STATE STANDARDS ANALYSIS

COLORADO

Colorado
5–8 Model Content Standards
Reading and Writing, Mathematics, and Science

and

ACT®
College Readiness Standards

February 2008

Executive Summary

How well are Colorado's Grade 5–8 Model Content Standards preparing students to be on track to be college-ready?

1. Are ACT's College Readiness Standards present in Colorado Grade 5–8 Model Content Standards?
2. What information can EXPLORE provide about students' achievement of Colorado Grade 5–8 Model Content Standards?

ANALYSIS 1

POSSIBLE GAPS HAVE BEEN IDENTIFIED IN COLORADO'S GRADE 5–8 MODEL CONTENT STANDARDS WITH RESPECT TO PREPARING STUDENTS TO BE ON TRACK TO BE READY FOR ENTRY-LEVEL POSTSECONDARY COURSES (SEE SECTION A FOR DETAILS).

- **READING AND WRITING RESULTS:** Many Colorado Grade 5–8 Model Content Standards map to ACT College Readiness Standards in Reading and English. However, some EXPLORE standards at the more complex, higher levels of proficiency and achievement in Reading (at the 24–27 score range) appear to be absent from the Colorado standards. With respect to measuring student achievement of Colorado standards, the EXPLORE English and Reading tests measure 5 out of 6 Colorado Grade 5–8 Model Content Standards in Reading and Writing (including 30 of 64 descriptors)

- **MATHEMATICS RESULTS:** Colorado Grade 5–8 Model Content Standards for mathematics are present in all strands of the ACT College Readiness Standards for mathematics. However, many of the EXPLORE standards at the more complex, higher levels of proficiency and achievement in Mathematics (at the 24–27 score range) appear to be absent from the Colorado standards. With respect to measuring student achievement of Colorado standards, the EXPLORE Mathematics Test measures 6 out of 6 Colorado Model Content Standards in Mathematics (including 33 of 34 descriptors).

ANALYSIS 2

THE ACT MEASURES NEARLY ALL COLORADO GRADE 5–8 MODEL CONTENT STANDARDS IN READING AND WRITING, MATHEMATICS, AND SCIENCE (SEE SECTION B FOR DETAILS).

- **SCIENCE RESULTS:** Some Colorado Grade 5–8 Model Science Standards were present in ACT's College Readiness Standards in Science. However, many of the EXPLORE College Readiness Standards at the more complex, higher levels of proficiency and achievement in science (at the 20–23 and the 24–27 score ranges) appear to be absent from the Colorado standards. With respect to measuring student achievement of Colorado standards, the EXPLORE Science Test measures 5 out of 5 Colorado Model Content Standard in Science (including 8 of 11 process descriptors and 39 of 39 content topics)

Most exceptions arise from the language or wording of a content standard and the ability of an instrument to measure that outcome.

Colorado's Content Standards in civics, dance, economics, foreign language, geography, history, music, physical education, theater, and visual arts are not measured by EXPLORE and are not included in this report.

ACT has the only empirically-derived definition of College Readiness

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:

ACT BUILDS ITS DEFINITION OF COLLEGE READINESS ON AN EMPIRICAL BASE:

1. **THE ACT NATIONAL CURRICULUM SURVEY**
2. **ACT'S COLLEGE READINESS BENCHMARK SCORES**
3. **ACT'S COLLEGE READINESS STANDARDS™**

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

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

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

  ACT analyzed thousands of student records to identify ACT, PLAN, and EXPLORE test 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): The ACT Benchmark scores are: 18 for English, 22 for Math, 21 for Reading, and 24 for Science. EXPLORE Benchmark scores are: 13 for English, 17 for Math, 15 for Reading, and 20 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 developed data-driven, empirically derived statements of what students typically know and are able to do in various score ranges on the ACT English, Reading, Mathematics, and Science tests. These statements provide specific details about students' college readiness and can be used to identify next steps for improvement.

In sum, EXPLORE provides specific and abundant data relevant to Colorado's Grade 5–8 Model Content Standards and to Colorado students' readiness for college.

Section A: ACT's College Readiness Standards present and missing in Colorado Grade 5-8 Model Content Standards

Using thousands of student records and responses, content and measurement experts developed data-driven, empirically derived statements of what students know and are typically able to do in various score ranges on ACT's English, Reading, Mathematics, and Science tests. These empirically derived score descriptors are called **ACT's College Readiness Standards**. Because of this unique way the ACT Standards were derived, ACT's Standards contain specific descriptions of proficiency and content, including descriptions of the complexity of the test material.

- Colorado Grade 5–8 Model Content Standards that are matched to ACT College Readiness Standards appear next to each other on the following tables. (Each Colorado statement is written out once. If a Colorado standard is matched to additional ACT standards in that strand, *only the number* of that Colorado standard will appear further down the column.)

- For the ACT College Readiness Standards, the **columns (strands**) describe groups of specific skills and knowledge needed to understand concepts in that strand. **Rows** contain specific statements based on different score ranges and therefore specifically capture the different levels of proficiencies of those skills.

- The EXPLORE College Readiness Benchmark score for each test is denoted in large font with a red box around it in the far left-hand column. *Statements appearing in the shaded areas within the score ranges at and below the benchmark score should be considered requisite for all students in order to be considered on track to succeed in college and work after high school.*

- At the bottom of each table are listed those Colorado Grade 5–8 Model Content Standards that are not sufficiently sampled on the EXPLORE tests to infer student proficiency of those skills. Most often, these skills are not matched because performance requirements implied by the standards' wording necessitate more individualized assessment.

ACT College Readiness Standards for English **compared to Colorado Grades 5–8 Model Content Standards**

