What Does It Mean to Be Prepared for College?

(Or for Jobs in the High-Growth, High-Performance Workplace)

As James Rosenbaum notes, there are currently good jobs with which one can support a family (such as in construction trades, clerical and administrative support, graphics, and many government and social services jobs) that students with strong high school records and no college degree can enter. But students who want to succeed in college or who want to enter the growing high-performance job sector—or who want to keep their options as broad as possible—must reach an academic level that is higher than what is typically required for a high school diploma. But how high? What does the level of achievement they must strive for look like? A new report by the American Diploma Project (ADP) tries to answer these questions.

Called Ready or Not: Creating a High School Diploma That Counts*, this new report establishes English and mathematics benchmarks that explain what high school students need to be prepared for college or good jobs in the high-performance workplace; offers examples of college coursework and workplace tasks that draw upon the benchmarks; and recommends helpful policies that should be adopted by states, postsecondary institutions, the federal government, and business leaders. Here, we provide excerpts adapted from the report, especially from its sections on benchmarks and postsecondary assignments.*

–EDITORS

Staggeringly high college dropout rates suggest that the high school diploma does not in itself signal readiness for college. What does readiness for college require? And what does it mean to be "ready" to enter the high-performance workplace that increasingly will be the source of the most promising jobs for high school graduates? To answer these questions, ADP has worked closely with K–12, postsecondary, and business leaders in five partner states (Indiana, Kentucky, Massachusetts, Nevada, and Texas) for the past two years to identify the English and mathematics knowledge and skills needed for success in both college and such workplaces. We first asked leading economists to examine market projections for the most promising jobs—those that pay enough to support a small family and that provide real potential for career advancement in industries such as healthcare, high-tech manufacturing, information technology, and telecommunications—and to pinpoint the academic knowledge and skills required for success in those occupations. We also worked closely with two- and four-year postsecondary leaders in partner states to determine prerequisite English and mathematics knowledge and skills required for success in entry-level, credit-bearing college courses.

The resulting benchmarks are ambitious, reflecting an unprecedented convergence in what these employers and postsecondary faculty need from new employees and entering freshmen. In math, they contain content typically taught in high school courses like Algebra I, Algebra II, Geometry, and Data Analysis and Statistics. In English, they demand strong oral and written communication skills that are staples in college classrooms and high-performance workplaces. They also describe analytical and research skills currently associated only with advanced and honors courses in high school, but which our employers and postsecondary faculty told us are required skills for students who want to succeed in college and the high-performance workplace.

The benchmarks also attempt to indicate the rigor of the expectations by providing examples of the kinds of reading and mathematical problems the benchmarks are meant to describe. In English, for example, it is not enough to ask high school students to analyze texts. According to our employers and postsecondary faculty, students should study particular kinds of rigorous texts. For this reason, the ADP English benchmarks are to be used in coordination with the reading lists developed by two ADP partner states, Indiana (excerpts shown, see box below) and Massachusetts. These lists not only define the quality and complexity of reading expected of all high school graduates, but also suggest a common "cultural literacy," including representative works of various cultures both within and beyond the United States. In math, however, rigor is illustrated differently by

embedding sample problems within the benchmarks themselves to illustrate the quality and complexity of the corresponding mathematics benchmarks.

What makes the ADP benchmarks unique is that they are accompanied by actual examples of the kinds of workplace tasks and postsecondary assignments that high school graduates will confront. It is important to note that the tasks and assignments are *not* meant to describe the quality and complexity of *high school* assignments. Although they may be used in the future to inform the development of high school lessons, the tasks and assignments are designed simply to illustrate the intellectual rigor of real-world environments beyond high school and the applicability of the ADP benchmarks in postsecondary and workplace settings. These benchmarks can also be used to assess the adequacy of the high school curriculum and to map back through earlier grades to refine state standards and assessments in English and math.

Samples from Indiana's Reading List for Grades 9–12

The following samples provide a taste of the quality and complexity of the suggested reading materials. The full list includes classic and contemporary fiction; historical fiction; science fiction and fantasy; folklore, fairytales, and mythology; poetry; short stories; drama; essays and speeches; science, social studies, and mathematics nonfiction; biography and autobiography; magazines and newspapers; reference tools; and informational, technical, and practical documents.

Fiction: Classic and Contemporary
The Abduction, Newth, Mette and Nunnally, Tiina

The Adventures of Augie March, Bellow, Saul

The Adventures of Huckleberry Finn, Twain, Mark

The Age of Innocence, Wharton, Edith

Animal Farm, Orwell, George

The Assistant, Malamud, Bernar

Autobiography of Miss Jane Pittman, Gaines, Ernest J.

