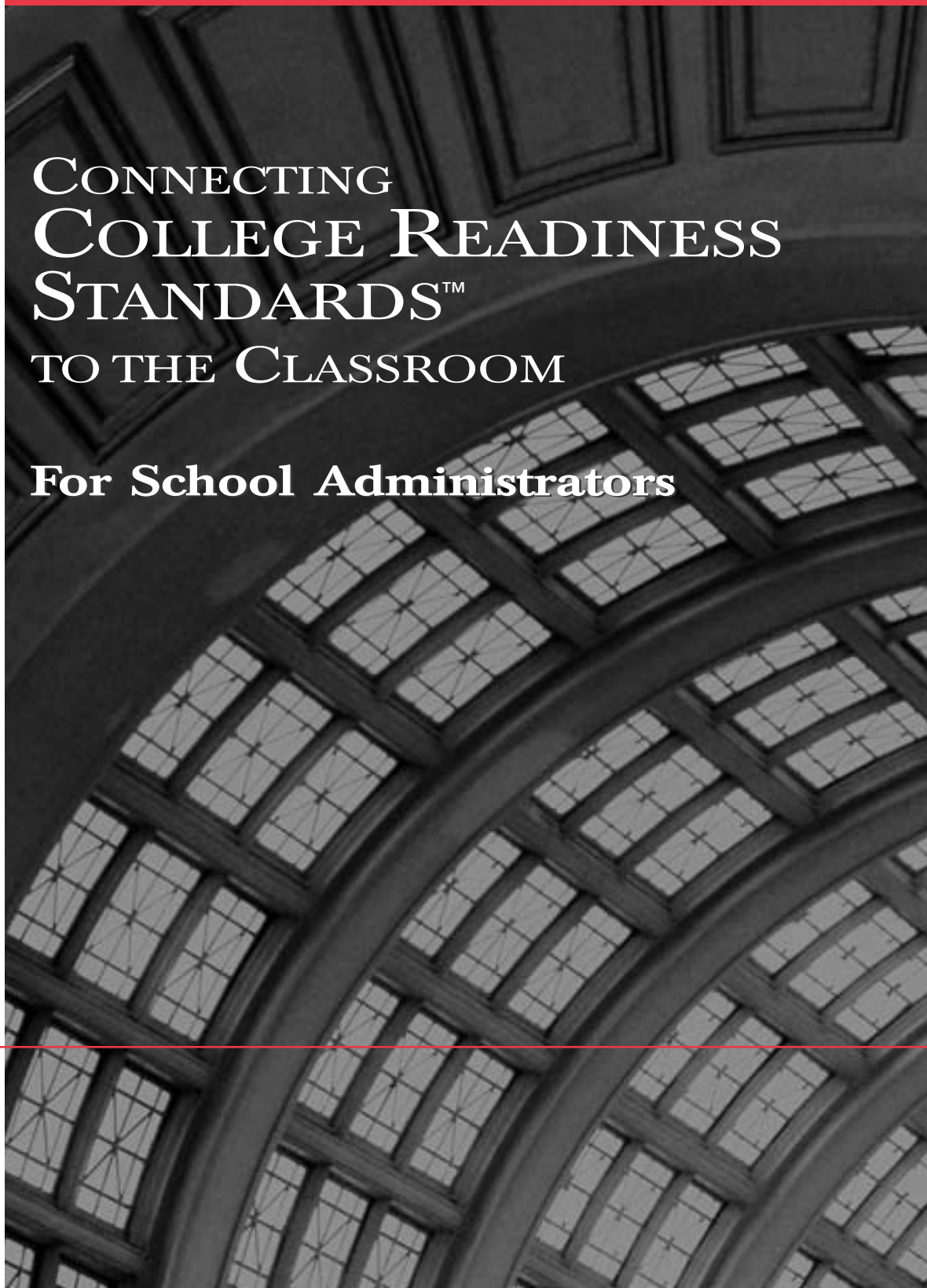
PLAN®



Connecting College Readiness Standards™ to the Classroom

For School Administrators

ACT®

ACT endorses the *Code of Fair Testing Practices in Education* and the *Code of Professional Responsibilities in Educational Measurement*, guides to the conduct of those involved in educational testing. ACT is committed to ensuring that each of its testing programs upholds the guidelines in each *Code*.

A copy of each *Code* may be obtained free of charge from ACT Customer Services (68), P.O. Box 1008, Iowa City, IA 52243-1008, 319/337-1429.

Visit ACT's website at: **www.act.org**

13347

Table of Contents

List of Tables

List of Figures

Introduction

ACT has developed this guide to help principals, guidance counselors, and curriculum coordinators interpret the College Readiness Standards Report data for PLAN®. The guide includes:

- A description of **ACT's Educational Planning and Assessment System (EPAS®)**
- A description of the **College Readiness Standards™** and **Benchmarks** for PLAN
- A description of the **PLAN test**
- A listing of the **College Readiness Standards** by score range and content area
- A description of the **Assessment-Instruction Link**
- A description of ways **ACT scores are used by colleges**

The College Readiness Standards for PLAN are statements that describe what students who score in the five score ranges 13–15, 16–19, 20–23, 24–27 and 28–32 are *likely* to know and to be able to do. The statements are generalizations based on the performance of many students scoring in these five score ranges. College Readiness Standards have not been developed for students whose scores fall in the 1–12 range because these students, as a group, do not demonstrate skills similar to each other consistently enough to permit useful generalizations.

The College Readiness Standards for PLAN are accompanied by ideas for progress that help teachers identify ways of enhancing student learning based on the scores students receive.

The College Readiness Standards Report for PLAN provides the percentage of your students in each College Readiness Standards score range in each of the four content areas the PLAN test measures—English, Mathematics, Reading, and Science. The report provides data that compare the performance of your students (Local) with all students in a nationally representative comparison group (norm group).

Local comparisons to the national norm group are most appropriate when PLAN is administered under conditions similar to those in the norming study—with all four tests administered in a single session in the standard order, and students having calculators available for use on the Mathematics Test.

The materials included in this service, used along with other resources, will allow you to work with your staff to understand the PLAN test results. This service also includes four content-specific guides, one each for English, Mathematics, Reading, and Science. These *Connecting College Readiness Standards to the Classroom* content-specific guides are most appropriate for classroom teachers and other school personnel who are responsible for planning and delivering daily classroom instruction. These guides include sample test questions that are tied to the College Readiness Standards, sample test question rationales, and a set of instructional activities linked to the Standards.

PLAN is a curriculum-based assessment program developed by ACT to help tenth graders plan their academic careers and prepare for entry into college or the world of work. PLAN is complemented by EXPLORE®, ACT's eighth- and ninth-grade program, and by the ACT®, for eleventh and twelfth graders. We hope this guide helps you to assist your students as they plan and pursue their future studies.

The College Readiness Standards Report for PLAN

The College Readiness Standards Report for PLAN allows you to compare the performance of students in your school with the performance of students nationwide. The report provides summary information about your students' academic performance that is useful for instructional planning and program evaluation.

Below is a sample report with an explanation of its features.

College Readiness Standards Report

2009-2010 PLAN Profile Summary Report — Page: 4
School Report - — Code: 999999
Custom Report — HIGH SCHOOL Name
Custom Description — CITY, ST
National Norm Group: Fall 10th — Total Students In Report: 113

TABLE 1c: Are our students *On Track* to be college ready when they graduate from high school?

College Readiness Standards Report
(Percent of students in College Readiness Standards score ranges)

CRS Range	English (Benchmark =15)	Mathematics (Benchmark =19)	Reading (Benchmark = 17)	Science (Benchmark = 21)	CRS Range
1-12	15 17	5 7	12 15	3 4	1-12
13-15	18 21	23 25	25 27	15 17	13-15
16-19	42 36	44 40	28 25	43 44	16-19
20-23	17 19	18 15	20 21	27 27	20-23
24-27	6 6	8 7	10 9	8 6	24-27
28-32	2 1	2 5	5 2	3 2	28-32
% At or Above Benchmark	72 69	36 35	56 51	25 25	% At or Above Benchmark

= Local = National

Notes: *Connecting College Readiness Standards to the Classroom* interpretive guides to use with this report can be found at www.act.org/standard/guides/plan. The College Readiness Standards can be found starting on page 8 of each content guide.

Local report group percentages can be compared with national reference group percentages, which are based on of all 10th-grade students in the norm group. All percentages have been rounded to the nearest whole number.

The score ranges given in this report are linked to the College Readiness Standards, which describe what students who score in various score ranges are likely to know and to be able to do, and reflect the progression and complexity of skills in each test of the PLAN program. College Readiness Benchmark Scores have been developed for PLAN to indicate a student's probable readiness for entry-level college coursework by the time the student graduates from high school. The data from this report, along with the College Readiness Standards and Benchmarks and information from other sources, can be used to inform local instructional priorities.

OO#: 111111
C#: 11716
PN#: 99999999

ACT 29-JUL-09

College Readiness Standards Ranges

Down the sides of the report, in shaded boxes, are the six score ranges reported for the College Readiness Standards for PLAN. To determine the number of score ranges and the width of each score range, ACT staff reviewed normative data, college admission criteria, and information obtained through ACT's Course Placement Service. For a more detailed explanation of the way the score ranges were determined, see page 7. For subject-specific tables listing the College Readiness Standards by score range, see pages 12, 20, 30, and 38. For a discussion of College Readiness Benchmark Scores, see pages 42–43.

Local and National Student Results

In the center of the report, the percent of students who scored in a particular score range at an individual school (Local) is compared with the percent of all students in the norm group (National) who scored in the same range. The percents of students for the norm group are based on the most current set of nationally representative norms.

Using the Test Results From Your PLAN College Readiness Standards Report

As you review the PLAN College Readiness Standards Report, you will note that it allows you to compare the performance of your students with that of all students in a nationally representative comparison group (norm group).

Valuable information can be obtained by comparing the performance of your students to that of the national group. This kind of information could be useful to teachers and curriculum specialists as they strive to set high standards and expectations for all students. Guidance counselors may also find such information valuable as they provide advice to students during the course-selection process.

Identifying Strengths and Weaknesses

You can identify relative strengths and weaknesses, by content area, of your tenth-grade students by comparing their performance (the percent of students who fall into each of the six score ranges) to that of the representative group of all tenth graders. It is desirable to have the percentage of your students in the highest score ranges (24–27 and 28–32) exceed that of the national sample. Likewise, it is desirable to have the percentage of your students in the lowest score ranges (1–12 and 13–15) be lower than that of the national sample.

Those content areas in which a greater percentage of your students have scores in the highest score ranges represent strengths. Those content areas in which a large percentage of your students have scores in the lowest score ranges represent weaknesses. It is possible that your College Readiness Standards Report reveals a large percentage of students at both extremes, with fewer students in the middle. This may be indicative of the courses the students have taken and the materials to which they have been exposed.