	Topic Development in Terms of Purpose and Focus	Corresponding Colorado Model Content Standards	Organization, Unity, and Coherence	Corresponding Colorado Model Content Standards	Word Choice in Terms of Style, Tone, Clarity, and Economy	Corresponding Colorado Model Content Standards	Sentence Structure and Formation	Corresponding Colorado Model Content Standards	Conventions of Usage	Corresponding Colorado Model Content Standards	Conventions of Punctuation	Corresponding Colorado Model Content Standards
13–15 **13**			Use conjunctive adverbs or phrases to show time relationships in simple narrative essays (e.g., *then, this time*)	2.3. plan, draft, revise, proofread, and edit written communications 2.9. drafting, revising, editing, and proofreading for a legible final copy 2.10. applying skills in analysis, synthesis, evaluation, and explanation to their writing and speaking 4.1. make predictions, analyze, draw conclusions, and discriminate between fact and opinion in writing, reading, speaking, listening, and viewing	Revise sentences to correct awkward and confusing arrangements of sentence elements Revise vague nouns and pronouns that create obvious logic problems	2.3. plan, draft, revise, proofread, and edit written communications 2.4. use a variety of devices such as figurative language, symbolism, dialect, and precise vocabulary to convey meaning 2.8. choosing vocabulary and figures of speech that communicate clearly 2.9. drafting, revising, editing, and proofreading for a legible final copy 2.10. applying skills in analysis, synthesis, evaluation, and explanation to their writing and speaking 4.1. make predictions, analyze, draw conclusions, and discriminate between fact and opinion in writing, reading, speaking, listening, and viewing 2.3, 2.4, 2.8, 2.9, 2.10 4.1	Use conjunctions or punctuation to join simple clauses Revise shifts in verb tense between simple clauses in a sentence or between simple adjoining sentences	2.3. plan, draft, revise, proofread, and edit written communications 2.9. drafting, revising, editing, and proofreading for a legible final copy 2.10. applying skills in analysis, synthesis, evaluation, and explanation to their writing and speaking 3.1. know and use correct grammar in speaking and writing 3.3. use correct sentence structure in writing 3.8. using simple, compound, complex, and compound/complex sentences in writing and speaking 4.1. make predictions, analyze, draw conclusions, and discriminate between fact and opinion in writing, reading, speaking, listening, and viewing 2.3, 2.9, 2.10 3.1, 3.3, 3.8 4.1	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	2.3. plan, draft, revise, proofread, and edit written communications 2.9. drafting, revising, editing, and proofreading for a legible final copy 2.10. applying skills in analysis, synthesis, evaluation, and explanation to their writing and speaking 3.1. know and use correct grammar in speaking and writing 3.2. apply correct usage in speaking and writing 3.6. using correct pronoun case, regular and irregular noun and verb forms, and subject-verb agreement involving comparisons in writing and speaking 3.7. using modifiers, homonyms, and homophones in writing and speaking 4.1. make predictions, analyze, draw conclusions, and discriminate between fact and opinion in writing, reading, speaking, listening, and viewing	Delete commas that create basic sense problems (e.g., between verb and direct object)	2.3. plan, draft, revise, proofread, and edit written communications 2.9. drafting, revising, editing, and proofreading for a legible final copy 2.10. applying skills in analysis, synthesis, evaluation, and explanation to their writing and speaking 3.4. demonstrate correct punctuation, capitalization, and spelling. 4.1. make predictions, analyze, draw conclusions, and discriminate between fact and opinion in writing, reading, speaking, listening, and viewing

ACT College Readiness Standards for English **compared to Colorado Grades 5–8 Model Content Standards**

	Topic Development in Terms of Purpose and Focus	Corresponding Colorado Model Content Standards	Organization, Unity, and Coherence	Corresponding Colorado Model Content Standards	Word Choice in Terms of Style, Tone, Clarity, and Economy	Corresponding Colorado Model Content Standards	Sentence Structure and Formation	Corresponding Colorado Model Content Standards	Conventions of Usage	Corresponding Colorado Model Content Standards	Conventions of Punctuation	Corresponding Colorado Model Content Standards
16–19	Identify the basic purpose or role of a specified phrase or sentence	2.1. write and speak for a variety of purposes such as telling stories, presenting analytical responses to literature, conveying technical information, explaining concepts and procedures, and persuading 2.3. plan, draft, revise, proofread, and edit written communications 2.9. drafting, revising, editing, and proofreading for a legible final copy 2.10. applying skills in analysis, synthesis, evaluation, and explanation to their writing and speaking 4.1. make predictions, analyze, draw conclusions, and discriminate between fact and opinion in writing, reading, speaking, listening, and viewing 4.4. identify the purpose, perspective, and historical and cultural influences of a speaker, author, or director 4.6. recognizing an author's or speaker's point of view and purpose, separating fact from opinion 4.7. using reading, writing, speaking, listening, and viewing skills to solve problems and answer questions	Select the most logical place to add a sentence in a paragraph	2.3, 2.9, 2.10 4.1	Delete obviously synonymous and wordy material in a sentence Revise expressions that deviate from the style of an essay	2.3, 2.8, 2.9, 2.10 4.1 2.3, 2.4, 2.8, 2.9, 2.10 4.1 PLUS 2.13. recognizing stylistic elements such as voice, tone, and style	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	2.3, 2.9, 2.10 3.1, 3.3, 3.8 4.1 2.3, 2.9, 2.10 3.1, 3.3, 3.8 4.1	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*	2.3, 2.9, 2.10 3.1, 3.2, 3.6, 3.7 4.1 2.3, 2.9, 2.10 3.1, 3.2, 3.7 4.1 PLUS 3.9. punctuating and capitalizing titles and direct quotations, using possessives, and correct paragraphing in writing	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)	2.3, 2.9, 2.10 3.4 4.1 2.3, 2.9, 2.10 3.4 4.1
	Delete a clause or sentence because it is obviously irrelevant to the essay	2.1, 2.3, 2.9, 2.10 4.1 PLUS 4.5. evaluate the reliability, accuracy, and relevancy of information										
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	2.1, 2.3, 2.9, 2.10 4.1, 4.4, 4.6, 4.7 2.1, 2.3, 2.9, 2.10 4.1, 4.5	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	2.3, 2.9, 2.10 4.1 2.3, 2.9, 2.10 4.1 2.3, 2.9, 2.10 4.1 PLUS 3.9. punctuating and capitalizing titles and direct quotations, using possessives, and correct paragraphing in writing	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	2.3, 2.8, 2.9, 2.10 4.1 2.3, 2.4, 2.8, 2.9, 2.10, 2.13 4.1 2.3, 2.4, 2.8, 2.9, 2.10 4.1	Recognize and correct marked disturbances of sentence flow and structure (e.g., participial phrase fragments, missing or incorrect relative pronouns, dangling or misplaced modifiers)	2.3, 2.9, 2.10 3.1, 3.3, 3.8 4.1 PLUS 3.7. using modifiers, homonyms, and homophones in writing and speaking	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	2.3, 2.9, 2.10 3.1, 3.2 4.1 2.3, 2.9, 2.10 3.1, 3.2, 3.6 4.1	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)	2.3, 2.9, 2.10 3.4 4.1 2.3, 2.9, 2.10 3.4 4.1

ACT College Readiness Standards for English **compared to Colorado Grades 5–8 Model Content Standards**

