. (History; Individuals, Society, and Culture)

WG.4.7. Identify patterns of economic activity in terms of primary (growing or extracting), secondary (manufacturing), and tertiary (distributing and services) activities. Realize that the percentage of the working population in each of these categories varies by country and changes over time, and that the trend everywhere is toward an increase in the percentage involved in providing services. (Economics)

WG.4.8. Map the distribution patterns of the world's major religions and identify architectural features associated with each. (History; Individuals, Society, and Culture)

WG.4.9. Map the distribution pattern of the world's major languages and explain the concept of a lingua franca (a widely-used second language; a language of trade and communication). (History; Individuals, Society, and Culture)

WG.4.10. Identify the cultural contributions of various ethnic groups in selected world regions and countries, including the United States. (History; Individuals, Society, and Culture)

WG.4.11. Map the worldwide occurrence of the three major economic systems — traditional, command, and market; describe the characteristics of each; and identify influences leading to potential change. (Economics)

WG.4.12. Classify the world's countries in terms of levels of economic development, as determined by Gross Domestic Product (GDP) per capita and key demographic and social indicators. Map and analyze the results. (Economics)

WG.4.13. Explain the meaning of the word *infrastructure* and analyze its relationship to a country's level of development. (Economics; Civics and Government; Individuals, Society, and Culture)

WG.4.14. Devise ways of illustrating the economic interdependence of countries and regions. (Economics)

WG.4.15. Explain how change in communication and transportation technology is contributing to both cultural convergence and divergence. (Individuals, Society, and Culture)

WG.4.16. Point out specific situations where human or cultural factors are involved in global conflict situations and identify different viewpoints in the conflict; create scenarios under which these cultural factors would no longer trigger conflict. (Economics; Civics and Government; Individuals, Society, and Culture)

WG.4.17. Explain how different points of view influence policies relating to the use and management of Earth's resources. (Economics; Civics and Government; Individuals, Society, and Culture)

WG.4.18. Identify international organizations of global power and influence (North Atlantic Treaty Organization/ NATO, the United Nations, the European Union, Association of Southeast Asian Nations/ASEAN) and form committees to report on the influence and limits to influence that each experiences. (Civics and Government; Economics)

WG.4.19. Demonstrate that change on Earth is constant, in both the physical and the cultural realm, and that the movement of populations, goods, and ideas creates ever-altering spatial patterns. (Economics; Civics and Government; History; Individuals, Society, and Culture)

Standard 5: Environment and Society

Students will analyze ways in which humans affect and are affected by their physical environment.

WG.5.1. Identify human-caused threats to the world's environment: atmospheric and surface pollution, deforestation, desertification, salinization, over-fishing, urban sprawl, and species extinction. Map the worldwide occurrence of each of these phenomena. (Economics; Civics and Government; Individuals, Society, and Culture)

WG.5.2. Identify ways in which occurrences in the natural environment can be a hazard to humans: earthquakes, volcanic eruptions, tornadoes, flooding, hurricanes and cyclones, lightning-triggered fires. (Economics; Civics and Government; Individuals, Society, and Culture)

WG.5.3. Examine ways that people in different parts of the world have adapted to the physical environment.

WG.5.4. Evaluate ways in which technology has expanded the capability of humans to modify the physical environment and the ability of humans to mitigate the effect of natural disasters. (Individuals, Society, and Culture)

WG.5.5. Examine the characteristics of major global environmental change.

WG.5.6. Analyze examples of changes in the physical environment that have reduced the capacity of the environment to support human activity. (Economics; Individuals, Society, and Culture)

WG.5.7. Evaluate how and why the ability of Earth to feed its people has changed over time. (Economics; Civics and Government; History; Individuals, Society, and Culture)

WG.5.8. Analyze world patterns of resource distribution and utilization, and explain the consequences of use of renewable and nonrenewable resources. (Economics; Individuals, Society, and Culture)

WG.5.9. Develop possible solutions to scenarios of environmental change brought on by human activity. (Economics; Civics and Government; Individuals, Society, and Culture)

WG.5.10. Assess how people's perceptions of their relationship to natural phenomena have changed over time and analyze how these changing perceptions are reflected in human activity and land use. (History; Individuals, Society, and Culture)

Standard 6: The Uses of Geography

Students will understand the influence of physical and human geographic factors on the evolution of significant historic events and movements. They will apply the geographic viewpoint to local, regional, and world policies and problems.