"Management of teaching and the curriculum cannot be effective without assessment."

— Robert Stake
Professor of Education,
Director of the Center for Instructional Research and Curriculum
University of Illinois

Are the Results Consistent With Other Information?

As you review your school's PLAN results, you may identify one or two content areas as potential weaknesses. For example, if a large percentage of students' Mathematics scores are in the 13–15 score range, you may want to establish the 16–19 score range as a target achievement outcome. However, before firmly establishing any target achievement outcomes, you will want to review additional sources of information, such as classroom assessments, teachers' observations and comments, and students' course grades.

It is important to recognize that PLAN does not measure everything students have learned nor does any test measure everything necessary for students to know to be successful in college or in the workplace. Likewise, other standardized instruments and classroom assessments will not measure everything students need to know and to be able to do. But the combined results from various sources—the PLAN tests, other standardized instruments, classroom assessments, teacher observations and comments, and course grades—will enable school personnel to confidently identify areas of strength and weakness.

To place the test results in context, the following pages provide information about ACT's Educational Planning and Assessment System (EPAS), the College Readiness Standards, and the PLAN tests.

ACT's Educational Planning and Assessment System (EPAS)

Foundation of EPAS

In the early 1980s, ACT conducted research to develop a system that would respond to the planning and assessment needs of students, parents, teachers, and administrators. To identify categories of essential information, ACT studied curricula being used in schools nationwide from seventh grade through the college freshman level. Completing this comprehensive study included:

- Seeking the advice and counsel of college instructors, secondary school teachers, administrators, subject-area experts, and curriculum specialists
- Studying various critiques of education in the United States
- Reviewing state curriculum requirements
- Analyzing textbooks widely used in middle school/junior high school, high school, and college
- Surveying practicing educators across the United States about what is taught in their classrooms

The study confirmed that there are skills and understandings, which develop over time, that are vital to students' success in their post-high school careers, whether they choose to enter the workplace or to pursue a postsecondary education. The results of this study laid the foundation for the design and development of EPAS. ACT routinely repeats this study to ensure that the EPAS tests continue to reflect the essential skills and understandings being taught in classrooms nationwide.

ACT's Educational Planning and Assessment System includes three testing programs: EXPLORE for eighth and ninth graders, PLAN for tenth graders, and the ACT, taken by eleventh and twelfth graders. The three instruments are administered at three separate points in a student's secondary educational experience.

EXPLORE can be used by all eighth and ninth graders. In the eighth and ninth grades, students need to formulate their plans for high school, and the EXPLORE program helps students investigate and understand a wide range of options. The results from EXPLORE provide educators with the means to structure high school planning and career exploration for students and parents, as well as with a baseline to monitor students' progress. Through EXPLORE, a student's strengths and weaknesses can be identified early in his or her secondary educational experience.

The second program in EPAS begins when students enter tenth grade. PLAN is a midpoint review of progress that is being made in high school. For use by all tenth-grade students, PLAN provides direction for educational and career planning, and can guide adjustments in students' course work so as to better prepare them to achieve their goals after high school.

The ACT is used by eleventh and twelfth graders who are considering attending a college or university. The ACT not only helps those students who are going on to a college or university, but it also provides schools with a final measure of the outcomes these students have attained by the time they reach their last two years of high school.

"Our real need then, is not to send a larger number of students to college . . . , but to enrich and improve the educational experiences at all levels—college, high school, and elementary school."

— E. F. Lindquist, February 1958
Cofounder of ACT

By beginning to evaluate students' strengths and weaknesses early in Grades 8 and 9 and continuing to assess progress through Grade 12, educators gain the information necessary to monitor and guide students as they prepare for their high school and post-high school goals. EPAS provides schools, parents, and students with:

- *a student planning component,* in which students are engaged in a long-term planning process that begins with career exploration and educational planning in Grades 8 or 9, moves to career and educational planning in Grade 10, and concludes with students actively preparing for life after high school.
- *an assessment component* composed of four tests—English, Mathematics, Reading, and Science—that measure what students can *do* with what they *know*. Another ACT program, WorkKeys®, assesses the skills employers are looking for and helps students develop the workplace skills necessary to obtain the jobs they want after high school.
- *an instructional support component,* which offers teachers support in the classroom. Some examples include a set of instructional support guides tied to the EPAS programs, one each for Language Arts, Mathematics, and Science; a series of interpretive guides related to the College Readiness Standards; and a set of workshop materials related to the College Readiness Standards.
- *an evaluation component,* which provides information that allows schools to research and monitor student performance over time and to assess the strengths and potential weaknesses of school programs.

Table 1: **Overview of EXPLORE, PLAN, and the ACT**

Testing Program	**Target Grades**	**Components**	**Content Areas**
EXPLORE	Transition to High School Grades 8 and/or 9	■ Student Planning ■ Assessment ■ Instructional Support ■ Evaluation	■ English ■ Mathematics ■ Reading ■ Science
PLAN	Midpoint High School Review Grade 10	■ Student Planning ■ Assessment ■ Instructional Support ■ Evaluation	■ English ■ Mathematics ■ Reading ■ Science
ACT	Final Measure of High School Outcomes Transition to College Grades 11 and/or 12	■ Student Planning ■ Assessment ■ Instructional Support ■ Evaluation	■ English ■ Mathematics ■ Reading ■ Science ■ Writing (Optional)

Description of the College Readiness Standards

What Are the College Readiness Standards?

The College Readiness Standards communicate educational expectations. Each Standard describes what students who score in the designated range are *likely* to be able to do with what they know. The College Readiness Standards are cumulative: students can typically demonstrate the skills and knowledge in the score ranges preceding the range in which they scored.

In helping students make the transition from high school to postsecondary education or to the world of work, teachers, counselors, and parents can use the College Readiness Standards for PLAN to interpret students' scores and to understand which skills students need to develop to be better prepared for the future.

How Were the Score Ranges Determined?

To determine the number of score ranges and the width of each score range for PLAN, ACT staff both reviewed PLAN normative data and considered the relationship among EXPLORE, PLAN, and the ACT.

In reviewing the PLAN normative data, ACT staff analyzed the distribution of student scores across the score scale. Because PLAN and the ACT have a common score scale, ACT can provide PLAN examinees with an estimated ACT Composite score. When the score ranges were being determined, therefore, both the PLAN score scale, 1–32, and the ACT score scale, 1–36, were reviewed side by side. And because many students take PLAN to determine how well they might perform on the ACT, the course-placement research that ACT has conducted over the last forty years was also reviewed. ACT's Course Placement Service provides colleges and universities with cutoff scores that are used to place students into appropriate entry-level courses in college, and these cutoff scores were used to help define the score ranges.

After analyzing all the data and reviewing different possible score ranges, ACT staff concluded that using the six score ranges 1–12, 13–15, 16–19, 20–23, 24–27, and 28–32 would best distinguish students' levels of achievement so as to assist teachers, administrators, and others in relating PLAN test scores to students' skills and understandings.

How Were the College Readiness Standards Developed?

After reviewing normative data, college admission criteria, and information obtained through ACT's Course Placement Service, content experts wrote the College Readiness Standards based on their analysis of the skills and knowledge students need in order to successfully respond to the test questions in each score range. Experts analyzed numerous test questions that had been answered correctly by 80%

"The examination should describe the student in meaningful terms—meaningful to the student, the parent, and the elementary and high school teacher—meaningful in the sense that the profile scores correspond to recognizable school activities, and directly suggest appropriate distributions of emphasis in learning and teaching."

— E. F. Lindquist, February 1958
Cofounder of ACT

or more of the examinees within each score range. The 80% criterion was chosen because it offers those who use the College Readiness Standards a high degree of confidence that students scoring in a given score range will most *likely* be able to demonstrate the skills and knowledge described in that range.

As content experts reviewed the test questions connected to each score range, distinct yet overlapping areas of knowledge and skill were identified. These areas of knowledge and skill, or *strands,* provide an organizational framework for the College Readiness Standards statements.

As a content validity check, ACT invited nationally recognized scholars from high school and university English, Mathematics, Reading, Science, and Education departments to review the College Readiness Standards for the PLAN tests. These teachers and researchers provided ACT with independent, authoritative reviews of the ways the College Readiness Standards reflect the skills and knowledge students need to successfully respond to the questions on the PLAN tests.

Because PLAN is curriculum based, ACT and independent consultants conduct a review every three to four years to ensure that the knowledge and skills described in the Standards and outlined in the test specifications continue to reflect those being taught in classrooms nationwide.

How Should the College Readiness Standards Be Interpreted and Used?

The College Readiness Standards reflect the progression and complexity of the skills measured in PLAN. Because no PLAN test form measures all of the skills and knowledge included in the College Readiness Standards, the Standards must be interpreted as skills and knowledge that *most* students who score in a particular score range are *likely* to be able to demonstrate. Since there were relatively few test questions that were answered correctly by 80% or more of the students who scored in the lower score ranges, the Standards in these ranges should be interpreted cautiously. The skills and understandings of students who score in the 1–12 score range may still be evolving. For these students, the skills and understandings in the higher ranges could become their target achievement outcomes. Additional information about low-scoring students can be found in the content-specific guides.

It is important to recognize that PLAN does not measure everything students have learned nor does any test measure everything necessary for students to know to be successful in college or in the world of work. The PLAN tests include questions from a large domain of skills and from areas of knowledge that have been judged important for success in college and beyond. Thus, the College Readiness Standards should be interpreted in a responsible way that will help students understand what they need to know and do if they are going to make a successful transition to college, vocational school, or the world of work. As students choose courses they plan to take in high school, they can use the Standards to identify the skills and knowledge they need to develop to be better prepared for their future.

The College Readiness Standards are complemented by brief descriptions of learning experiences from which high school students might benefit. Based on the College Readiness Standards, these ideas for progress are designed to provide classroom teachers with help for lesson plan development. These ideas, which are given in Tables 3, 4, 6, and 7, demonstrate ways that information learned from standardized test results can be used to inform classroom instruction.

Because students learn over time and in various contexts, it is important to use a variety of instructional methods and materials to meet students' diverse needs and to help strengthen and build upon their knowledge and skills. The ideas for progress offer teachers a variety of suggestions to foster learning experiences from which students would likely benefit as they move from one level of learning to the next.

Because learning is a complex and individual process, it is especially important to use multiple sources of information—classroom observations and teacher-developed assessment tools, as well as standardized tests—to accurately reflect what each student knows and can do. The Standards and the ideas for progress, used in conjunction with classroom-based and curricular resources, help teachers and administrators to guide the whole education of every student.

Description of the PLAN Tests

The PLAN program contains academic tests in four curriculum areas: English, Mathematics, Reading, and Science. These curriculum-based tests are designed to provide students with an early indication of their educational progress in the context of the post-high school educational and career options they are considering. The results from PLAN can be used to help students build a solid foundation for future academic and career success.