	Topic Development in Terms of Purpose and Focus	Corresponding Colorado Model Content Standards	Organization, Unity, and Coherence	Corresponding Colorado Model Content Standards	Word Choice in Terms of Style, Tone, Clarity, and Economy	Corresponding Colorado Model Content Standards	Sentence Structure and Formation	Corresponding Colorado Model Content Standards	Conventions of Usage	Corresponding Colorado Model Content Standards	Conventions of Punctuation	Corresponding Colorado Model Content Standards
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	2.1, 2.3, 2.9, 2.10 4.1, 4.4, 4.6, 4.7 PLUS 4.3. recognize, express, and defend points of view orally and in writing 4.9. recognizing, expressing, and defending a point of view orally in an articulate manner and in writing 2.1, 2.3, 2.9, 2.10 4.1, 4.5 2.1, 2.3, 2.9, 2.10 4.1, 4.4, 4.6, 4.7	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	2.3, 2.9, 2.10 4.1 2.3, 2.9, 2.10 4.1 2.3, 2.9, 2.10 3.9 4.1	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	2.3, 2.8, 2.9, 2.10 4.1 2.3, 2.4, 2.8, 2.9, 2.10, 4.1 2.3, 2.4, 2.8, 2.9, 2.10 2.13 4.1	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	2.3, 2.9, 2.10 3.1, 3.3, 3.7, 3.8 4.1 2.3, 2.9, 2.10 3.1, 3.3, 3.8 4.1	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*	2.3, 2.9, 2.10 3.1, 3.2 4.1 2.3, 2.9, 2.10 3.1, 3.2, 3.6, 3.7 4.1	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	2.3, 2.9, 2.10 3.4 4.1 2.3, 2.9, 2.10 3.4 4.1 2.3, 2.9, 2.10 3.4 4.1 PLUS 3.9. punctuating and capitalizing titles and direct quotations, using possessives, and correct paragraphing in writing 2.3, 2.9, 2.10 3.4 4.1
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		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	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		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	

Colorado Grades 5–8 Writing benchmarks NOT measured by the EXPLORE English Test:

2.2. write and speak for audiences such as peers, teachers, and the community

2.5. organize written and oral presentations using strategies such as lists, outlining, cause/effect relationships, comparison/contrast, problem/solution, and narration

2.6. use handwriting and at the most appropriate time, word processing to produce a product that is legible

2.7. writing stories, letters, and reports with greater detail and supporting material

2.11. incorporating source materials into their speaking and writing (for example, interviews, news articles, encyclopedia information)

2.12. writing and speaking in the content areas (for example, science, geography, history, literature), using the technical vocabulary of the subject accurately

3.5. identifying the parts of speech such as nouns, pronouns, verbs, adverbs, adjectives, conjunctions, prepositions, and interjections

3.10. using prefixes, root words, and suffixes correctly in writing and speaking

3.11. expanding spelling skills to include more complex words

3.12. demonstrating use of conventional spelling in their published works

3.13. using resources such as spell checkers, dictionaries, and charts to monitor their spelling accuracy

4.2. use reading, writing, speaking, listening, and viewing to define and solve problems

5.1. select relevant material for reading, writing, and speaking purposes

5.2. understand the structure, organization, and use of various media, reference, and technological sources as they select information for their reading and writing

5.3. paraphrase, summarize, organize, and synthesize information

5.4. give credit for others' ideas, images, or information

5.5. use information to produce a quality product

5.6. using organizational features of printed text such as prefaces, afterwords, and appendices

5.7. using organizational features of electronic information (for example, microfiche headings and numbering, headings for accessing nested information in hypertext media, electronic media CD-ROM, laser disc), and library and interlibrary catalog databases

5.8. locating and selecting relevant information

5.9. using available technology to research and produce an end-product that is accurately documented

5.10. giving credit for borrowed information in a bibliography

ACT College Readiness Standards for Mathematics **compared to Colorado Grades 5–8 Model Content Standards**

	Basic Operations & Applications	Corresponding Colorado Model Content Standards	Probability, Statistics, & Data Analysis	Corresponding Colorado Model Content Standards	Numbers: Concepts & Properties	Corresponding Colorado Model Content Standards	Expressions, Equations, & Inequalities	Corresponding Colorado Model Content Standards
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)	6.2. construct, use, and explain procedures to compute and estimate with whole numbers, fractions, decimals, and integers 6.2 5.3. read and interpret various scales including those based on number lines, graphs, and maps	Calculate the average of a list of positive whole numbers Perform a single computation using information from a table or chart	3.2. display and use measures of central tendency, such as mean, median, and mode, and measures of variability, such as range and quartiles	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	2.1. represent, describe, and analyze patterns and relationships using tables, graphs, verbal rules, and standard algebraic notation 2.2. describe patterns using variables, expressions, equations, and inequalities in problem-solving situations 2.5. solve simple linear equations in problem-solving situations using a variety of methods (informal, formal, graphical) and a variety of tools (physical materials, calculators, computers)
16–19 **17**	Solve routine one-step arithmetic problems (using whole numbers, fractions, and decimals) such as single-step percent Solve some routine two-step arithmetic problems	6.2 PLUS 1.4. use the relationships among fractions, decimals, and percents, including the concepts of ratio and proportion, in problem-solving situations 6.1. use models to explain how ratios, proportions, and percents can be used to solve real-world problems 6.2	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	3.2 3.2 2.1. represent, describe, and analyze patterns and relationships using tables, graphs, verbal rules, and standard algebraic notation 3.1. read and construct displays of data using appropriate techniques (for example, line graphs, circle graphs, scatter plots, box plots, stem-and-leaf plots) and appropriate technology 3.4. formulate hypotheses, draw conclusions, and make convincing arguments based on data analysis 3.5. determine probabilities through experiments or simulations	Recognize one-digit factors of a number Identify a digit's place value	1.3. apply number theory concepts (for example, primes, factors, multiples) to represent numbers in various ways	Substitute whole numbers for unknown quantities to evaluate expressions Solve one-step equations having integer or decimal answers Combine like terms (e.g., $2x + 5x$)	 2.5
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	1.4, 6.1 PLUS 4.3. apply the concepts of ratio, proportion, and similarity in problem-solving situations 6.3. develop, apply, and explain a variety of different estimation strategies in problem-solving situations, and explain why an estimate may be acceptable in place of an exact answer 6.4. select and use appropriate algorithms for computing with commonly used fractions and decimals, percents, and integers in problem-solving situations and determine whether the results are reasonable	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	3.2 2.1, 3.1 PLUS 3.3. evaluate arguments that are based on statistical claims 3.5 PLUS 3.6. make predictions and compare results using both experimental and theoretical probability drawn from real-world problems 3.7. use counting strategies to determine all the possible outcomes from an experiment (for example, the number of ways students can line up to have their picture taken)	Exhibit knowledge of elementary number concepts including rounding, the ordering of decimals, pattern identification, absolute value, primes, and greatest common factor	1.3 PLUS 1.1. demonstrate meanings for integers, rational numbers, percents, exponents, square roots, and pi (π) using physical materials and technology in problem-solving situations 1.2. read, write, and order integers, rational numbers, and common irrational numbers such as $\sqrt{2}$, $\sqrt{5}$, and π 1.5. develop, test, and explain conjectures about properties of integers and rational numbers 1.6. use number sense to estimate and justify the reasonableness of solutions to problems involving integers, rational numbers, and common irrational numbers such as $\sqrt{2}$, $\sqrt{5}$, and π	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	5.4. develop and use formulas and procedures to solve problems involving measurement 2.5 2.1, 2.2
24–27	Solve multistep arithmetic problems that involve planning or converting units of measure (e.g., feet per second to miles per hour)	5.3, 6.3, 6.4 PLUS 5.6. select and use appropriate units and tools to measure to the degree of accuracy required in a particular problem-solving situation	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	3.2 2.1 PLUS 2.3. analyze functional relationships to explain how a change in one quantity results in a change in another (for example, how the area of a circle changes as the radius increases, or how a person's height changes over time) 3.5, 3.6	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	1.3 1.2 1.3 1.1	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	2.5 2.2
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	