WG.6.1. Describe the ways in which Earth's physical processes are dynamic and interactive.

WG.6.2. Analyze the possible effect of a natural disaster on the local community and devise plans to cope with the disaster so as to minimize or mitigate its effect. (Economics; Civics and Government; Individuals, Society, and Culture)

WG.6.3. Identify major patterns of human migration, both in the past and present. (History; Individuals, Society, and Culture)

WG.6.4. Identify spatial patterns in the movement of people, goods, and ideas throughout history. (Economics; History; Individuals, Society, and Culture)

WG.6.5. Understand the relationships between changing transportation technologies and increasing urbanization. (Economics; Individuals, Society, and Culture)

WG.6.6. Evaluate the impact of human migration on physical and human systems. (Economics; Civics and Government; Individuals, Society, and Culture)

WG.6.7. Assess how people's changing perceptions of geographic features have led to changes in human societies. (Individuals, Society, and Culture)

WG.6.8. Compare the attitudes of different religions toward the environment and resource use; consider the effect of religion on world economic development patterns, cultural conflict, and social integration. (Economics; Individuals, Society, and Culture)

WG.6.9. Assess the growing worldwide impact of tourism. Consider the multiple effects of tourism on developing countries and develop guidelines for Americans who travel as tourists in other countries. (Economics)

WG.6.10. Consider the possible consequences of a world temperature increase.

WG.6.11. Assess the consequences of population growth or decline in various parts of the United States. Determine whether the local community is growing or shrinking and develop long-range plans based on present trends. (Individuals, Society, and Culture)

WG.6.12. Develop policies that are designed to guide the use and management of Earth's resources and that reflect multiple points of view. (Civic and Government; Economics)

Standard 1: Beginnings of Human Society

Students will examine the lives of the hunting and gathering people of the ancient world during the beginnings of human society.

WH.1.1. Trace the approximate chronology and territorial range of early human communities, and analyze the processes that led to their development. (Geography; Individuals, Society, and Culture)

WH.1.2. Analyze and compare how peoples of West Africa, Europe, Southeast Asia, East Asia, and the Americas domesticated food plants and developed agricultural communities in response to local needs and conditions. (Geography)

WH.1.3. Describe types of evidence and methods of investigation by which scholars have reconstructed the early history of domestication, agricultural settlement, and cultural development.

WH.1.4. Describe social, cultural, and economic characteristics of large agricultural settlements on the basis of evidence gathered by archaeologists.

Standard 2: Early Civilizations: 4000 to 1000 B.C.E.

Students will examine the characteristics of early civilizations, including those of Egypt, Mesopotamia, the Indus River Valley, and China, from 4000 to 1000 B.C.E.

WH.2.1. Explain the criteria that have been used to define the idea of civilization and the key differences between civilizations and other forms of social organization. (Individuals, Society, and Culture)

WH.2.2. Compare causes and conditions by which civilizations developed in Egypt, Southwest Asia and the Eastern Mediterranean region, India, and China, and explain why the emergence of these civilizations was a decisive transformation in human history. (Geography; Individuals, Society, and Culture)

WH.2.3. Differentiate hierarchies in the social structures of early civilized peoples and explain the influence of religious belief systems upon ancient governmental systems, including analysis of the importance of Judaism. (Individuals, Society, and Culture)

WH.2.4. Construct a timeline of main events on the origin and early development of civilizations in Mesopotamia, Egypt, the Indus River Valley, and China.

WH.2.5. Use multiple sources of evidence to explain relationships in early civilizations, including those in Egypt or China, between the development of state authority and the growth of aristocratic power, taxation systems, and institutions of coerced labor, including slavery. (Economics; Civics and Government)

Standard 3: Classical Civilizations of Greece and Rome: 2000 B.C.E. to 500 C.E.

Students will examine the antecedents, origins, development, and achievements of the classical civilizations of Greece and Rome from 2000 B.C.E. to 500 C.E.

Greek Civilization

WH.3.1. Trace the origins of Cretan civilization and its impact on later civilizations on the Greek mainland.