PLAN, and the EPAS system of which it is a part, is based on the convictions of one of ACT's cofounders, E. F. Lindquist. Lindquist believed that academic tests should reflect the range of content and skills taught in school, not just course-specific material. Lindquist's belief in a content-skills continuum suggests a test that, rather than measuring isolated bits of knowledge acquired in courses, assesses complex reasoning and problem-solving skills.

The PLAN academic tests focus on thinking skills: the ability to select, manipulate, and manage core skills, strategies, and processes in order to solve specific problems in specific contexts. Consequently, the PLAN tests contain a large proportion of analytical, problem-solving exercises.

The following pages provide information specific to each of the academic tests in PLAN. This information includes content and cognitive aspects of each test. Immediately following the description of each academic test is a table that suggests links between what students are likely to be able to do (the College Readiness Standards) and what learning experiences students would likely benefit from (the ideas for progress).

"The test should measure what students can do with what they have learned."

— (ACT, 1996a, p. 1)

The College Readiness Standards in the tables are organized both by score range (along the left-hand side) and by strand (across the top). The lack of a College Readiness Standards statement in a score range indicates that there was insufficient evidence with which to determine a descriptor.

The ideas for progress are also arranged by score range and by strand. Although many of the ideas cross more than one strand, a primary strand has been identified for each in order to facilitate their use in the classroom. As you will note, ideas have been provided for the 28–32 score range, the highest score range for PLAN. Ideas for the 28–32 score range are shown to provide ideas for educational experiences from which students may benefit before they take the ACT and enter college.

What Does the PLAN English Test Measure?

The PLAN English Test is designed to simulate one stage in the writing process—the editing and revising of a nearly finished draft. The emphasis of the English Test is on students' application of sound writing practices. The test measures students' ability to use the conventions of standard written English. Students are also required to choose language or a style that is appropriate to a certain audience or writing goal, to choose among a variety of organizational formats, or to determine an overall writing strategy appropriate to the essay topic. The English Test essays and their accompanying test questions are primarily generated by, and are reviewed by, practicing classroom teachers, and thus reflect current teaching techniques and curricular emphases. Additional information about the PLAN English Test is provided in Table 2 on page 10.

The multiple-choice approach to the measurement of English language skills was designed to simulate the revisions of a draft of a written piece. While this is not a direct measure of writing, the skills are measured within the context of various extended prose texts with the intent of replicating a stage in the writing process—revising and editing—while maintaining the advantages of obtaining a large sample of student knowledge in a relatively short period of time. The English Test asks students to think about writing situations and to choose the best means of expression given those situations. As stated in the directions, the best answer is "the one that best expresses the idea, makes the statement appropriate for standard written English, or is worded most consistently with the style and tone of the passage as a whole." That is, students are asked to simulate the decision-making process that takes place while writing: to think about audience, purpose, and the conventions of language and to make decisions about the case at hand, weighing and then adopting or rejecting various options. Six elements of effective writing are included in the PLAN English Test; these elements have been identified by English language consultants as important to clear communication.

Usage/Mechanics

Punctuation questions range from those asking students to remove unnecessary commas, semicolons, or exclamation points to those asking students to make judgments about the best punctuation to use to avoid ambiguity and clarify meaning.

Grammar and Usage questions ask students to make judgments about agreement between subject and verb, between pronoun and antecedent, and between modifiers and the word modified; formation of verb tenses; pronoun case; formation of comparative and superlative adjectives and adverbs; and idiomatic usage.

Sentence Structure questions range from those that require recognition of syntactic conventions to those requiring judgments about the relationship among the statements in the essay. The questions in this category deal with relationships between and among clauses, the management and placement of modifiers, and unnecessary or inappropriate shifts in construction.

Table 2: **PLAN English Test Content Areas**
50 questions, 30 minutes, 4 essays (300 words each)

Content Area	Percentage of Questions
Usage/Mechanics	**60%**
Punctuation	14%
Grammar and Usage	18%
Sentence Structure	28%
Rhetorical Skills	**40%**
Strategy	12%
Organization	14%
Style	14%

Rhetorical Skills

Strategy questions ask about developing a given topic by choosing expressions appropriate to an essay's audience and purpose; judging the effect of adding, revising, or deleting supporting material; and judging the relevancy of statements in context. These questions focus on the processes of writing: the choices made and strategies employed by a writer in the act of composing or revising.

Organization questions ask about the order and coherence of ideas and about the effective choice of opening, transitional, and closing statements.

Style questions ask about precision and appropriateness in the choice of words and images, maintenance of the level of style and tone in an essay, rhetorically effective management of sentence elements, and avoidance of ambiguous pronoun references, wordiness, and redundancy.

The English Test does not assess memorized rules of grammar; the emphasis is on the application of sound writing practices to the editing of prose that is typical of that encountered in school and in life in general.

The College Readiness Standards and the ideas for progress can be found in Table 3 on pages 12–17. As you review the Standards, you will note a progression in complexity across the score ranges. For example, in the 13–15 range for the Organization, Unity, and Coherence strand, students are able to "use conjunctive adverbs or phrases to show time relationship in simple narrative essays (e.g., *then, this time*)," while in the 28–32 range, students are able to "make sophisticated distinctions concerning the logical use of conjunctive adverbs or phrases, particularly when signaling a shift between paragraphs."

The ideas for progress are arranged by score range and by strand. Although many of the ideas cross more than one strand, a primary strand has been identified for each in order to facilitate their use in the classroom. For example, the statement in the 24–27 range "experiment with more subtle organizational structures" brings together concepts from several strands, such as Topic Development in Terms of Purpose and Focus and Organization, Unity, and Coherence. However, this idea for progress is primarily linked to the Organization, Unity, and Coherence strand.

PLAN ENGLISH TEST

Table 3: The College Readiness Standards

The Standards describe what students who score in the specified score ranges are *likely* to know and to be able to do. The ideas for progress help teachers identify ways of enhancing students' learning based on the scores students receive. The score range at the Benchmark level of achievement is highlighted.

		Topic Development in Terms of Purpose and Focus	***Organization, Unity, and Coherence***	***Word Choice in Terms of Style, Tone, Clarity, and Economy***
1–12	**Standards**	■ Students who score in the 1–12 range are most likely beginning to develop the knowledge and skills assessed in the other score ranges.		
	ideas for progress	■ read and discuss the work of favorite writers ■ regularly write informal responses to literature (fiction and nonfiction) in their journals ■ identify sentences that convey the main ideas in a variety of texts and then practice composing such sentences	■ write short texts in a variety of genres, illustrating simple organization ■ use paragraphing as an organizational device	■ revise writing to clarify sentences containing too many phrases and clauses ■ check writing to make sure pronoun references are clear ■ revise writing to edit out empty words (e.g., *really, very, big, kind of*)
13–15	**Standards**		■ 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
	ideas for progress	■ read writers of various genres and imitate their work ■ revise writing to ensure that every sentence is necessary to the purpose of the piece and that no important information has been left out	■ write many simply organized short texts of various genres ■ revise writing to ensure that information is in the best order	■ identify and revise obviously wordy, redundant, or cluttered material
16–19	**Standards**	■ 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
	ideas for progress	■ continue reading writers of various genres and imitating their work ■ write longer and more complicated essays, stories, reviews, etc. ■ state the main theme of or summarize essays they have written ■ revise essays by eliminating sentences or ideas that violate the essay's focus	■ recognize and experiment with more sophisticated organizational structures (e.g., comparison-contrast, cause-effect) ■ revise writing to delete illogical conjunctive adverbs ■ discuss the most logical place to add specific information in a draft essay ■ discuss the purpose and the importance of the opening paragraph for directing the rest of the piece	■ revise writing to make it more concise and precise ■ discuss and model tone and style

Sentence Structure and Formation	*Conventions of Usage*	*Conventions of Punctuation*
■ vary sentence length by combining simple sentences ■ check writing to make sure verb tenses are consistent	■ make sure to use adjectives like *well, less,* and *worst* correctly	■ learn to recognize when commas are overused
■ 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)
■ revise writing to correct glaring shifts in verb tense or voice	■ revise writing to correct basic grammar and punctuation errors ■ practice and understand correct usage of common homonyms (e.g., *their/there, past/passed*)	■ practice using punctuation correctly in simple sentences (e.g., "He ran, jumped, and swam.") ■ check for and correct unnecessary commas
■ 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 an 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)
■ experiment with writing more sophisticated sentences; check to ensure verbs agree with subjects and modifiers don't dangle	■ revise sentences to ensure that each verb agrees with its subject when there is some text between the two	■ use commas to set off parenthetical phrases

PLAN ENGLISH TEST

Table 3 (continued): The College Readiness Standards

The Standards describe what students who score in the specified score ranges are *likely* to know and to be able to do. The ideas for progress help teachers identify ways of enhancing students' learning based on the scores students receive. The score range at the Benchmark level of achievement is highlighted.

		Topic Development in Terms of Purpose and Focus	***Organization, Unity, and Coherence***	***Word Choice in Terms of Style, Tone, Clarity, and Economy***
20–23	**Standards**	■ 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
	ideas for progress	■ continue reading the work of writers of various genres; begin experimenting with a variety of writing styles ■ revise fairly straightforward writing to sharpen focus and coherence of entire piece	■ experiment with using words and phrases that create clear transitions in writing ■ rearrange sentences in a paragraph in order to improve its coherence ■ write introductions that capture the reader's interest, write conclusions that provide a sense of closure, and describe the rhetorical effects that each creates	■ continue to edit sentences for empty language, wordiness, and redundancy ■ revise structurally complex sentences to correct vague or ambiguous pronoun references
24–27	**Standards**	■ 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
	ideas for progress	■ develop awareness of ways that form and content can be changed as the audience for the writing changes ■ learn how meaning can be expressed through connotation	■ experiment with more subtle organizational structures ■ revise writing by refining introductions, conclusions, and transitions in complex paragraphs	■ select and manipulate words, phrases, and clauses to convey shades of meaning and tone ■ avoid clutter and use vivid verbs and specific nouns

Sentence Structure and Formation	*Conventions of Usage*	*Conventions of Punctuation*
■ 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)
■ revise writing to correct faulty coordination and subordination of clauses ■ revise sentences to correct inconsistencies in verb tense and pronoun person	■ check to be sure pronouns agree with antecedents in increasingly complex sentences	■ use punctuation to set off nonessential information in a sentence ■ recognize inappropriate uses of commas
■ 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 a compound verb joined by *and*) ■ Use apostrophes to indicate simple possessive nouns ■ Recognize inappropriate uses of colons and semicolons
■ use sentence-combining techniques to create more sophisticated sentences; check to avoid fragments, comma splices, and run-ons	■ recognize the difference between *its* and *it's, your* and *you're, who* and *whom*	■ use commas to set off nonessential appositives or clauses ■ use semicolons to indicate relationships between independent clauses

PLAN ENGLISH TEST

Table 3 (continued): **The College Readiness Standards**

The Standards describe what students who score in the specified score ranges are *likely* to know and to be able to do. The ideas for progress help teachers identify ways of enhancing students' learning based on the scores students receive. The score range at the Benchmark level of achievement is highlighted.