ACT College Readiness Standards for Mathematics **compared to Colorado Grades 5–8 Model Content Standards**

	Graphical Representations	Corresponding Colorado Model Content Standards	Properties of Plane Figures	Corresponding Colorado Model Content Standards	Measurement	Corresponding Colorado Model Content Standards	Functions	Corresponding Colorado Model Content Standards
13–15	Identify the location of a point with a positive coordinate on the number line	5.3. read and interpret various scales including those based on number lines, graphs, and maps			Estimate or calculate the length of a line segment based on other lengths given on a geometric figure	5.1. estimate, use, and describe measures of distance, perimeter, area, volume, capacity, weight, mass, and angle comparison 5.2. estimate, make, and use direct and indirect measurements to describe and make comparisons 5.3. read and interpret various scales including those based on number lines, graphs, and maps		
16–19 **17**	Locate points on the number line and in the first quadrant	4.4. solve problems using coordinate geometry	Exhibit some knowledge of the angles associated with parallel lines	4.2. describe, analyze, and reason informally about the properties (for example, parallelism, perpendicularity, congruence) of two- and three-dimensional figures	Compute the perimeter of polygons when all side lengths are given Compute the area of rectangles when whole number dimensions are given	5.1 PLUS 4.5. solve problems involving perimeter and area in two dimensions, and involving surface area and volume in three dimensions 4.5, 5.1		
20–23	Locate points in the coordinate plane Comprehend the concept of length on the number line Exhibit knowledge of slope	4.4 PLUS 2.4. distinguish between linear and nonlinear functions through informal investigations 4.6. transform geometric figures using reflections, translations, and rotations to explore congruence	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°)	4.2 5.1. estimate, use, and describe measures of distance, perimeter, area, volume, capacity, weight, mass, and angle comparison 5.2. estimate, make, and use direct and indirect measurements to describe and make comparisons	Compute the area and perimeter of triangles and rectangles in simple problems Use geometric formulas when all necessary information is given	4.5, 5.1 4.5, 5.1 PLUS 2.3. analyze functional relationships to explain how a change in one quantity results in a change in another (for example, how the area of a circle changes as the radius increases, or how a person's height changes over time) 5.4. develop and use formulas and procedures to solve problems involving measurement	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	5.1, 5.2	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	4.5, 5.1 PLUS 5.5. describe how a change in an object's linear dimensions affects its perimeter, area, and volume 4.5, 5.1, 5.5	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	

Colorado Grades 5–8 Mathematics benchmarks NOT measured by the EXPLORE Mathematics Test:

4.1. construct two- and three-dimensional models using a variety of materials and tools

ACT College Readiness Standards for Reading **compared to Colorado Grades 5–8 Model Content Standards**