WH.3.2. Describe the institutions and traditions of the Greek city-based republics, their influence on the lives of citizens and other residents, and their impact on the development of democratic and republican forms of government. (Civics and Government)

WH.3.3. Identify and explain the significance of achievements of Greeks in mathematics, science, philosophy, architecture, and the arts and their impact on various peoples and places in subsequent periods of world history. (Individuals, Society, and Culture)

WH.3.4. Analyze the major events of the wars between Persians and the Greeks, reasons why the Persians failed to conquer the Greeks, and consequences of the wars for Greek civilization.

WH.3.5. Compare and contrast the daily life, social hierarchy, culture, and institutions of Athens and Sparta; describe the rivalry between Athens and Sparta; and explain the causes and consequences of the Peloponnesian War. (Geography; Civics and Government; Individuals, Society, and Culture)

WH.3.6. Describe the rise of Alexander the Great to power, the development and demise of his empire, and his legacy.

Roman Civilization

WH.3.7. Trace the origins of the Etruscan civilization and its impact upon Roman civilization, as well as the influences of the Greeks upon the Romans. (Individuals, Society, and Culture)

WH.3.8. Describe Roman republican government and society, and trace the changes that culminated in the end of the Republic and the beginning of the Roman Empire. (History; Civics and Government; Individuals, Society, and Culture)

WH.3.9. Describe Roman achievement in law and technology and explain their impact on various peoples and places in subsequent periods of world history. (Individuals, Society, and Culture)

WH.3.10. Explain the origins of Christianity, including the lives and teachings of Jesus and Paul and the relationships of early Christians with officials of the Roman Empire. (Individuals, Society, and Culture)

WH.3.11. Analyze the causes, conditions, and consequences of the spread of Christianity throughout the Roman Empire, including the policies of Emperor Constantine the Great. (Individuals, Society, and Culture)

WH.3.12. Explain the causes, conditions, and consequences of the decline and fall of the western part of the Roman Empire.

Standard 4: Major Civilizations, States, and Empires in Asia, Africa, and the Americas: 1000 B.C.E. to 1500 C.E.

Students will trace the development of major civilizations, states, and empires in different regions of Asia, Africa, and the Americas from 1000 B.C.E. to 1500 C.E.

Asia

WH.4.1. Trace the development and major achievements of civilization in India with particular emphasis on the rise and fall of the Maurya Empire, the "golden period" of the Gupta Empire, and the reign of Emperor Ashoka. (Civics and Government)

WH.4.2. Use various primary and secondary sources to examine, interpret, and compare the main ideas of Hinduism and Buddhism, and explain their influence on civilization in India. (Individuals, Society, and Culture)

WH.4.3. Explain how Buddhism spread and influenced peoples and their cultures in Ceylon, Central Asia, and East Asia. (Individuals, Society, and Culture)

WH.4.4. Trace the development and major achievements of Chinese civilization during various key dynasties, such as the Zhou, Qin, Han, Tang, and Song. (Civics and Government; Individuals, Society, and Culture)

WH.4.5. Describe the life of Confucius; compare the fundamental teachings of Confucianism and Taoism; and explain the influence of these ideas on Chinese civilization. (Individuals, Society, and Culture)

WH.4.6. Describe the origins and development of Japanese society and the imperial state in Japan. (Civics and Government; Individuals, Society, and Culture)

WH.4.7. Describe the life of Muhammad, fundamental teachings of Islam, and connections of Islam to Judaism and Christianity. (Individuals, Society, and Culture)

WH.4.8. Trace the extent and consequences of Islam's spread in Asia and the Mediterranean region, including North Africa and Europe's Iberian Peninsula. (Individuals, Society, and Culture)

WH.4.9. Explain how the community of Muslims (believers in Islam) became divided into Sunnis and Shi'ites and the long-term consequences of this division. (Individuals, Society, and Culture)

WH.4.10. Describe and explain the rise and expansion of the Mongol empire and its consequences for Eurasian peoples, including the achievements of Chinggis Khan in the context of Mongol society and his impact on Eurasian history.

Sub-Saharan Africa

WH.4.11. Describe the rise and fall of the ancient east African kingdoms of Kush and Axum and the development of Ethiopia.

WH.4.12. Describe the rise and fall of the ancient kingdom of Ghana and how it became Africa's first large empire.

WH.4.13. Describe the rise, development, and decline of Mali and Songhai.