		Topic Development in Terms of Purpose and Focus	***Organization, Unity, and Coherence***	***Word Choice in Terms of Style, Tone, Clarity, and Economy***
28–32	**Standards**	■ 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
	ideas for progress	■ write essays that indicate a heightened awareness of the audience for those essays ■ recognize the role that specific sentences play in terms of the essay as a whole	■ revise or add introductory sentences or transitions based on an understanding of the logic and rhetorical purpose of the paragraph and the essay as a whole	■ revise writing to delete redundancies in terms of the paragraph as a whole

Sentence Structure and Formation	*Conventions of Usage*	*Conventions of Punctuation*
■ 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
■ maintain parallel structure between phrases and clauses in a complex sentence ■ employ a variety of sentence structures in their writing	■ revise sentences to ensure agreement between verb and subject when a phrase between the two suggests a different number for the verb	■ use the colon to introduce an example or an elaboration

What Does the PLAN Mathematics Test Measure?

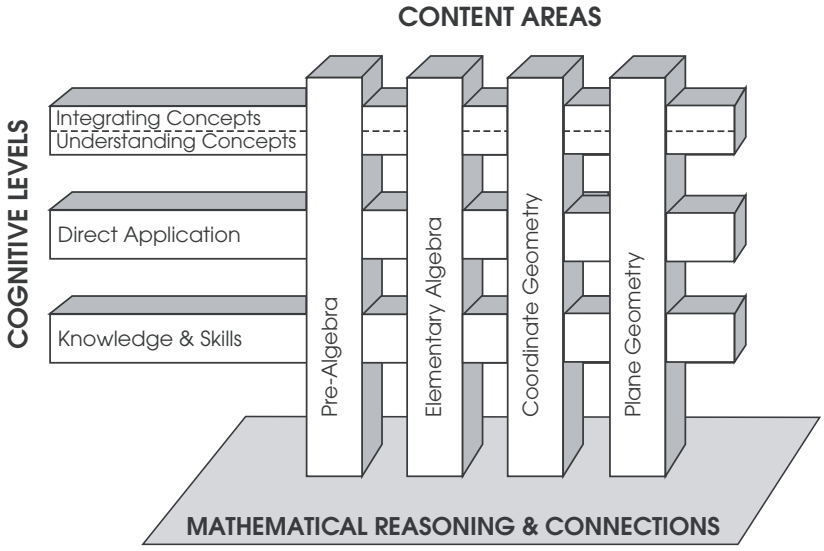
The PLAN Mathematics Test is a 40-question, 40-minute test designed to assess the mathematical reasoning skills that students typically acquire in many first- and second-year high school courses (pre-algebra, first-year algebra, and plane geometry). While some material from second-year courses is included on the test, most items, including the geometry items, emphasize content presented before the second year of high school. The multiple-choice test requires students to analyze problems in real-world and purely mathematical settings, plan and carry out solution strategies, and verify the appropriateness of solutions. Most of the test questions are individual items, but some may belong to sets (i.e., several items based on the same graph, chart, or information).

On the PLAN Mathematics Test, students demonstrate their ability to read and understand mathematical terminology; to apply definitions, algorithms, theorems, and properties; to interpret and analyze data; and to use mathematics to solve problems.

Students also apply quantitative reasoning in a variety of ways, such as discerning relationships between mathematical concepts, connecting and integrating mathematical concepts and ideas, and making generalizations. Computational skills and knowledge of basic formulas are assumed as background for the problems, but extensive computation and memorization of complex formulas are not required. The concepts covered on the test emphasize the major content areas that are prerequisite to successful performance in upper-level college-prep mathematics courses.

Students are expected to have calculators available when taking the PLAN Mathematics Test and are encouraged to use the calculator they are most comfortable with. Many questions on the test may be solved with or without a calculator, neither strategy being clearly superior to the other. The test also includes problems for which a calculator is clearly the best tool to use, and others where a non-calculator solution is advisable. Students must choose when to use and when not to use calculators.

The questions focus on mathematical reasoning and making connections within and among four content areas and at various cognitive levels. These areas and levels are shown in Figure 1.



Adapted from *Mathematics Framework for the 1996 National Assessment of Educational Progress* (p.11)

Figure 1: **PLAN Mathematics Test Content Areas and Cognitive Levels**

Through the various cognitive levels, students demonstrate their ability to use and reason with mathematics. *Knowledge and Skills* questions (about 35% of the test) require students to use one or more facts, definitions, formulas, or procedures to solve problems that are presented in purely mathematical terms. *Direct Application* questions (about 30% of the test) require students to use their knowledge and skills to solve straightforward problems set in real-world situations. *Understanding Concepts* and *Integrating Conceptual Understanding* questions (about 35% of the test) assess students' depth of understanding of major concepts by requiring reasoning from a single concept or the integration of several concepts to reach an inference or a conclusion.

The content of the PLAN Mathematics Test is reflective of the content taught in mathematics classrooms and of the prerequisite skills and understandings necessary for upper-level college-prep mathematics courses. A brief description of the content sampled on the test and the approximate percentage of the test devoted to each content area on the PLAN Mathematics Test are provided below.

Pre-Algebra (35%). Questions in this content area are based on basic operations using whole numbers, decimals, fractions, and integers; place value; square roots and approximations; the concept of exponents; scientific notation; factors; ratio, proportion, and percent; linear equations in one variable; absolute value and ordering numbers by value; elementary counting techniques and simple probability; data collection, representation, and interpretation; and understanding simple descriptive statistics.

Elementary Algebra (20%). Questions in this content area are based on properties of exponents and square roots, evaluation of algebraic expressions through substitution, using variables to express functional relationships, understanding algebraic operations, and solutions of quadratic equations.

Coordinate Geometry (18%). Questions in this content area are based on graphing and the relations between equations and graphs, including points, lines, and parabolas; graphing inequalities; slope; parallel and perpendicular lines; distance; and midpoints.

Plane Geometry (27%). Questions in this content area are based on the properties and relations of plane figures, including angles and relations among perpendicular and parallel lines; properties of circles, triangles, rectangles, parallelograms, and trapezoids; transformations; the concept of proof and proof techniques; volume; and applications of geometry to three dimensions.

The College Readiness Standards and the ideas for progress can be found in Table 4 on pages 20–27. As you review the Standards, you will note a progression in complexity across the score ranges. For example, in the 13–15 range for the Basic Operations & Applications strand, students are able to "solve problems in one or two steps using whole numbers," while in the 28–32 range, students demonstrate that they are able to "solve word problems containing several rates, proportions, or percentages."

The ideas for progress are arranged by score range and by strand. Although many of the ideas cross more than one strand, a primary strand has been identified for each in order to facilitate their use in the classroom. For example, the statement in the 20–23 score range "represent and interpret relationships defined by equations and formulas; translate between representations as ordered pairs, graphs, and equations; and investigate symmetry and transformations (e.g., reflections, translations, rotations)" brings together concepts from several strands, such as Expressions, Equations, & Inequalities, and Graphical Representations. However, this idea for progress is primarily linked to the Graphical Representations strand.

PLAN Mathematics Test

Table 4: The College Readiness Standards

The Standards describe what students who score in the specified score ranges are *likely* to know and to be able to do. The ideas for progress help teachers identify ways of enhancing students' learning based on the scores students receive. The score range at the Benchmark level of achievement is highlighted.

		Basic Operations & Applications	*Probability, Statistics, & Data Analysis*	*Numbers: Concepts & Properties*
1–12	**Standards**	■ Students who score in the 1–12 range are most likely beginning to develop the knowledge and skills assessed in the other score ranges.		
	ideas for progress	■ practice and apply estimation and computation using whole numbers and decimals ■ choose the appropriate method of computation to solve multistep problems (e.g., calculator, mental, or pencil and paper) ■ practice selecting appropriate units of measure (e.g., inches or feet, hours or minutes, centimeters or meters) and converting between units ■ model and connect physical, verbal, and symbolic representations of money	■ interpret data from a variety of displays and use it in computation (e.g., mean, median, mode, range) ■ organize, display, and analyze data in a variety of ways	
13–15	**Standards**	■ 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
	ideas for progress	■ investigate and build understanding of the concept of percentage as a comparison of a part to a whole ■ use multiple operations to solve multistep arithmetic problems	■ solve real-world problems that involve measures of central tendency (e.g., mean, median, mode) ■ interpret data from a variety of displays (e.g., box-and-whisker plot) and use it along with additional information to solve real-world problems ■ conduct simple probability experiments and represent results using different formats	■ recognize and apply place value, rounding, and elementary number theory concepts

Expressions, Equations, & Inequalities	*Graphical Representations*	*Properties of Plane Figures*	*Measurement*
■ model a variety of problem situations with expressions and/or equations ■ use the inverse relationships for the basic operations of addition and subtraction to determine unknown quantities	■ locate and describe points in terms of their position on the number line		■ identify line segments in geometric figures and estimate or calculate their measure
■ 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	■ 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
■ use mathematical symbols and variables to express a relationship between quantities (e.g., the number of 59¢ candy bars that you can buy for $5 must satisfy $59n \leq 500$) ■ evaluate algebraic expressions and solve simple equations using integers	■ locate and describe objects in terms of their position on the number line and on a grid	■ describe, compare, and contrast plane and solid figures using their attributes	■ distinguish between area and perimeter, and find the area or perimeter when all relevant dimensions are given

PLAN MATHEMATICS TEST

Table 4 (continued): The College Readiness Standards

The Standards describe what students who score in the specified score ranges are *likely* to know and to be able to do. The ideas for progress help teachers identify ways of enhancing students' learning based on the scores students receive. The score range at the Benchmark level of achievement is highlighted.