	Main Ideas and Author's Approach	Corresponding Colorado Model Content Standards	Supporting Details	Corresponding Colorado Model Content Standards	Sequential, Comparative, and Cause-Effect Relationships	Corresponding Colorado Model Content Standards	Meanings of Words	Corresponding Colorado Model Content Standards	Generalizations and Conclusions	Corresponding Colorado Model Content Standards
13–15 **15**	Recognize a clear intent of an author or narrator in uncomplicated literary narratives	**1.1.** use comprehension skills such as previewing, predicting, inferring, comparing and contrasting, re-reading and self-monitoring, summarizing, identifying the author's purpose, determining the main idea, and applying knowledge of foreshadowing, metaphor, simile, symbolism, and other figures of speech **1.3.** adjust reading strategies for different purposes such as reading carefully, idea by idea; skimming and scanning; fitting materials into an organizational pattern, such as reading a novel chronologically; finding information to support particular ideas; and finding the sequence of steps in a technical publication **1.6.** using a full range of strategies to comprehend technical writing, newspapers, magazines, poetry, short stories, plays, and novels in addition to the types of reading material mentioned above. Students extend their thinking and understanding as they read stories about people from similar and different backgrounds **4.1.** make predictions, analyze, draw conclusions, and discriminate between fact and opinion in writing, reading, speaking, listening, and viewing **4.4.** identify the purpose, perspective, and historical and cultural influences of a speaker, author, or director **4.6.** recognizing an author's or speaker's point of view and purpose, separating fact from opinion **4.7.** using reading, writing, speaking, listening, and viewing skills to solve problems and answer questions **4.8.** making predictions, drawing conclusions, and analyzing what they read, hear, and view **6.7.** reading, responding to, and discussing a variety of novels, poetry, short stories, non-fiction, content-area and technical material, and plays	Locate basic facts (e.g., names, dates, events) clearly stated in a passage	**1.1.** use comprehension skills such as previewing, predicting, inferring, comparing and contrasting, re-reading and self-monitoring, summarizing, identifying the author's purpose, determining the main idea, and applying knowledge of foreshadowing, metaphor, simile, symbolism, and other figures of speech **1.3.** adjust reading strategies for different purposes such as reading carefully, idea by idea; skimming and scanning; fitting materials into an organizational pattern, such as reading a novel chronologically; finding information to support particular ideas; and finding the sequence of steps in a technical publication **1.6.** using a full range of strategies to comprehend technical writing, newspapers, magazines, poetry, short stories, plays, and novels in addition to the types of reading material mentioned above. Students extend their thinking and understanding as they read stories about people from similar and different backgrounds **4.1.** make predictions, analyze, draw conclusions, and discriminate between fact and opinion in writing, reading, speaking, listening, and viewing **4.7.** using reading, writing, speaking, listening, and viewing skills to solve problems and answer questions **4.8.** making predictions, drawing conclusions, and analyzing what they read, hear, and view **6.7.** reading, responding to, and discussing a variety of novels, poetry, short stories, non-fiction, content-area and technical material, and plays	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	**1.1.** use comprehension skills such as previewing, predicting, inferring, comparing and contrasting, re-reading and self-monitoring, summarizing, identifying the author's purpose, determining the main idea, and applying knowledge of foreshadowing, metaphor, simile, symbolism, and other figures of speech **1.3.** adjust reading strategies for different purposes such as reading carefully, idea by idea; skimming and scanning; fitting materials into an organizational pattern, such as reading a novel chronologically; finding information to support particular ideas; and finding the sequence of steps in a technical publication **1.6.** using a full range of strategies to comprehend technical writing, newspapers, magazines, poetry, short stories, plays, and novels in addition to the types of reading material mentioned above. Students extend their thinking and understanding as they read stories about people from similar and different backgrounds **4.1.** make predictions, analyze, draw conclusions, and discriminate between fact and opinion in writing, reading, speaking, listening, and viewing **4.7.** using reading, writing, speaking, listening, and viewing skills to solve problems and answer questions **4.8.** making predictions, drawing conclusions, and analyzing what they read, hear, and view **6.7.** reading, responding to, and discussing a variety of novels, poetry, short stories, non-fiction, content-area and technical material, and plays 1.1, 1.3, 1.6 4.1, 4.7, 4.8 6.7	Understand the implication of a familiar word or phrase and of simple descriptive language	**1.1.** use comprehension skills such as previewing, predicting, inferring, comparing and contrasting, re-reading and self-monitoring, summarizing, identifying the author's purpose, determining the main idea, and applying knowledge of foreshadowing, metaphor, simile, symbolism, and other figures of speech **1.3.** adjust reading strategies for different purposes such as reading carefully, idea by idea; skimming and scanning; fitting materials into an organizational pattern, such as reading a novel chronologically; finding information to support particular ideas; and finding the sequence of steps in a technical publication **1.4.** use word recognition skills and resources such as phonics, context clues, picture clues, word origins, and word order clues; reference guides; roots, prefixes, and suffixes of words for comprehension **1.6.** using a full range of strategies to comprehend technical writing, newspapers, magazines, poetry, short stories, plays, and novels in addition to the types of reading material mentioned above. Students extend their thinking and understanding as they read stories about people from similar and different backgrounds **4.1.** make predictions, analyze, draw conclusions, and discriminate between fact and opinion in writing, reading, speaking, listening, and viewing **4.7.** using reading, writing, speaking, listening, and viewing skills to solve problems and answer questions **4.8.** making predictions, drawing conclusions, and analyzing what they read, hear, and view **6.7.** reading, responding to, and discussing a variety of novels, poetry, short stories, non-fiction, content-area and technical material, and plays	Draw simple generalizations and conclusions about the main characters in uncomplicated literary narratives	**1.1.** use comprehension skills such as previewing, predicting, inferring, comparing and contrasting, re-reading and self-monitoring, summarizing, identifying the author's purpose, determining the main idea, and applying knowledge of foreshadowing, metaphor, simile, symbolism, and other figures of speech **1.3.** adjust reading strategies for different purposes such as reading carefully, idea by idea; skimming and scanning; fitting materials into an organizational pattern, such as reading a novel chronologically; finding information to support particular ideas; and finding the sequence of steps in a technical publication **1.6.** using a full range of strategies to comprehend technical writing, newspapers, magazines, poetry, short stories, plays, and novels in addition to the types of reading material mentioned above. Students extend their thinking and understanding as they read stories about people from similar and different backgrounds **4.1.** make predictions, analyze, draw conclusions, and discriminate between fact and opinion in writing, reading, speaking, listening, and viewing **4.7.** using reading, writing, speaking, listening, and viewing skills to solve problems and answer questions **4.8.** making predictions, drawing conclusions, and analyzing what they read, hear, and view **6.7.** reading, responding to, and discussing a variety of novels, poetry, short stories, non-fiction, content-area and technical material, and plays
16–19	Identify a clear main idea or purpose of straightforward paragraphs in uncomplicated literary narratives	1.1, 1.3, 1.6 4.1, 4.4, 4.6, 4.7, 4.8 6.7	Locate simple details at the sentence and paragraph level in uncomplicated passages Recognize a clear function of a part of an uncomplicated passage	1.1, 1.3, 1.6 4.1, 4.7, 4.8 6.7 1.1, 1.3, 1.6 4.1, 4.7, 4.8 6.7	Identify relationships between main characters in uncomplicated literary narratives Recognize clear cause-effect relationships within a single paragraph in uncomplicated literary narratives	1.1, 1.3, 1.6 4.1, 4.7, 4.8 6.7 1.1, 1.3, 1.6 4.1, 4.7, 4.8 6.7	Use context to understand basic figurative language	1.1, 1.3, 1.4, 1.6 4.1, 4.7, 4.8 6.7	Draw simple generalizations and conclusions about people, ideas, and so on in uncomplicated passages	1.1, 1.3, 1.6 4.1, 4.6, 4.7, 4.8 6.7

ACT College Readiness Standards for Reading **compared to Colorado Grades 5–8 Model Content Standards**

	Main Ideas and Author's Approach	Corresponding Colorado Model Content Standards	Supporting Details	Corresponding Colorado Model Content Standards	Sequential, Comparative, and Cause-Effect Relationships	Corresponding Colorado Model Content Standards	Meanings of Words	Corresponding Colorado Model Content Standards	Generalizations and Conclusions	Corresponding Colorado Model Content Standards
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	1.1, 1.3, 1.6 4.1, 4.4, 4.6, 4.7, 4.8 6.7 1.1, 1.3, 1.6 4.1, 4.4, 4.6, 4.7, 4.8 6.7 PLUS **4.3.** recognize, express, and defend points of view orally and in writing **4.9.** recognizing, expressing, and defending a point of view orally in an articulate manner and in writing **6.1.** know and use literary terminology	Locate important details in uncomplicated passages Make simple inferences about how details are used in passages	1.1, 1.3, 1.6 4.1, 4.7, 4.8 6.7 1.1, 1.3, 1.6 4.1, 4.7, 4.8 6.7	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	1.1, 1.3, 1.6 4.1, 4.7, 4.8 6.7 1.1, 1.3, 1.6 4.1, 4.7, 4.8 6.7 1.1, 1.3, 1.6 4.1, 4.7, 4.8 6.7	Use context to determine the appropriate meaning of some figurative and nonfigurative words, phrases, and statements in uncomplicated passages	1.1, 1.3, 1.4, 1.6 4.1, 4.7, 4.8 6.7	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	1.1, 1.3, 1.6 4.1, 4.6, 4.7, 4.8 6.7
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	1.1, 1.3, 1.6 4.1, 4.4, 4.6, 4.7, 4.8 6.7 1.1 6.1 PLUS **6.11.** using literary terminology accurately, including setting, character, conflict, plot, resolution, theme, foreshadowing, and figurative language	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 pas-sage, support important points in more challenging passages	1.1, 1.3, 1.6 4.1, 4.7, 4.8 6.7	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 relation-ships in uncomplicated passages Identify clear cause-effect relationships in more challenging passages	1.1, 1.3, 1.6 4.1, 4.7, 4.8 6.7 1.1, 1.3, 1.6 4.1, 4.7, 4.8 6.7 1.1, 1.3, 1.6 4.1, 4.7, 4.8 6.7	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	1.1, 1.3, 1.4, 1.6 4.1, 4.7, 4.8 6.7	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	1.1, 1.3, 1.6 4.1, 4.7, 4.8 6.7
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		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	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		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 relation-ships 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 conclu-sions 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	

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.

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.