WH.4.14. Explain the origins and development of the slave trade in Africa and its connections to Arabic peoples of North Africa and Southwest Asia and to Western European peoples. (Individuals, Society, and Culture)

The Pre-Columbian Americas

WH.4.15. Describe the origins and importance of farming in the development of pre-Columbian societies and civilizations in various regions of the Americas. (Geography; Individuals, Society, and Culture)

WH.4.16. Compare and contrast the Maya, Aztec, and Inca civilizations in terms of their arts, religion, sciences, economy, social hierarchy, government, armed forces, and imperial expansion.

Standard 5: Medieval Europe and the Rise of Western Civilization: 500 to 1500

Students will examine the political, economic, social, and cultural development of Europe, which influenced the rise of Western Civilization from 500 to 1500.

WH.5.1. Describe the impact on Western Europe of the collapse of the Roman Empire.

WH.5.2. Describe the importance of Christian monasteries and convents as centers of education, political power, economic productivity, and commercial life, and describe their roles in spreading the Christian religion and civilization throughout Western and Central Europe. (Individuals, Society, and Culture)

WH.5.3. Explain how Western civilization arose from a synthesis of Christianity and classical Greco-Roman civilization with the cultures of northern European peoples. (Individuals, Society, and Culture)

WH.5.4. Describe the rise and achievements of Charlemagne and the Empire of the Franks and explain how the idea of Christendom influenced the development of cultural unity in Europe. (Individuals, Society, and Culture)

WH.5.5. Define feudalism and the manorial system, and explain their impact upon European civilization. (Economics; Civics and Government; Individuals, Society, and Culture)

WH.5.6. Describe the technological improvements in agriculture and the growth of towns, guilds, and banking during the Middle Ages. (Economics)

WH.5.7. Analyze and compare the success of the Latin and Greek churches in spreading the Christian religion and civilization to peoples of Northern and Eastern Europe. (Individuals, Society, and Culture)

WH.5.8. Explain the Great Schism of 1054 and the development of Eastern and Western branches of Christianity. (Individuals, Society, and Culture)

WH.5.9. Explain the causes of the Crusades and their consequences for Europe and Southwest Asia, including the growth in power of the monarchies in Europe. (Civics and Government; Individuals, Society, and Culture)

WH.5.10. Describe the rise, achievements, decline and demise of the Byzantine Empire, the relationships of Byzantine and Western Civilizations, the conquest of Constantinople by the Turks in 1453, and the impact on European peoples of the Turkish (Ottoman) Empire. (Civics and Government; Individuals, Society, and Culture)

WH.5.11. Interpret maps and timelines depicting major events in medieval Europe, which were related to the rise of Western Civilization. (History; Geography)

Standard 6: The Renaissance and Reformation in Europe and the Development of Western Civilization: 1250 to 1650

Students will examine the antecedents, events, outcomes, and legacies for Western Civilization of the Renaissance and Reformation from 1250 to 1650.

WH.6.1. Trace the origins and developments of the Renaissance in the Italian peninsula. Explain its diffusion throughout Western Europe and its impact on peoples and places associated with Western Civilization.

WH.6.2. Describe the main themes and achievements of the Renaissance, including its impact on science, technology, and the arts. (Individuals, Society, and Culture)

WH.6.3. Analyze the social and cultural impact of the invention of the printing press upon the Renaissance and the Protestant Reformation. (Individuals, Society, and Culture)

WH.6.4. Analyze the discontent of Christian reformers with the Roman Catholic Church of the sixteenth century, which led to the Protestant Reformation. (Individuals, Society, and Culture)

WH.6.5. Trace the spread of Protestantism across Europe and the reactions of the Catholic Church, and explain the influence of the Reformation on the development of Western civilization. (Individuals, Society, and Culture)

WH.6.6. Explain the importance of various Protestant reformers, including Martin Luther, John Calvin, and Ulrich Zwingli. (Individuals, Society, and Culture)

WH.6.7. Trace the origins and development of the Church of England. (Civics and Government; Individuals, Society, and Culture)

WH.6.8. Explain the purposes, policies, and importance of the Catholic Reformation (the Church's response to the Protestant Reformation) and its consequences, including the Council of Trent. (Individuals, Society, and Culture)

WH.6.9. Explain the importance of various Catholic reformers, including Ignatius Loyola, Carlo Borromeo, and Francis de Sales. (Individuals, Society, and Culture)

WH.6.10. Explain the causes, events, and consequences of wars associated with the Reformation, which culminated with the Thirty Years War, 1618 to 1648. (Economics; Civics and Government; Individuals, Society, and Culture)

Standard 7: Worldwide Exploration, Conquest, and Colonization, 1450 to 1750

Students will examine the causes, events, and consequences of European worldwide exploration, conquest, and colonization from 1450 to 1750.