		Basic Operations & Applications	***Probability, Statistics, & Data Analysis***	***Numbers: Concepts & Properties***
16–19	**Standards**	■ 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
	ideas for progress	■ solve routine arithmetic problems that involve rates, proportions, and percents ■ model and solve problems that contain verbal and symbolic representations of money ■ do multistep computations with rational numbers	■ interpret data and use appropriate measures of central tendency to find unknown values ■ find the probability of a simple event in a variety of settings ■ gather, organize, display, and analyze data in a variety of ways to use in problem solving ■ conduct simple probability experiments, use a variety of counting techniques (e.g., Venn diagrams, Fundamental Counting Principle, organized lists), and represent results from data using different formats	■ apply elementary number concepts, including identifying patterns pictorially and numerically (e.g., triangular numbers, arithmetic and geometric sequences), ordering numbers, and factoring ■ recognize, identify, and apply field axioms (e.g., commutative)
20–23	**Standards**	■ 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
	ideas for progress	■ apply and use number properties to model and solve problems that involve reasoning with proportions ■ select and use appropriate units when solving problems that involve one or more units of measure	■ construct and analyze Venn diagrams to help determine simple probabilities	■ use the inverse relationships for the four basic operations, exponentiation, and root extractions to determine unknown quantities

Expressions, Equations, & Inequalities	*Graphical Representations*	*Properties of Plane Figures*	*Measurement*
■ Substitute whole numbers for unknown quantities to evaluate expressions ■ Solve one-step equations having integer or decimal answers ■ Combine like terms (e.g., $2x + 5x$)	■ 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
■ create expressions that model mathematical situations using combinations of symbols and numbers ■ evaluate algebraic expressions and solve multistep first-degree equations	■ sketch and identify line segments, midpoints, intersections, and vertical and horizontal lines	■ describe angles and triangles using mathematical terminology and apply their properties	■ find area and perimeter of a variety of polygons by substituting given values into standard geometric formulas
■ 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	■ 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
■ identify, interpret, and generate symbolic representations that model the context of a problem ■ factor and perform the basic operations on polynomials ■ create and solve linear equations and inequalities that model real-world situations ■ solve literal equations for any variable	■ represent and interpret relationships defined by equations and formulas; translate between representations as ordered pairs, graphs, and equations; and investigate symmetry and transformations (e.g., reflections, translations, rotations)	■ recognize what geometric properties and relationships for parallel lines to apply to find unknown angle measures ■ recognize when to apply geometric properties and relationships of triangles to find unknown angle measures	■ apply a variety of strategies to determine the circumference or perimeter and the area for circles, triangles, rectangles, and composite geometric figures

PLAN MATHEMATICS TEST

Table 4 (continued): **The College Readiness Standards**

The Standards describe what students who score in the specified score ranges are *likely* to know and to be able to do. The ideas for progress help teachers identify ways of enhancing students' learning based on the scores students receive. The score range at the Benchmark level of achievement is highlighted.

		Basic Operations & Applications	***Probability, Statistics, & Data Analysis***	***Numbers: Concepts & Properties***
24–27	**Standards**	■ 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
	ideas for progress	■ model and solve real-world problems that involve a combination of rates, proportions, and/or percents	■ find the probability of simple events, disjoint events, compound events, and independent events in a variety of settings using a variety of counting techniques	■ apply and use elementary number concepts and number properties to model and solve nonroutine problems that involve new ideas

Expressions, Equations, & Inequalities	*Graphical Representations*	*Properties of Plane Figures*	*Measurement*
■ 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	■ 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
■ create and use basic families of functions (which include linear, absolute value, and quadratic) to model and solve problems in common settings ■ explore and use different methods to solve systems of equations ■ manipulate radical expressions (e.g., rationalize denominators)	■ graph linear equations and inequalities, determine slopes of lines, identify parallel and perpendicular lines, and find distances ■ identify characteristics of figures from a general equation	■ apply special right-triangle properties and the Pythagorean theorem to solve congruent and similar shape problems	■ apply a variety of strategies using relationships between perimeter, area, and volume to calculate desired measures

PLAN MATHEMATICS TEST

Table 4 (continued): **The College Readiness Standards**

The Standards describe what students who score in the specified score ranges are *likely* to know and to be able to do. The ideas for progress help teachers identify ways of enhancing students' learning based on the scores students receive. The score range at the Benchmark level of achievement is highlighted.

		Basic Operations & Applications	***Probability, Statistics, & Data Analysis***	***Numbers: Concepts & Properties***
28–32	**Standards**	■ 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
	ideas for progress	■ solve problems that require combining multiple concepts	■ design and conduct probability investigations (e.g., how the margin of error is determined) and then determine, analyze, and communicate the results	■ explain, solve, and/or draw conclusions for complex problems using relationships and elementary number concepts

Expressions, Equations, & Inequalities	*Graphical Representations*	*Properties of Plane Figures*	*Measurement*
■ 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	■ 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	■ 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
■ formulate expressions, equations, and inequalities that require planning to accurately model real-world problems (e.g., direct and inverse variation)	■ solve and graph quadratic inequalities	■ make generalizations, arrive at conclusions based on conditional statements, and offer solutions for new situations that involve connecting mathematics with other content areas ■ investigate angle and arc relationships for circles	■ examine and compare a variety of methods to find areas of composite figures and construct scale drawings

What Does the PLAN Reading Test Measure?

The PLAN Reading Test measures the reading comprehension skills students typically acquire in courses taken up to and including tenth grade. Designed to simulate the types of reading tasks students encounter in their academic work and in life outside of school, the Reading Test measures students' literal-level reading skills as well as their ability to make inferences, draw conclusions, generalize from specific data, and reason logically.

The passages selected for the Reading Test are from published works of fiction and nonfiction, represent diverse points of view, and are produced by writers who reflect a wide variety of backgrounds. Students' reading skills are assessed in three content areas: Prose Fiction, Humanities, and Social Science. Table 5 below provides a description of each of the content areas.

Questions in the Reading Test are classified in the general categories of Referring and Reasoning.

Referring. The questions in this category ask about material explicitly stated in a passage. These questions are designed to measure literal reading comprehension. A question is classified in the Referring category if the information required to answer it is directly given in the passage text. In such questions, there are usually relationships between the language of the passage and that of the question, and the answer to the question is evident in a single sentence, or two adjacent sentences, in the passage. Some Referring questions paraphrase the language of the passage.

Reasoning. The questions in this category ask about meaning implicit in a passage and require cogent reasoning about a passage. These questions are designed to measure "meaning making" by logical inference, analysis, and synthesis. A question is classified in the Reasoning category if it requires inferring or applying a logical process to elicit an answer from the passage, or if it demands that the examinee combine many statements in the passage or interpret entire sections of the text.

Table 5: **PLAN Reading Test Content Areas**
25 questions, 20 minutes, 3 passages (500 words each)

Description of Passage		**Percentage of Questions**
Prose Fiction	The test questions in this category are based on passages from short stories or novels.	32%
Humanities	The test questions in this category are based on passages from memoirs and personal essays, and in the content areas of architecture, art, dance, ethics, film, language, literary criticism, music, philosophy, radio, television, or theater	36%
Social Science	The test questions in this category are based on passages in anthropology, archaeology, biography, business, economics, education, geography, history, political science, psychology, or sociology.	32%

The College Readiness Standards and the ideas for progress can be found in Table 6 on pages 30–35. As you review the Standards, you will note a progression in complexity across the score ranges. For example, in the 13–15 range for the Main Ideas and Author's Approach strand, students are able to "recognize a clear intent of an author or narrator in uncomplicated literary narratives," while in the 28–32 range, students are able to "infer the main idea or purpose of more challenging passages or their paragraphs."

A guiding principle underlying the development of the College Readiness Standards was that reading well depends on a range of flexible, adaptable strategies and that good readers work actively to construct meaning. As students progress in their learning, they encounter different types of discourse and read texts that vary in complexity. Effective readers adjust their reading to fit the type of text and employ specific tactics when they encounter sophisticated text. Because the complexity of a passage on the PLAN Reading Test plays such a key role in students' ability to successfully negotiate the passage (and the test questions), the College Readiness Standards for the PLAN Reading Test also include Descriptions of the PLAN Reading Passages. These descriptions clarify what kinds of passages are referred to in the College Readiness Standards as *Uncomplicated, More Challenging,* or *Complex Literary Narratives* and *Uncomplicated, More Challenging,* or *Complex Informational Passages*.

The ideas for progress are arranged by score range and by strand. Although many of the ideas cross more than one strand, a primary strand has been identified for each in order to facilitate their use in the classroom. For example, the statement in the 20–23 score range "distinguish between key concepts and subordinate ideas in a text and write a concise summary" brings together concepts from several strands, such as Main Ideas and Author's Approach, Supporting Details, and Generalizations and Conclusions. However, this idea for progress is primarily linked to the Main Ideas and Author's Approach strand.

PLAN Reading Test

Table 6: **The College Readiness Standards**

The Standards describe what students who score in the specified score ranges are *likely* to know and to be able to do. The ideas for progress help teachers identify ways of enhancing students' learning based on the scores students receive. The score range at the Benchmark level of achievement is highlighted.

		Main Ideas and Author's Approach	*Supporting Details*
1–12	**Standards**	■ Students who score in the 1–12 range are most likely beginning to develop the knowledge and skills assessed in the other score ranges.	
	ideas for progress	■ locate details in a literary text that suggest the author's or narrator's intent ■ speculate about an author's or narrator's beliefs, motives, or thinking	■ write, exchange, and answer a series of questions that examine significant details presented in a text ■ locate and discuss details presented in a text (e.g., who, what, where)
13–15	**Standards**	■ 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
	ideas for progress	■ work with peers to create logical statements about the main idea or purpose of simple paragraphs	■ determine which details in a text are essential to understanding the author's or narrator's intended message ■ scan a text in order to locate specific details (e.g., dates, specialized terms, facts) ■ identify the author's or narrator's reasons for including specific information in the text

Descriptions of the PLAN 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.

Sequential, Comparative, and Cause-Effect Relationships	*Meanings of Words*	*Generalizations and Conclusions*
■ use various strategies (e.g., timelines, event chains, discussion) to determine whether an event occurred and, if so, when it occurred ■ discuss an issue of interest, determining how past events affected the present ■ locate evidence in a text that explicitly states why an event or a series of events occurred ■ search for patterns or clues (e.g., signal words) that indicate cause-effect relationships	■ use various resources (e.g., dictionary, thesaurus) to explore connotations of familiar words or descriptive language	■ recognize generalizations about the main character in a literary text ■ combine several pieces of information to make a reasonable generalization about a specific character ■ make predictions about characters and events presented in a literary text, verifying or rejecting those predictions and making new ones as they read
■ 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
■ analyze how an author or narrator uses description, dialogue, and action to suggest relationships between characters in written or nonprint sources (e.g., films, ads) ■ select phrases or statements from a literary text that illustrate how a specific character feels toward others in the text ■ read portions of a literary text, predicting how a person's actions or words would likely impact a specific situation ■ use various strategies (e.g., questioning, role-playing) to determine plausible cause-effect relationships	■ examine specific language in a text and propose plausible interpretations based in part on their own viewpoints and experiences	■ analyze the reasonableness of generalizations by reviewing information presented in the text and from other sources ■ compose generalizations that include qualifying language (e.g., *a few, sometimes*) when limited evidence is presented by the author or narrator ■ determine what a literary narrative is generally about, organizing the text's information into general statements that are supported by details from the text ■ draw reasonable conclusions about people and situations using evidence presented in a text

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.