Colorado Grades 5–8 Reading benchmarks NOT measured by the EXPLORE Reading Test:

1.2. make connections between their reading and what they already know, and identify what they need to know about a topic before reading about it

1.5. use information from their reading to increase vocabulary and enhance language usage

4.2. use reading, writing, speaking, listening, and viewing to define and solve problems

4.10. determining literary quality based on elements such as the author's use of vocabulary, character development, plot development, description of setting, and realism of dialogue

5.1. select relevant material for reading, writing, and speaking purposes

5.2. understand the structure, organization, and use of various media, reference, and technological sources as they select information for their reading and writing

5.3. paraphrase, summarize, organize, and synthesize information

5.4. give credit for others' ideas, images, or information

5.5. use information to produce a quality product

5.6. using organizational features of printed text such as prefaces, afterwords, and appendices

5.7. using organizational features of electronic information (for example, microfiche headings and numbering, headings for accessing nested information in hypertext media, electronic media CD-ROM, laser disc), and library and interlibrary catalog databases

5.8. locating and selecting relevant information

5.9. using available technology to research and produce an end-product that is accurately documented

5.10. giving credit for borrowed information in a bibliography

6.2. read literature to investigate common issues and interests

6.3. read literature to understand places, people, events, and vocabulary, both familiar and unfamiliar

6.4. read literature that reflects the uniqueness and integrity of the American experience

6.5. read classic and contemporary literature, representing various cultural and ethnic traditions from throughout the world

6.6. read classic and contemporary literature of the United States about the experiences and traditions of diverse ethnic groups

6.8. reading, responding to, and discussing literature that represents points of view from places, people, and events that are familiar and unfamiliar

6.9. distinguishing the elements that characterize and define a literary “classic”

6.10. comparing the diverse voices of our national experience as they read a variety of United States literature

6.12. using new vocabulary from literature in other context

ACT College Readiness Standards for Science **compared to Colorado Grades 5–8 Model Content Standards**

	Interpretation of Data	Corresponding Colorado Model Content Standards	Scientific Investigation	Corresponding Colorado Model Content Standards	Evaluation of Models, Inferences, and Experimental Results	Corresponding Colorado Model Content Standards
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)	**1.2.** use appropriate tools, technologies and metric measurements to gather and organize data and report results **1.3.** interpret and evaluate data in order to formulate logical conclusions 1.2, 1.3				
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	1.2, 1.3 1.2, 1.3 1.2, 1.3 1.2, 1.3	Understand the methods and tools used in a simple experiment	**1.1.** ask questions and state hypotheses that lead to different types of scientific investigations (for example: experimentation, collecting specimens, constructing models, researching scientific literature) **1.2.** use appropriate tools, technologies and metric measurements to gather and organize data and report results **1.5.** identify and evaluate alternative explanations and procedures		
20–23 **20**	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	1.2, 1.3 1.2, 1.3 PLUS **1.6.** communicate results of their investigations in appropriate ways (for example: written reports, graphic displays, oral presentations	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	1.1, 1.2, 1.5 PLUS **5.1.** a controlled experiment must have comparable results when repeated 5.1	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	**1.1.** ask questions and state hypotheses that lead to different types of scientific investigations (for example: experimentation, collecting specimens, constructing models, researching scientific literature) **1.2.** use appropriate tools, technologies and metric measurements to gather and organize data and report results **1.3.** interpret and evaluate data in order to formulate logical conclusions **1.4.** demonstrate that scientific ideas are used to explain previous observations and to predict future events (for example: plate tectonics and future earthquake activity) **5.4.** models can be used to predict change (for example: computer simulation, video sequence, stream table)
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	 **1.5.** identify and evaluate alternative explanations and procedures 1.5 1.5 1.4, 1.5

ACT College Readiness Standards for Science **compared to Colorado Grades 5–8 Model Content Standards**

	Interpretation of Data	Corresponding Colorado Model Content Standards	Scientific Investigation	Corresponding Colorado Model Content Standards	Evaluation of Models, Inferences, and Experimental Results	Corresponding Colorado Model Content Standards
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

Colorado Grades 5–8 Science benchmarks NOT measured by the EXPLORE Science Test:

Colorado Science Standards 2, 3, and 4: The EXPLORE Science Test presents content from all three of these standards. 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, any one form of the EXPLORE Science Test covers some, but not all, of the discrete science content knowledge specifically described in Colorado Model Science Content Standards 2, 3, and 4.

5.2. scientific knowledge changes as new knowledge is acquired and previous ideas are modified (for example: through space exploration)

5.3. contributions to the advancement of science have been made by people in different cultures and at different times in history

5.5. there are interrelationships among science, technology and human activity that affect the world

Reading and Writing

COLORADO Grades 5–8 Reading and Writing
Model Content Standards

Standard 1: Students read and understand a variety of materials.

In order to meet this standard, students will

- use comprehension skills such as previewing, predicting, inferring, comparing and contrasting, re-reading and self-monitoring, summarizing, identifying the author's purpose, determining the main idea, and applying knowledge of foreshadowing, metaphor, simile, symbolism, and other figures of speech;
- make connections between their reading and what they already know, and identify what they need to know about a topic before reading about it;
- adjust reading strategies for different purposes such as reading carefully, idea by idea; skimming and scanning; fitting materials into an organizational pattern, such as reading a novel chronologically; finding information to support particular ideas; and finding the sequence of steps in a technical publication;
- use word recognition skills and resources such as phonics, context clues, picture clues, word origins, and word order clues; reference guides; roots, prefixes, and suffixes of words for comprehension; and
- use information from their reading to increase vocabulary and enhance language usage.

What grade 5–8 students know and are able to do includes:

- using a full range of strategies to comprehend technical writing, newspapers, magazines, poetry, short stories, plays, and novels in addition to the types of reading material mentioned above. Students extend their thinking and understanding as they read stories about people from similar and different backgrounds.

Standard 2: Students write and speak for a variety of purposes and audiences.

In order to meet this standard, students will

- write and speak for a variety of purposes such as telling stories, presenting analytical responses to literature, conveying technical information, explaining concepts and procedures, and persuading;
- write and speak for audiences such as peers, teachers, and the community;
- plan, draft, revise, proofread, and edit written communications;
- use a variety of devices such as figurative language, symbolism, dialect, and precise vocabulary to convey meaning;
- organize written and oral presentations using strategies such as lists, outlining, cause/effect relationships, comparison/contrast, problem/solution, and narration; and
- use handwriting and at the most appropriate time, word processing to produce a product that is legible.

What grade 5–8 students know and are able to do includes:

- writing stories, letters, and reports with greater detail and supporting material;
- choosing vocabulary and figures of speech that communicate clearly;
- drafting, revising, editing, and proofreading for a legible final copy;
- applying skills in analysis, synthesis, evaluation, and explanation to their writing and speaking;
- incorporating source materials into their speaking and writing (for example, interviews, news articles, encyclopedia information);
- writing and speaking in the content areas (for example, science, geography, history, literature), using the technical vocabulary of the subject accurately; and
- recognizing stylistic elements such as voice, tone, and style.