WH.7.1. Explain the causes and conditions of worldwide voyages of exploration and discovery by expeditions from Portugal, Spain, France, England, and the Netherlands.

WH.7.2. Explain the origins, developments, main events, and consequences of European overseas expansion through conquest and colonization.

WH.7.3. Explain the origins, developments, and consequences of the transatlantic slave trade between Africa and the Americas. (Economics; Geography; Individuals, Society, and Culture)

WH.7.4. Explain the encounters between Europeans and peoples of sub-Saharan Africa, Asia, and the Americas and the consequences for the various peoples involved in these global interactions. (Economics; Geography; Individuals, Society, and Culture)

WH.7.5. Describe the worldwide exchange of flora, fauna, and pathogens brought about by transoceanic voyages of exploration and the consequences for the various peoples involved in these encounters. (Economics; Individuals, Society, and Culture)

WH.7.6. Identify major technological innovations in shipbuilding, navigation, and naval warfare, and explain how these technological advances were related to European voyages of exploration, conquest, and colonization. (Economics; Individuals, Society, and Culture)

WH.7.7. Construct and interpret timelines about main events of the European voyages of exploration and discovery and encounters of the Spanish with the Aztec and Inca civilizations.

WH.7.8. Analyze and compare the ways that slavery and other forms of coerced labor or social bondage were practiced in East Africa, West Africa, Southwest Asia, Europe, and the Americas from 1450 to 1750. (Economics; Individuals, Society, and Culture)

Standard 8: Scientific, Political, and Industrial Revolutions: 1500 to 1900

Students will examine the causes, events, and global consequences of the scientific, political, and industrial revolutions that originated in Western Europe and profoundly influenced the world from 1500 to 1900.

WH.8.1. Explain the modern scientific method, which exemplified the Scientific Revolution, and distinguish modern science from science in preceding periods of world history. (Individuals, Society, and Culture)

WH.8.2. Describe new theories of the universe and the natural world, which were associated with the Scientific Revolution. (Individuals, Society, and Culture)

WH.8.3. Analyze the impact of science upon technology, government, economy, and society in Europe, and explain the global importance of the Scientific Revolution. (Economics; Civics and Government; Individuals, Society, and Culture)

WH.8.4. Trace the origins and consequences of the English Civil War on the government and society of England, and explain the significance of the Glorious Revolution of 1688 for the development of popular government and liberty in England and its colonies in North America. (Economics; Civics and Government; Individuals, Society, and Culture)

WH.8.5. Explain the concept of "the Enlightenment" in European history and describe its impact upon political thought and government in Europe, North America, and other regions of the world. (Economics; Civics and Government)

WH.8.6. Compare and contrast the causes and events of the American and French Revolutions of the late eighteenth century and their consequences for the growth of liberty,

equality, and democracy in Europe, North America, and other parts of the world. (Civics and Government; Individuals, Society, and Culture)

WH.8.7. Describe the causes, events, and outcomes of the Latin American independence movements of the nineteenth century. (Civics and Government; Individuals, Society, and Culture)

WH.8.8. Describe the causes and conditions of the Industrial Revolution in England, Europe, and the United States, and explain the global consequences. (Economics; Individuals, Society, and Culture)

WH.8.9. Explain the rise of socialism and communism in the context of the political and industrial revolutions. (Civics and Government; Individuals, Society, and Culture)

WH.8.10. Analyze and evaluate the influence of Christianity, Enlightenment-era philosophy, and democratic revolutions and ideas in abolishing the slave trade, in emancipating slaves in the Americas, and in achieving social reforms in various regions of the world.

Standard 9: Global Imperialism: 1750 to 1900

Students will examine the origins, major events, and consequences of worldwide imperialism from 1750 to 1900.

WH.9.1. Discuss the rise of nation-states and nationalism in Europe, North America, and Asia. (Civics and Government; Individuals, Society, and Culture)

WH.9.2. Define and explain the causes, main events, and global consequences of nineteenth-century imperialism.