PLAN Reading Test

Table 6 (continued): The College Readiness Standards

The Standards describe what students who score in the specified score ranges are *likely* to know and to be able to do. The ideas for progress help teachers identify ways of enhancing students' learning based on the scores students receive. The score range at the Benchmark level of achievement is highlighted.

		Main Ideas and Author's Approach	*Supporting Details*
16–19	**Standards**	■ 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
	ideas for progress	■ analyze techniques used by the author of a text to reveal or conceal his or her point of view	■ explain in their own words the significance of specific information in written or nonprint sources ■ distinguish between what is most and least important in a text
20–23	**Standards**	■ 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
	ideas for progress	■ determine how an inference might change based on the inclusion of additional information ■ synthesize information from challenging texts to clarify understanding of important concepts and ideas ■ distinguish between key concepts and subordinate ideas in a text and write a concise summary ■ search for clues that suggest the viewpoint from which a literary text is written or told and determine whether the author's or narrator's point of view is valid or biased ■ analyze the relationship between an author's or narrator's intended message and the rhetorical devices used to convey that message (e.g., language used, evidence provided)	■ gather and interpret details presented in a text, determining the contribution of each to the author's or narrator's intended message ■ identify details that clearly support the key point(s) of written or nonprint sources ■ check inferences against information provided in a text, identifying what is and is not sufficiently supported by the text

Sequential, Comparative, and Cause-Effect Relationships	*Meanings of Words*	*Generalizations and Conclusions*
■ 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
■ place events from a literary text in chronological order by locating substantial evidence from the text ■ identify similarities and differences between people, objects, events, or ideas, drawing accurate conclusions ■ identify interrelationships between and among people, objects, events, or ideas in written or nonprint sources ■ determine factors that have clearly influenced the outcome of a situation ■ identify statements in texts that clearly state the cause(s) and effect(s) of specific events	■ clarify the meanings of words or descriptive phrases by searching for clues in the text (e.g., sentence structure, context, prefixes/suffixes, spelling patterns)	■ make accurate generalizations about people and events based on evidence presented in the text ■ identify inaccurate generalizations (e.g., stereotypes) in written or nonprint sources ■ identify details in a challenging text that confirm or disprove conclusions drawn by the author or narrator and by the students themselves or their peers ■ make reasoned judgments about ideas and events based on evidence from written or nonprint sources
■ 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
■ analyze the sequence of events in written or nonprint sources ■ map sequences of events in texts or films or from everyday occurrences, defending their reasoning ■ evaluate the extent to which comparisons made by the author or narrator help clarify specific textual relationships ■ search for clues embedded in a text that suggest cause-effect relationships ■ examine events in written or nonprint sources to determine the precipitating cause(s) and final outcome(s)	■ investigate the meanings of words and their possible effect(s) on the perceptions and behavior of people ■ research words and phrases from different sources, identifying their shades of meaning in various contexts or situations	■ defend or challenge the author's or narrator's assertions by locating several key pieces of information in a challenging text ■ make accurate generalizations based on implicit information in the text ■ analyze specific parts of a text, drawing accurate conclusions

PLAN Reading Test

Table 6 (continued): **The College Readiness Standards**

The Standards describe what students who score in the specified score ranges are *likely* to know and to be able to do. The ideas for progress help teachers identify ways of enhancing students' learning based on the scores students receive. The score range at the Benchmark level of achievement is highlighted.

		Main Ideas and Author's Approach	*Supporting Details*
24–27	**Standards**	■ 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
	ideas for progress	■ develop a reasonable interpretation of the central theme(s) or main point(s) of a challenging text ■ divide challenging texts into sections, determining what the key points are for each section ■ determine the primary purpose of specific sections of a text or the text as a whole ■ use two different mediums (e.g., sculpture, poetry, photography, music) to present a synopsis of the main idea(s) of a text, thereby expanding understanding of the text's meaning ■ identify subtle evidence that conveys the author's or narrator's point of view in challenging texts ■ change the wording of a text in order to convey a different tone or attitude (e.g., from persuasive to serious)	■ enumerate aspects or characteristics of people, objects, events, or ideas ■ interpret and integrate details in a text in order to verify or contradict a specific point or claim made by the author or narrator ■ recognize and study the evolution of an author's argument(s) as presented in a complex informational text
28–32	**Standards**	■ 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
	ideas for progress	■ identify and analyze ideas in a complex text and write a reasoned synopsis of the text ■ determine the author's or narrator's position toward a specific topic, issue, or idea by noting key facts, claims, and details from the text	■ identify facts embedded in complex informational texts

Sequential, Comparative, and Cause-Effect Relationships	*Meanings of Words*	*Generalizations and Conclusions*
■ 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
■ read texts containing challenging sequences (e.g., flashback, flash-forward), discussing how the order of events affects understanding of the text ■ explain how altering a series of events would likely change the outcome of a situation or the actions of the characters ■ develop an in-depth understanding of the fine distinctions between literary characters in a challenging text by closely examining the language used by the author or narrator ■ identify relationships between ideas and/or people in a challenging text and how those relationships develop over the course of the text ■ identify clues in a challenging text that suggest possible motives for and effects of a person's actions or words ■ read conflicting viewpoints of an event and use textual evidence to identify which one has the most reasonable explanations of causes and effects	■ develop and use strategies for deciphering the meanings of words or phrases embedded in richly figurative or technical contexts ■ analyze figurative and technical language in the media, relating some instances to a personal experience	■ synthesize information in challenging texts, making valid generalizations or conclusions about people and situations ■ confirm or disprove generalizations suggested in texts by providing examples or counterexamples from other sources
■ 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
■ determine the chronological sequence of events and the spatial relationships in complex texts (e.g., Dickens, García Marquez, Morrison, Tolstoy) ■ analyze subtle relationships between and among people, objects, events, and ideas in complex texts or films, forming accurate inferences ■ identify implications and possible consequences of actions in complex texts	■ employ strategies for defining a difficult concept, such as identifying its characteristics or providing examples of what it is and is not like	■ examine information from multiple sources and perspectives (including the author's or narrator's) in order to make reasonable generalizations about people, objects, ideas, and situations ■ evaluate the impact of literary devices (e.g., figurative language) on the meaning of a literary narrative

What Does the PLAN Science Test Measure?

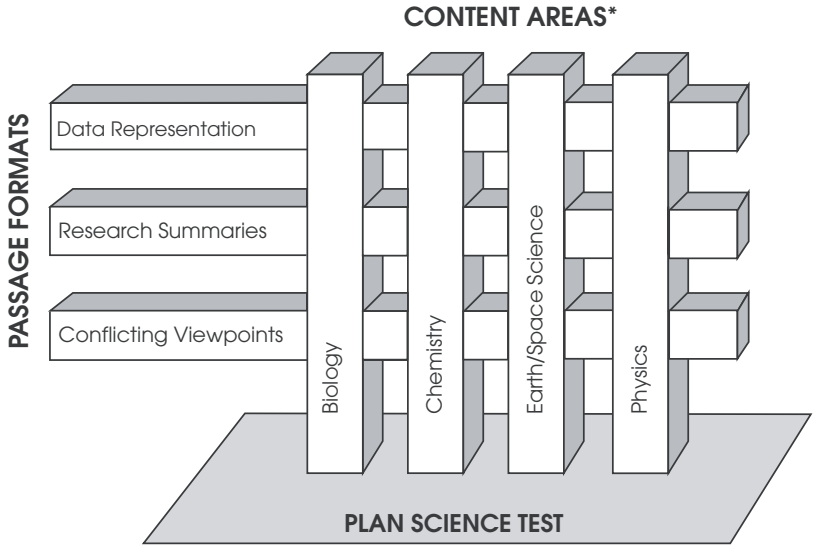
The PLAN Science Test is a 30-question, 25-minute test designed to assess the knowledge and the thinking skills, processes, and strategies students acquire in first-year and second-year high school science courses. These skills include analyzing and interpreting data, comparing experimental designs and methods, comparing assumptions underlying experiments, making generalizations, and identifying and evaluating conflicting points of view. The test presents five sets of scientific information, each followed by a number of multiple-choice test questions. The scientific information is conveyed in one of three different formats:

Data Representation. This format, which accounts for 33% of the test, presents students with graphic and tabular materials similar to those found in science journals and texts. The test questions associated with this format measure skills such as graph reading, interpretation of scatterplots, and interpretation of information presented in tables.

Research Summaries. This format, which accounts for 47% of the test, provides students with descriptions of one or more experiments. The test questions focus upon the design of experiments and the interpretation of experimental results.

Conflicting Viewpoints. This format, which accounts for 20% of the test, presents students with expressions of hypotheses, models, or views that, being based on differing premises or on incomplete data, are inconsistent with one another. The test questions focus upon the understanding, analysis, comparison, and evaluation of the alternative viewpoints.

The PLAN Science Test is based upon the type of content that is typically covered in high school general science courses. Materials are drawn from biology, chemistry, Earth/space science, and physics. Each test activity uses stimulus materials from one of these areas. Materials are produced specifically for the Science Test to match the level of complexity of those used in the classroom. The intent is to present students with a situation to engage their reasoning skills, rather than to invite their recall of a classroom activity. Some of the topics included in each content area are listed on page 37.



*All four content areas are represented in the test. The content areas are distributed over the differrent formats in such a way that at least one set of scientific information, and no more than two sets, represents each content area.

Adapted from *Mathematics Framework for the 1996 National Assessment of Educational Progress* (p.11)

Figure 2: **PLAN Science Test Content Areas and Passage Formats**

Biology. The stimulus materials and questions in this content area cover such topics as cell biology, botany, zoology, microbiology, ecology, genetics, and evolution.

Chemistry. The stimulus materials and questions in this content area cover such topics as atomic theory, inorganic chemical reactions, chemical bonding, reaction rates, solutions, equilibrium, gas laws, electrochemistry, and properties and states of matter.

Earth/Space Science. The stimulus materials and questions in this content area cover such topics as geology, meteorology, astronomy, environmental science, and oceanography.

Physics. The stimulus materials and questions in this content area cover such topics as mechanics, energy, thermodynamics, electromagnetism, fluids, solids, and light waves.

Figure 2 on page 36 provides an overview of the structure of the PLAN Science Test.

The questions in the Science Test are classified according to three primary cognitive levels: understanding, analysis, and generalization. *Understanding* questions test students' ability to comprehend the information presented and, to a limited extent, their understanding of how it fits into the general scheme of the particular stimulus format. *Analysis* questions go beyond the level of understanding questions by testing students' ability to relate a number of components of the presented material to each other on a higher, more abstract level. *Generalization* questions test students' ability to think beyond the presented materials and to see how the stimulus material relates to the rest of the world.

The College Readiness Standards and the ideas for progress can be found in Table 7 on pages 38–40. As you review the Standards, you will note a progression in complexity across the score ranges. For example, in the 13–15 range for the Interpretation of Data strand, students are able to "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)," while in the 28–32 range students are able to "compare or combine data from a simple data presentation with data from a complex data presentation."