The Bean Trees, Kingsolver, Barbara

Billy Budd, Melville, Herman

Bless Me, Ultima, Anaya, Rudolfo

Buried Onions, Soto, Gary

Catcher in the Rye, Salinger, J.D.

Ceremony, Silko, Leslie Marmon

The Contender, Lipsyte, Robert

Crime and Punishment, Dostoyevsky, Fyodor

Science Fiction/Fantasy
1984, Orwell, George

2001: A Space Odyssey, Clarke, Arthur C.

Brave New World, Huxley, Aldous

Fahrenheit 451, Bradbury, Ray

Foundation, Asimov, Issac

The Lord of the Rings, Tolkien, J. R.R.

The Martian Chronicles, Bradbury, Ray

The War of the Worlds, Wells, H.G.

Watership Down, Adams, Richard

Biography/Autobiography
Growing Up, Baker, Russell

Alexander Graham Bell: Making Connections, Pasachoff, Naomi

John Wilkes Booth: A Sister's Memoir, Clarke, Asia Booth

Out of Darkness: The Story of Louis Braille, Freedman, Russell

The Childhood Story of Christy Brown [previously *My Left Foot*], Brown, Christy

Madame Curie, Curie, Eve

Narrative of the Life of Frederick Douglass, Douglass, Frederick

Barrio Boy, Galarza, Ernesto

Gandhi, Great Soul, Severance, John

A Mathematician's Apology, Hardy, G.H.

English Benchmarks

The ADP college and workplace readiness benchmarks for English are organized into eight strands: Language; Communication; Writing; Research; Logic; Informational Text; Media; and Literature. Shown in these excerpts are all of the language, research, and literature benchmarks, plus about half of the communication benchmarks.

Language
Writers and speakers are taken seriously when their vocabulary is sophisticated and their sentences are free of grammatical errors. Without fail, employers and college faculty cite correct grammar, usage, punctuation, capitalization, and spelling as absolutely essential to success in classrooms and workplaces beyond high school. Whether presenting a marketing concept to a team of colleagues or clients or presenting an interpretation of a secondary source in a college seminar, students and employees will need facility with these fundamental skills for the successful exchange of ideas and information.

Benchmarks. The high school graduate can:

1. Demonstrate control of standard English through the use of grammar, punctuation, capitalization, and spelling.

2. Use general and specialized dictionaries, thesauruses, and glossaries (print and electronic) to determine the definition, pronunciation, etymology, spelling, and usage of words.

3. Use roots, affixes, and cognates to determine the meaning of unfamiliar words.

4. Use context to determine the meaning of unfamiliar words.

5. Identify the meaning of common idioms, as well as literary, classical, and biblical allusions; use them in oral and written communication.

6. Recognize nuances in the meanings of words; choose words precisely to enhance communication.

7. Comprehend and communicate quantitative, technical, and mathematical information.

Communication
Employers and college professors cite strong oral communication skills as being so essential to success that they insist schools should emphasize them, simultaneously with the transmittal of other academic knowledge. Success in credit-bearing college coursework, whether in the humanities, sciences, or social sciences, depends heavily on effective communication about the concepts and detailed information contained within readings, lectures, and class discussions. Success in the workplace, whatever the profession, is also heavily dependent on one's ability to listen attentively to colleagues or customers and to express ideas clearly and persuasively.

Benchmarks. The high school graduate can:

1. Give and follow spoken instructions to perform specific tasks, to answer questions, or to solve problems.

2. Summarize information presented orally by others.

3. Paraphrase information presented orally by others.

4. Identify the thesis of a speech and determine the essential elements that elaborate it.

5. Analyze the ways in which the style and structure of a speech support or confound its meaning or purpose.

6. Make oral presentations that:

- exhibit a logical structure appropriate to the audience, context, and purpose;
- group related ideas and maintain a consistent focus;
- include smooth transitions;
- support judgments with sound evidence and well-chosen details;
- make skillful use of rhetorical devices;
- provide a coherent conclusion; and
- employ proper eye contact, speaking rate, volume, enunciation, inflection, and gestures to communicate ideas effectively.

Research*

Research requires the ability to frame, analyze, and solve problems, while building on the ideas and contributions of others. As future college students or employees, students will be asked to hone these essential skills with increasing sophistication. Credit-bearing coursework in colleges and universities will require students to identify areas for research, narrow those topics, and adjust research methodology as necessary. College students will be asked to consider various interpretations of both primary and secondary resources as they develop and defend their own conclusions. Thorough research is the foundation of the free exchange of ideas in a postsecondary academic environment. Similarly, in the workplace, employers depend heavily on employees to evaluate the credibility of existing research to establish, reject, or refine products and services.

Benchmarks. The high school graduate can:

1. Define and narrow a problem or research topic.

2. Gather relevant information from a variety of print and electronic sources, as well as from direct observation, interviews, and surveys.