WH.9.3. Analyze the causes and consequences of the partition of Africa by European imperialists. (Civics and Government; Individuals, Society, and Culture)

WH.9.4. Analyze the causes and consequences of domination in China by European powers. (Civics and Government; Individuals, Society, and Culture)

WH.9.5. Analyze the causes and consequences of British and French imperialism in India. (Civics and Government; Individuals, Society, and Culture)

WH.9.6. Analyze the causes and consequences of Russian imperialism on central Asia and Siberia. (Civics and Government; Individuals, Society, and Culture)

WH.9.7. Explain the impact of imperialism upon indigenous peoples and cultures in Africa and Asia with particular emphasis on Japanese responses to challenges by Western imperial powers, which influenced Japan to become an industrial, military, and imperial power.

WH.9.8. Use a variety of information resources to describe advances in transportation, weapons technology, and industrial development in Europe during the nineteenth century. Describe the relationship of these factors to the success of imperial expansion. (Economics; Civics and Government; Individuals, Society, and Culture)

Standard 10: An Era of Global Conflicts, Challenges, Controversies, and Changes: 1900 to the Present

Students will analyze and explain twentieth-century trends and events of global significance, such as world wars, international controversies and challenges, and cross-cultural changes that have connected once-separated regions into an incipient global community.

WH.10.1. Trace and explain the antecedents, causes, major events, and global consequences of World War I.

WH.10.2. Explain causes of the February and October Revolutions of 1917 in Russia, their effects on the outcome of World War I, and the success of the Bolsheviks (Communists) in their establishment of the Soviet Union (the Union of Soviet Socialist Republics). (Economics; Civics and Government; Individuals, Society, and Culture)

WH.10.3. Compare the totalitarian ideologies, institutions, and leaders of the Soviet Union and Nazi Germany. Describe acts of oppression, including extermination by the Nazis and Soviet Communists against particular inhabitants within their countries, and acts of aggression against other countries during the 1930s by the Soviet Union and Nazi Germany. (Civics and Government; Individuals, Society, and Culture)

WH.10.4. Trace and explain the antecedents, causes, major events, and global consequences of World War II, including the Holocaust. (Civics and Government; Individuals, Society, and Culture)

WH.10.5. Explain the origins and purposes of the United Nations in the context of World War I and World War II.

WH.10.6. Trace and explain the antecedents, causes, major events, and global consequences of the Cold War. (Civics and Government; Individuals, Society, and Culture)

WH.10.7. Explain the decline and demise of the Soviet Union and the political and economic changes in former communist countries of Central and Eastern Europe. (Economics)

WH.10.8. Analyze and explain why some African and Asian countries achieved independence peacefully through legal means and others as a consequence of armed struggles or wars. (Civics and Government; Individuals, Society, and Culture)

WH.10.9. Explain the origins of the modern state of Israel, the reactions of Arabic peoples and states, and the conflicts between Israel and other states in its region. (Civics and Government; Individuals, Society, and Culture)

WH.10.10. Define "post-industrial society," and use this concept to differentiate global economic and global technological development during the latter half of the twentieth century from that of the period 1800 to 1950.

WH.10.11. Describe ethnic or nationalistic conflicts and violence in various parts of the world, including Southeastern Europe, Southwest and Central Asia, and Central Africa. (Individuals, Society, and Culture)

WH.10.12. Analyze and evaluate the global expansion of liberty and democracy since the 1970s and the successes or failures of democratic reform movements in challenging authoritarian or despotic regimes in Africa, Asia, Eastern Europe, and Latin America.

Standard 11: Historical Research

Students will conduct historical research that includes forming research questions, developing a thesis, investigating a variety of primary and secondary sources, and presenting their findings with documentation.

WH.11.1. Locate and analyze primary and secondary sources presenting differing perspectives on events and issues of the past.

WH.11.2. Locate and use sources found at local and state libraries, archival collections, museums, historic sites, and electronic sites.

Section C: ACT's College Readiness Standards Included in Indiana's Grade 8–12 Academic Standards

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

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

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

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

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

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

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

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

Descriptions of the ACT Reading Passages

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Section D: ACT's WorkKeys Skills Included in Indiana's Academic Standards

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

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

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

WorkKeys Skills

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