The ideas for progress are arranged by score range and by strand. Although many of the ideas cross more than one strand, a primary strand has been identified for each in order to facilitate their use in the classroom. For example, the statement in the 20–23 score range "evaluate whether the data produced by an experiment adequately support a given conclusion" brings together concepts from all three strands: Interpretation of Data, Scientific Investigation, and Evaluation of Models, Inferences, and Experimental Results. However, this idea for progress is primarily linked to the Evaluation of Models, Inferences, and Experimental Results strand.

As you review the table, you will note that in the Scientific Investigation strand and the Evaluation of Models, Inferences, and Experimental Results strand, ideas for progress based on the knowledge and skills being tested are provided even where there are no Standards in the next higher score range.

PLAN Science Test

Table 7: The College Readiness Standards

The Standards describe what students who score in the specified score ranges are *likely* to know and to be able to do. The ideas for progress help teachers identify ways of enhancing students' learning based on the scores students receive. The score range at the Benchmark level of achievement is highlighted.

		Interpretation of Data	*Scientific Investigation*	*Evaluation of Models, Inferences, and Experimental Results*
1–12	**Standards**	■ Students who score in the 1–12 range are most likely beginning to develop the knowledge and skills assessed in the other score ranges.		
	ideas for progress	■ locate data in simple tables and graphs ■ become familiar with different types of graphs (e.g., line graphs, pie charts, bar graphs) ■ become familiar with units of measurement commonly used in science	■ observe experiments being performed and discuss what was done and why	■ discuss what hypotheses and conclusions are and how they are different from each other
13–15	**Standards**	■ 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)		
	ideas for progress	■ locate several data points in a simple table or graph and make comparisons between them ■ become familiar with common terms used in science (e.g., *star, force, mineral*) ■ create basic tables and graphs from sets of scientific data ■ read newspaper and magazine articles pertaining to science and technology and discuss main points with peers ■ describe trends and relationships in data displayed in simple tables and graphs	■ determine an appropriate method for performing a simple experiment ■ perform simple laboratory activities designed to teach familiarity with a number of commonly used tools (e.g., thermometers, balances, glassware)	■ read science articles of an appropriate level from newspapers and science newsmagazines and identify any hypotheses or conclusions made by the author(s)

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

PLAN Science Test

Table 7: (continued) **The College Readiness Standards**

The Standards describe what students who score in the specified score ranges are *likely* to know and to be able to do. The ideas for progress help teachers identify ways of enhancing students' learning based on the scores students receive. The score range at the Benchmark level of achievement is highlighted.

		Interpretation of Data	*Scientific Investigation*	*Evaluation of Models, Inferences, and Experimental Results*
16–19	**Standards**	■ 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	
	ideas for progress	■ display data gathered in laboratory exercises in a variety of formats (e.g., line graphs, pie charts, bar graphs)	■ perform experiments that require more than one step ■ conduct a simple experiment that makes use of a control group	■ read descriptions of actual experiments (e.g., completed science fair research, simple experiments from science education journals) and discuss whether the conclusions that were made support or contradict the hypotheses ■ formulate hypotheses, predictions, or conclusions based on the results of an experiment
20–23	**Standards**	■ 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
	ideas for progress	■ examine line graphs to determine if they show a direct or inverse relationship between variables ■ become familiar with scatterplots ■ determine a simple mathematical relationship between two variables ■ integrate scientific information from popular sources (e.g., newspapers, magazines, the Internet) with that found in textbooks	■ perform several repetitions of an experiment to determine the reliability of results	■ evaluate whether the data produced by an experiment adequately support a given conclusion ■ compare and contrast two different models about a scientific phenomenon

PLAN Science Test

Table 7: (continued) **The College Readiness Standards**

The Standards describe what students who score in the specified score ranges are *likely* to know and to be able to do. The ideas for progress help teachers identify ways of enhancing students' learning based on the scores students receive. The score range at the Benchmark level of achievement is highlighted.

		Interpretation of Data	*Scientific Investigation*	*Evaluation of Models, Inferences, and Experimental Results*
24–27	**Standards**	■ 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
	ideas for progress	■ relate scientific information contained in written text to numerical data ■ manipulate algebraic equations that represent data	■ determine the hypothesis behind an experiment that requires more than one step ■ determine alternate methods of testing a hypothesis	■ communicate findings of an experiment and compare conclusions with those of peers
28–32	**Standards**	■ 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
	ideas for progress	■ examine two or more related sets of data and then combine those data in ways that are useful	■ carry out scientific investigations in which the importance of accuracy and precision is stressed ■ consider how changing an experimental procedure will affect the results of their scientific investigations ■ design and carry out additional scientific inquiries to answer specific questions	■ formulate hypotheses, predictions, or conclusions by comparing and contrasting several different sets of data from different experiments ■ evaluate the merits of a conclusion based on the analysis of several sets of data ■ seek out new information that enhances or challenges their existing knowledge

The Link Between Curriculum and Assessment

Why Is It Important to Link Assessment With Curriculum?

The PLAN tests are designed to measure students' curriculum-related knowledge and the complex cognitive skills that contribute to success in further education and careers. PLAN results provide tenth-grade students with the information they need to continue making plans for high school and beyond. The PLAN test results also allow school personnel to compare the performance of their tenth-grade students with all tenth-grade students in a nationally representative comparison group and with a subgroup of those tenth graders who have indicated that they plan to attend college.

The College Readiness Standards and the ideas for progress can serve as one model for monitoring student achievement and for enhancing the kinds of discussions that need to occur among classroom teachers and between teachers and principals. The materials can also be used to stimulate thinking about teaching and learning. Teachers are the critical link in the instruction-assessment process but may not have actively participated in the review and discussion of the PLAN test results until now.

The College Readiness Standards materials are designed to promote the formation of discussion groups composed of teachers, administrators, and curriculum supervisors. Such groups can analyze the data and use it to inform classroom practice. Including teachers in this process helps them to better understand student performance patterns and how these patterns relate to classroom teaching. This process will also be enhanced by the experience that only teachers have as a result of their continual work with students. As these discussions progress, performance patterns that emerge from the data may reveal opportunities for improvement at both the building and the classroom levels.

Leadership from a building principal is about directing the learning of the faculty toward a shared purpose that results in a positive, constructive change for students.

As you work side by side with your teachers in reviewing your school's performance, it will be important to tie the assessment information to the goals of your educational program and to discuss how these goals are aligned with information about postsecondary institutions. With an ever-increasing number of high school graduates entering college, it becomes the school's responsibility to ensure that its graduates have mastered the prerequisite skills necessary for success in entry-level college courses.

In addition, many high schools monitor the effectiveness of their educational program by tracking the success of their graduates after they leave high school. Some of the criteria by which schools measure success are the number of graduates who enroll in postsecondary institutions, the types of institutions the graduates choose to attend, the courses into which those students are placed, and the attrition rate of those students.

Are Your Students Developing the Skills Necessary to Succeed in College?

Because PLAN is administered during the tenth grade, it allows for a midpoint review of progress students are making in high school. To facilitate this review, PLAN and ACT scores are linked through a common score scale and students receive an estimated ACT Composite score along with their PLAN scores. These scores can be used to evaluate students' readiness for college course work and to provide guidance as they prepare for their transition to college or further training.

As students and others review test scores from EXPLORE, PLAN, and the ACT, they should be aware that ACT's data clearly reveal that students' ACT test scores are directly related to preparation for college. Students who take rigorous high school courses, which ACT has defined as core college preparatory courses, and succeed in those courses achieve much higher test scores than students who do not. ACT has defined core college preparatory course work as four or more years of English, and three or more years each of mathematics, social studies, and natural science.

Effective college planning requires identifying those colleges that will provide the best fit to a student's interests, needs, and abilities. Students' standardized test scores, high school grades, class rank, level of academic preparation, out-of-class accomplishments, and specific interests and aspirations all help admissions personnel identify applicants who can benefit most from their institutions' programs.

College admission policies vary widely in their level of selectivity. ACT scores typically required by colleges having varying levels of selectivity are shown in Table 8 below. This information provides only general guidelines. There is considerable overlap among admission categories, and colleges often make exceptions to their stated admission policies.

ACT scores, besides helping colleges and universities make admission decisions, also are used by colleges in making decisions about course placement, scholarship offers, and an appropriate course of study for students.

ACT works with colleges to help them develop guidelines that place students in courses that are appropriate for their level of achievement as measured by the ACT. In doing this work, ACT has gathered course grade and test score data from a large number of first-year students across a wide range of postsecondary institutions. These data provide an overall measure of what it takes to be successful in a standard first-year college course. Data from 98 institutions and over 90,000 students were used to establish the ACT College Readiness Benchmark Scores, which are median course placement scores achieved on the ACT that are directly reflective of student success in a college course.

Table 8: **The Link Between ACT Composite Scores and College Admission Policies**

Admission Policy	Typical Class Rank of Admitted Students	Typical ACT Composite Scores of Admitted Students
Highly Selective	Majority of accepted freshmen in top 10% of high school graduating class	25–30
Selective	Majority of accepted freshmen in top 25% of high school graduating class	21–26
Traditional	Majority of accepted freshmen in top 50% of high school graduating class	18–24
Liberal	Some of accepted freshmen from lower half of high school graduating class	17–22
Open	All high school graduates accepted to limit of capacity	16–21

Success is defined as a 50 percent chance that a student will earn a grade of B or better. The courses are the ones most commonly taken by first-year students in the areas of English, mathematics, social studies, and science, namely English Composition, College Algebra, an entry-level College Social Studies/Humanities course, and College Biology. The ACT scores established as the ACT College Readiness Benchmark Scores are 18 on the English Test, 22 on the Mathematics Test, 21 on the Reading Test, and 24 on the Science Test. The College Readiness Benchmark Scores were based upon a sample of postsecondary institutions from across the United States. The data from these institutions were weighted to reflect postsecondary institutions nationally. The Benchmark Scores are median course placement values for these institutions and as such represent a *typical* set of expectations.

College Readiness Benchmark Scores have also been developed for EXPLORE and for PLAN, to indicate a student's probable readiness for college-level work, in the same courses named above, by the time the student graduates from high school. The EXPLORE and PLAN College Readiness Benchmark Scores were developed using records of students who had taken EXPLORE, PLAN, and the ACT (four years of matched data). Using either EXPLORE subject-area scores or PLAN subject-area scores, we estimated the conditional probabilities associated with meeting or exceeding the corresponding ACT Benchmark Score. Thus, each EXPLORE (1–25) or PLAN (1–32) score was associated with an estimated probability of meeting or exceeding the relevant ACT Benchmark Score. We then identified the EXPLORE and PLAN scores, at Grades 8, 9, 10, and 11, that came the closest to a 0.5 probability of meeting or exceeding the ACT Benchmark Score, by subject area. These scores were selected as the EXPLORE and PLAN Benchmark Scores.