Standard 3: Students write and speak using conventional grammar, usage, sentence structure, punctuation, capitalization, and spelling.

In order to meet this standard, students will

- know and use correct grammar in speaking and writing;
- apply correct usage in speaking and writing;
- use correct sentence structure in writing; and
- demonstrate correct punctuation, capitalization, and spelling.

What grade 5–8 students know and are able to do includes:

- identifying the parts of speech such as nouns, pronouns, verbs, adverbs, adjectives, conjunctions, prepositions, and interjections;
- using correct pronoun case, regular and irregular noun and verb forms, and subject-verb agreement involving comparisons in writing and speaking;
- using modifiers, homonyms, and homophones in writing and speaking;
- using simple, compound, complex, and compound/complex sentences in writing and speaking;
- punctuating and capitalizing titles and direct quotations, using possessives, and correct paragraphing in writing;

- using prefixes, root words, and suffixes correctly in writing and speaking;
- expanding spelling skills to include more complex words;
- demonstrating use of conventional spelling in their published works; and
- using resources such as spell checkers, dictionaries, and charts to monitor their spelling accuracy.

Standard 4: Students apply thinking skills to their reading, writing, speaking, listening, and viewing.

In order to meet this standard, students will

- make predictions, analyze, draw conclusions, and discriminate between fact and opinion in writing, reading, speaking, listening, and viewing;
- use reading, writing, speaking, listening, and viewing to define and solve problems;
- recognize, express, and defend points of view orally and in writing;
- identify the purpose, perspective, and historical and cultural influences of a speaker, author, or director; and
- evaluate the reliability, accuracy, and relevancy of information.

What grade 5–8 students know and are able to do includes:

- recognizing an author's or speaker's point of view and purpose, separating fact from opinion;
- using reading, writing, speaking, listening, and viewing skills to solve problems and answer questions;
- making predictions, drawing conclusions, and analyzing what they read, hear, and view;
- recognizing, expressing, and defending a point of view orally in an articulate manner and in writing; and
- determining literary quality based on elements such as the author's use of vocabulary, character development, plot development, description of setting, and realism of dialogue.

Standard 5: Students read to locate, select, and make use of relevant information from a variety of media, reference, and technological sources.

In order to meet this standard, students will

- select relevant material for reading, writing, and speaking purposes;
- understand the structure, organization, and use of various media, reference, and technological sources as they select information for their reading and writing;
- paraphrase, summarize, organize, and synthesize information;
- give credit for others' ideas, images, or information; and
- use information to produce a quality product.

What grade 5–8 students know and are able to do includes:

- using organizational features of printed text such as prefaces, afterwords, and appendices;
- using organizational features of electronic information (for example, microfiche headings and numbering, headings for accessing nested information in hypertext media, electronic media CD-ROM, laser disc), and library and interlibrary catalog databases;
- locating and selecting relevant information;
- using available technology to research and produce an end-product that is accurately documented; and
- giving credit for borrowed information in a bibliography.

Standard 6: Students read and recognize literature as a record of human experience.

In order to meet this standard, students will

- know and use literary terminology;
- read literature to investigate common issues and interests;
- read literature to understand places, people, events, and vocabulary, both familiar and unfamiliar;
- read literature that reflects the uniqueness and integrity of the American experience;
- read classic and contemporary literature, representing various cultural and ethnic traditions from throughout the world; and
- read classic and contemporary literature of the United States about the experiences and traditions of diverse ethnic groups.

What grade 5–8 students know and are able to do includes:

- reading, responding to, and discussing a variety of novels, poetry, short stories, non-fiction, content-area and technical material, and plays;
- reading, responding to, and discussing literature that represents points of view from places, people, and events that are familiar and unfamiliar;
- distinguishing the elements that characterize and define a literary "classic";
- comparing the diverse voices of our national experience as they read a variety of United States literature;
- using literary terminology accurately, including setting, character, conflict, plot, resolution, theme, foreshadowing, and figurative language; and
- using new vocabulary from literature in other context.

COLORADO Grades 5–8 Mathematics
Model Content Standards

Standard 1: Students develop number sense and use numbers and number relationships in problem-solving situations and communicate the reasoning used in solving these problems.

1. demonstrate meanings for integers, rational numbers, percents, exponents, square roots, and pi (π) using physical materials and technology in problem-solving situations;
2. read, write, and order integers, rational numbers, and common irrational numbers such as $\sqrt{2}$, $\sqrt{5}$, and π;
3. apply number theory concepts (for example, primes, factors, multiples) to represent numbers in various ways;
4. use the relationships among fractions, decimals, and percents, including the concepts of ratio and proportion, in problem-solving situations;
5. develop, test, and explain conjectures about properties of integers and rational numbers; and
6. use number sense to estimate and justify the reasonableness of solutions to problems involving integers, rational numbers, and common irrational numbers such as $\sqrt{2}$, $\sqrt{5}$, and π.

Standard 2: Students use algebraic methods to explore, model, and describe patterns and functions involving numbers, shapes, data, and graphs in problem-solving situations and communicate the reasoning used in solving these problems.

1. represent, describe, and analyze patterns and relationships using tables, graphs, verbal rules, and standard algebraic notation;
2. describe patterns using variables, expressions, equations, and inequalities in problem-solving situations;
3. analyze functional relationships to explain how a change in one quantity results in a change in another (for example, how the area of a circle changes as the radius increases, or how a person's height changes over time);
4. distinguish between linear and nonlinear functions through informal investigations; and
5. solve simple linear equations in problem-solving situations using a variety of methods (informal, formal, graphical) and a variety of tools (physical materials, calculators, computers).

Standard 3: Students use data collection and analysis, statistics, and probability in problem-solving situations and communicate the reasoning used in solving these problems.

1. read and construct displays of data using appropriate techniques (for example, line graphs, circle graphs, scatter plots, box plots, stem-and-leaf plots) and appropriate technology;
2. display and use measures of central tendency, such as mean, median, and mode, and measures of variability, such as range and quartiles;
3. evaluate arguments that are based on statistical claims;
4. formulate hypotheses, draw conclusions, and make convincing arguments based on data analysis;
5. determine probabilities through experiments or simulations;
6. make predictions and compare results using both experimental and theoretical probability drawn from real-world problems; and
7. use counting strategies to determine all the possible outcomes from an experiment (for example, the number of ways students can line up to have their picture taken).

Standard 4: Students use geometric concepts, properties, and relationships in problem-solving situations and communicate the reasoning used in solving these problems.

1. construct two- and three-dimensional models using a variety of materials and tools;
2. describe, analyze, and reason informally about the properties (for example, parallelism, perpendicularity, congruence) of two- and three-dimensional figures;
3. apply the concepts of ratio, proportion, and similarity in problem-solving situations;
4. solve problems using coordinate geometry;
5. solve problems involving perimeter and area in two dimensions, and involving surface area and volume in three dimensions; and
6. transform geometric figures using reflections, translations, and rotations to explore congruence.

Standard 5: Students use a variety of tools and techniques to measure, apply the results in problem-solving situations, and communicate the reasoning used in solving these problems.

1. estimate, use, and describe measures of distance, perimeter, area, volume, capacity, weight, mass, and angle comparison;

2. estimate, make, and use direct and indirect measurements to describe and make comparisons;
3. read and interpret various scales including those based on number lines, graphs, and maps;
4. develop and use formulas and procedures to solve problems involving measurement;
5. describe how a change in an object's linear dimensions affects its perimeter, area, and volume; and
6. select and use appropriate units and tools to measure to the degree of accuracy required in a particular problem-solving situation.

Standard 6: Students link concepts and procedures as they develop and use computational techniques, including estimation, mental arithmetic, paper-and-pencil, calculators, and computers, in problem-solving situations and communicate the reasoning used in solving these problems.

1. use models to explain how ratios, proportions, and percents can be used to solve real-world problems;
2. construct, use, and explain procedures to compute and estimate with whole numbers, fractions, decimals, and integers;
3. develop, apply, and explain a variety of different estimation strategies in problem-solving situations, and explain why an estimate may be acceptable in place of an exact answer; and
4. select and use appropriate algorithms for computing with commonly used fractions and decimals, percents, and integers in problem-solving situations and determine whether the results are reasonable.

Science

COLORADO Grades 5–8 Science
Model Content Standards

Standard 1:

Students apply the processes of scientific investigation and design, conduct, communicate about, and evaluate such investigations.

1. ask questions and state hypotheses that lead to different types of scientific investigations (for example: experimentation, collecting specimens, constructing models, researching scientific literature)
2. use appropriate tools, technologies and metric measurements to gather and organize data and report results
3. interpret and evaluate data in order to formulate logical conclusions
4. demonstrate that scientific ideas are used to explain previous observations and to predict future events (for example: plate tectonics and future earthquake activity)
5. identify and evaluate alternative explanations and procedures
6. communicate results of their investigations in appropriate ways (for example: written reports, graphic displays, oral presentations

Standard 2: Physical Science: Students know and understand common properties, forms, and changes in matter and energy. (Focus: Physics and Chemistry)

1. physical properties of solids, liquids, gases and the plasma state and their changes can be explained using the particulate nature of matter model
2. mixtures of substances can be separated based on their properties (for example: solubilities, boiling points, magnetic properties, densities and specific heat)
3. mass is conserved in a chemical or physical change
4. mass and weight can be distinguished
5. all matter is made up of atoms that are comprised of protons, neutrons and electrons and when a substance is made up of only one type of atom it is an element
6. when two or more elements are combined a compound is formed which is made up of molecules
7. quantities (for example: time, distance, mass, force) that characterize moving objects and their interactions within a system (for example, force, speed, velocity, potential energy, kinetic energy) can be described, measured and calculated
8. that there are different forms of energy and those forms of energy can be transferred and stored (for example: kinetic, potential) but total energy is conserved
9. electric circuits provide a means of transferring electrical energy when heat, light, sound, magnetic effects and chemical changes are produced
10. white light is made up of different colors that correspond to different wavelengths

Standard 3: Students know and understand the characteristics and structure of living things, the processes of life, and how living things interact with each other and their environment. (Focus: Biology—Anatomy, Physiology, Botany, Zoology, Ecology)

1. classification schemes can be used to understand the structure of organisms
2. human body systems have specific functions and interaction (for example: circulatory and respiratory, muscular and skeletal)
3. there is a differentiation among levels of organization (cells, tissues, and organs) and their roles within the whole organism
4. multicellular organisms have a variety of ways to get food and other matter to their cells (for example: digestion, transport of nutrients by circulatory system)
5. photosynthesis and cellular respiration are basic processes of life (for example, set up a terrarium or aquarium and make changes such as blocking out light)
6. different types of cells have basic structures, components and functions (for example: cell membrane, nucleus, cytoplasm, chloroplast, single-celled organisms in pond water, Elodea, onion cell, human cheek cell)
7. there are noncommunicable conditions and communicable diseases (for example: heart disease and chicken pox)
8. there is a flow of energy and matter in an ecosystem (for example: as modeled in a food chain, web, pyramid, decomposition)
9. asexual and sexual cell reproduction/division can be differentiated
10. chromosomes and genes play a role in heredity (for example, genes control traits, while chromosomes are made up of many genes)
11. changes in environmental conditions can affect the survival of individual organisms, populations, and entire species
12. changes or constancy in groups of organisms over geologic time can be revealed through evidence
13. individual organisms with certain traits are more likely than others to survive and have offspring.

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Standard 4: Earth and Space Science: Students know and understand the processes and interactions of Earth's systems and the structure and dynamics of Earth and other objects in space. (Focus: Geology, Meteorology, Astronomy, Oceanography)

1. interrelationships exist between minerals, rocks, and soils
2. humans use renewable and nonrenewable resources (for example: forests and fossil fuels)
3. natural processes shape the Earth's surface (for example: landslides, weathering, erosion, mountain building, volcanic activity)
4. major geological events such as earthquakes, volcanic eruptions, and mountain building are associated with plate boundaries and attributed to plate motions
5. fossils are formed and used as evidence to indicate that life has changed through time
6. successive layers of sedimentary rock and the fossils contained within them can be used to confirm age, geologic time, history, and changing life forms of the Earth; this evidence is affected by the folding, breaking and uplifting of layers
7. the atmosphere has basic composition, properties, and structure (for example: the range and distribution of temperature and pressure in the troposphere and stratosphere)
8. atmospheric circulation is driven by solar heating (for example: the transfer of energy by radiation, convection, conduction)
9. there are quantitative changes in weather conditions over time and space (for example: humidity, temperature, air pressure, cloud cover, wind, precipitation)
10. there are large-scale and local weather systems (for example: fronts, air masses, storms)
11. the world's water is distributed and circulated through oceans, glaciers, rivers, groundwater, and atmosphere
12. the ocean has a certain composition and physical characteristics (for example: currents, waves, features of the ocean floor, salinity, and tides)
13. there are characteristics (components, composition, size) and scientific theories of origin of the solar system
14. relative motion, axes tilt and positions of the Sun, Earth, and Moon have observable effects (for example: seasons, eclipses, moon phases)
15. the universe consists of many billions of galaxies (each containing many billions of stars) and that vast distances separate these galaxies and stars from one another and from the Earth
16. technology is needed to explore space (for example: telescopes, spectroscopes, spacecraft, life support systems)

Standard 5: Students understand that the nature of science involves a particular way of building knowledge and making meaning of the natural world.

1. a controlled experiment must have comparable results when repeated
2. scientific knowledge changes as new knowledge is acquired and previous ideas are modified (for example: through space exploration)
3. contributions to the advancement of science have been made by people in different cultures and at different times in history
4. models can be used to predict change (for example: computer simulation, video sequence, stream table)
5. there are interrelationships among science, technology and human activity that affect the world

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