All the Benchmark Scores are given in Table 9. Note that, for example, the first row of the table should be read as follows: An eighth-grade student who scores 13, or a ninth-grade student who scores 14, on the EXPLORE English Test has a 50 percent probability of scoring 18 on the ACT English Test; and a tenth-grade student who scores 15, or an eleventh-grade student who scores 17, on the PLAN English Test has a 50 percent probability of scoring 18 on the ACT English Test.

Table 9: **College Readiness Benchmark Scores**

	EXPLORE Test Score		PLAN Test Score		ACT
Subject Test	**Grade 8**	**Grade 9**	**Grade 10**	**Grade 11**	**Test Score**
English	13	14	15	17	18
Mathematics	17	18	19	21	22
Reading	15	16	17	19	21
Science	20	20	21	23	24

How Can the College Readiness Standards Be Used to Set Target Achievement Outcomes?

Establishing a set of intended outcomes requires a careful review of your school, district, and state curricular frameworks. By completing a match between your curricular frameworks and the skills and understandings measured on the various sources of information, you will be in a better position to establish target achievement outcomes.

Table 10 on page 45 is provided to guide you in the process of examining the match between the content and skills deemed important by your school and the knowledge and skills assessed in the four tests included in PLAN: English, Mathematics, Reading, and Science. A complete set of worksheets for each content area is included in your report package.

To complete the comparison, teachers should review each skill; consider whether the skill, knowledge, or process is included in the school, district, and state curricular frameworks; and answer the following three questions:

- Is this skill, knowledge, or process **included** in your (content area) curriculum?
- At what grade level (or in which course) are students **first introduced** to the skill, knowledge, or process?
- At what grade level (or in which course) are students **expected to demonstrate proficiency** in the skill, knowledge, or process?

Having teachers and curriculum coordinators engage in such an activity will encourage them to focus on the skills and concepts that are emphasized in their courses, to identify instructional needs, to consider the many ways in which teachers teach and students learn, and to reflect on how their course goals fit into and work toward the school's educational goals. This activity allows teachers and curriculum coordinators to discuss and compare their perspectives related to curriculum expectations. There is much evidence that student achievement can be raised when teachers and other school personnel address the academic content that teachers teach and the amount of practice that is provided to students in particular areas.

The results of the activity should reveal the extent of correspondence between classroom practices and the College Readiness Standards. Administrators, teachers, and curriculum coordinators can expect to find answers to the following questions:

- Is there agreement among your staff about which skills, knowledge, and processes are important?
- Given agreement that a skill, knowledge, or process should be taught to proficiency, does your staff agree on the grade (or course) at which each is first introduced?
- Does your staff agree on the grade (or course) at which proficiency should be attained?
- How accurate is your staff's perception of students' level of proficiency and of the grade (or course) at which proficiency is attained?
- Does your staff spend valuable instructional time on skills, knowledge, and processes on which students have already demonstrated proficiency?
- Are important skills, knowledge, and processes inadvertently overlooked?

Table 10: **PLAN Mathematics College Readiness Standards for Score Range 20–23**

	For each skill, knowledge, or process:		
Mathematics Standards Score Range: 20–23	Is it **included** in your mathematics curriculum?	At what grade level (or in which course) are students **first introduced** to it?	At what grade level (or in which course) are students **expected to demonstrate proficiency?**
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			
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			

Putting the Pieces Together

Students must be equipped with the necessary intellectual and technological skills for the 21st century. Ensuring that students are prepared to meet the challenges of the 21st century is a shared responsibility. Such efforts can only be described as multilayered and complex: schools need to develop their curricula, consider state and national standards, prepare teachers to work with curricula and standards, conduct programs to meet the needs of students, and make informed instruction and assessment decisions. Achieving excellence requires principals, guidance counselors, and curriculum coordinators to adopt the role of instructional leader: to work closely with teachers on curriculum, instruction, and assessment.

We developed this guide to help you interpret your school's PLAN test results and relate them to your curriculum. Specifically, we hope the guide will serve as a resource that helps you understand what the College Readiness Standards tell you about your students' academic progress, identify important learning goals in the content areas assessed in PLAN, and provide a means for teachers to discuss the alignment (by content area) between expectations, instruction, and assessment. If assessment results are to be used to improve student learning, the match between significant learning goals, instructional programs, and assessment tools is a key element.

Where Do We Go From Here?

ACT recognizes that teachers are the essential link between instruction and assessment. We are committed to providing you with assistance as you continue your efforts to provide quality instruction.

ACT is always looking for ways to improve its services. We welcome your comments and questions. Please send them to:

College Readiness Standards
Elementary and Secondary School Programs (32)
ACT
P.O. Box 168
Iowa City, IA 52243-0168

"A mind, stretched to a new idea, never goes back to its original dimensions."

— Oliver Wendell Holmes

What Other ACT Products and Services Are Available?

In addition to the College Readiness Standards materials, ACT offers many products and services that support school counselors, students and their parents, and others. Here are some of these additional resources:

ACT's Website—**www.act.org** contains a host of information and resources for parents, teachers, and others. Students can visit **www.planstudent.org**, which is designed to aid students as they prepare for their next level of learning.

The ACT—a guidance, placement, and admissions program that helps students prepare for the transition to postsecondary education while providing a measure of high school outcomes for college-bound students.

EXPLORE—an eighth- and ninth-grade assessment program designed to stimulate career explorations and facilitate high school planning.

WorkKeys®—a system linking workplace skill areas to instructional support and specific requirements of occupations.

ACT Online Prep™—an online test preparation program that provides students with real ACT tests and an interactive learning experience.

The Real ACT Prep Guide—the official print guide to the ACT, containing three practice ACTs.

DISCOVER®—a computer-based career planning system that helps users assess their interests, abilities, experiences, and values, and provides instant results for use in investigating educational and occupational options.

Bibliography

(Please note that in 1996 the corporate name "The American College Testing Program" was changed to "ACT.")

American College Testing Program. (1992). *Content validity of ACT's educational achievement tests.* Iowa City, IA: Author.

ACT. (1996a). *Language arts for a successful transition to college: The content foundations of the ACT Assessment.* Iowa City, IA: Author.

ACT. (1996b). *Mathematics for a successful transition to college: The content foundations of the ACT Assessment.* Iowa City, IA: Author.

ACT. (1996c). *Science Reasoning for a successful transition to college: The content foundations of the ACT Assessment.* Iowa City, IA: Author.

ACT. (1998). *Maintaining the content validity of ACT's educational achievement tests.* Iowa City, IA: Author.

ACT. (1999). *PLAN technical manual.* Iowa City, IA: Author.

ACT. (2000a). *Content validity evidence in support of ACT's educational achievement tests: ACT's 1998–1999 national curriculum study.* Iowa City, IA: Author.

ACT. (2000b). *Supplement to the PLAN technical manual.* Iowa City, IA: Author.

ACT. (2003). *Content validity evidence in support of ACT's educational achievement tests: ACT National Curriculum Survey 2002-2003.* Iowa City, IA: Author.

ACT. (2004). *Crisis at the core: Preparing all students for college and work.* Iowa City, IA: Author.

ACT. (2005a). *PLAN program handbook.* Iowa City, IA: Author.

ACT (2005b). *The real ACT prep guide: The only official prep guide from the makers of the ACT.* [Lawrenceville, NJ:] Thomson Peterson's.

ACT. (2005c). *Your guide to PLAN.* Iowa City, IA: Author.

ACT, & Council of Great City Schools. (1999). *Gateways to success: A report on urban student achievement and coursetaking.* Iowa City, IA: Authors.

ACT, & The Education Trust. (2004). *On course for success: A close look at selected high school courses that prepare all students for college.* Iowa City, IA: Authors.

Burke, K. (1992). Significant outcomes. In K. Burke (Ed.), *Authentic assessment: A collection* (pp. 201–203). Palatine, IL: IRI/Skylight Publishing.

Holmes, O. W. (1960). *The autocrat of the breakfast-table.* Everyman's Library, No. 66. London: J. M. Dent & Sons. (Original work published 1858)

Lindquist, E. F. (1958). *Some requirements of and some basic considerations concerning college entrance and college scholarship examinations* (pp. 1–6). Unpublished manuscript.

National Assessment Governing Board. (1995?). *Mathematics framework for the 1996 National Assessment of Educational Progress: NAEP mathematics consensus project* (developed under Contract No. RN91084001 by The College Board). Washington, DC: U.S. Government Printing Office.

Stake, R. (1998, July 21). Some comments on assessment in U.S. education. *Education Policy Analysis Archives, 6*(14). Retrieved August 12, 2005, from http://epaa.asu.edu/epaa/v6n14.html

To help schools derive maximum benefit from their participation in ACT programs and services, ACT maintains a staff of consultants in regional offices. If you need additional ACT information or assistance, please contact the ACT office that serves your state.

ACT Offices

ACT National Office

500 ACT Drive
P.O. Box 168
Iowa City, IA 52243-0168
319/337-1000

West Region

2880 Sunrise Boulevard, Suite 214
Rancho Cordova, CA 95742-6103
916/631-9200
Fax 916/631-8263

3131 S. Vaughn Way, Suite 218
Aurora, CO 80014-3507
303/337-3273
Fax 303/337-2613

Southwest Region

8303 MoPac Expy. N., Suite A-110
Austin, TX 78759-8393
512/345-1949
Fax 512/345-2997

Midwest Region

300 Knightsbridge Parkway, Suite 300
Lincolnshire, IL 60069-9498
847/634-2560
Fax 847/634-1074

1001 Centennial Way, Suite 400
Lansing, MI 48917-8249
517/327-5919
Fax 517/327-0772

700 Taylor Road, Suite 210
Gahanna, OH 43230-3318
614/470-9828
Fax 614/470-9830

Northeast Region

4 Pine West Plaza, Suite 403
Albany, NY 12205-5515
518/869-7378
Fax 518/869-7392

Southeast Region

3355 Lenox Road NE, Suite 320
Atlanta, GA 30326-1332
404/231-1952
Fax 404/231-5945

1315 E. Lafayette Street, Suite A
Tallahassee, FL 32301-4757
850/878-2729
Fax 850/877-8114

Washington DC Office

One Dupont Circle NW, Suite 340
Washington, DC 20036-1170
202/223-2318
Fax 202/293-2223

Hunt Valley Office

Executive Plaza One
11350 McCormick Road, Suite 200
Hunt Valley, MD 21031-1002
410/584-8000
Fax 410/785-1714

Office for Distance Learning Resources

1365 N. Winchester Street
Olathe, KS 66061-5880
913/768-1696
Fax 913/768-0184

National Center for Educational Achievement

4030-2 W. Braker Lane, Suite 200
Austin, TX 78759-5329
512/320-1800
Fax 512/320-1877