3. Make distinctions about the credibility, reliability, consistency, strengths, and limitations of resources, including information gathered from Web sites.

4. Report findings within prescribed time and/or length requirements, as appropriate.

5. Write an extended research essay (approximately six to 10 pages), building on primary and secondary sources, that:

- marshals evidence in support of a clear thesis statement and related claims;
- paraphrases and summarizes with accuracy and fidelity the range of arguments and evidence supporting or refuting the thesis, as appropriate; and
- cites sources correctly and documents quotations, paraphrases, and other information using a standard format.

Literature

High school graduates today need to be well read to succeed in college, in careers, and as citizens in our democratic society. Whether navigating the editorial pages of a local newspaper or communicating ideas to fellow colleagues or classmates, high-school graduates who have been asked to analyze a variety of rich literature will be well prepared. Among the benefits of reading literature and carefully analyzing significant works from the literary heritage of both English and other languages is the appreciation of our common humanity. Regular practice in identifying and analyzing the aesthetic and expressive elements of literature also improves the quality of all kinds of student writing. Practice in providing evidence from literary works to support an interpretation fosters the skill of reading any text closely and teaches students to think, speak, and write logically and coherently—priority skills identified by employers and postsecondary faculty. Employers report that employees who have considered the moral dilemmas encountered by literary characters are better able to tolerate ambiguity and nurture problem-solving skills in the workplace. Postsecondary faculty from a

wide variety of disciplines note that the skills required by thorough literary analysis are applicable in a range of other humanities, science, and social science disciplines.

Benchmarks. The high school graduate can:

1. Demonstrate knowledge of 18th- and 19th-century foundational works of American literature.

2. Analyze foundational U.S. documents for their historical and literary significance (for example, The Declaration of Independence, the Preamble to the U.S. Constitution, Abraham Lincoln's "Gettysburg Address," Martin Luther King's "Letter from Birmingham Jail").

3. Interpret significant works from various forms of literature: poetry, novel, biography, short story, essay, and dramatic literature; use understanding of genre characteristics to make deeper and subtler interpretations of the meaning of the text.

4. Analyze the setting, plot, theme, characterization, and narration of classic and contemporary short stories and novels.

5. Demonstrate knowledge of metrics, rhyme scheme, rhythm, alliteration, and other conventions of verse in poetry.

6. Identify how elements of dramatic literature (for example, dramatic irony, soliloquy, stage direction, and dialogue) articulate a playwright's vision.

7. Analyze works of literature for what they suggest about the historical period in which they were written.

8. Analyze the moral dilemmas in works of literature, as revealed by characters' motivation and behavior.

9. Identify and explain the themes found in a single literary work; analyze the ways in which similar themes and ideas are developed in more than one literary work.

Sample Postsecondary Midterm Exam in Introductory English

Tests in first-year English courses often require students to identify excerpts from course readings and to explain their significance. To perform well on this midterm exam from Western Nevada Community College, an open admissions institution in Carson City, Nev., students must have a solid understanding of the themes and literary techniques employed in a broad selection of short stories and poems. Students must also be able to describe how the works relate to one another. To do well on this exam, students must bring with them from high school a strong background in writing and analyzing literature; specifically, they must be completely comfortable with language benchmarks 1 and 6, as well as literature benchmarks, 1, 3, 4, and 5, and benchmarks from the other strands such as writing and logic. The readings for this exam are all from *The Norton Introduction to Literature* (shorter eighth edition edited by Jerome Beaty, Alison Booth, J. Paul Hunter, and Kelly J. Mays) and were written by authors such as Ernest Hemingway, Edgar Allan Poe, Anton Chekhov, and Elizabeth B. Browning. About half of the exam is shown here.

Part one: Fiction
Explain the significance of each excerpt, especially the section in bold, as it relates to each story's theme (NOT PLOT) or to the story's main character.

1. "Jupiter was an anomaly. His retrieving instincts and **his high spirits were out of place** in Shady Hill... Jupiter went where he pleased, ransacking..." ("The Country Husband")

2. "I replied to the yells of him who clamoured. I **re-echoed, I aided, I surpassed them in volume** and in strength. I did this, and the clamourer grew still." ("The Cask of Amontillado")

3. "Her poems are always cool and intellectual; **that is their form, which is contradicted or supported by** a gravely sensuous texture." ("Our Friend Judith")

Part two: Poetry
Explain the significance of the excerpted lines, focusing especially on the words that are in bold type.

1. "Back from the hospital, his mind rattling/Like the suitcase, swinging from his hand,/That contains **shaving cream, a piggy bank,/A book he sometimes pretends to read**." ("Alzheimer's," p. 637)

2. "My mother, after a life/of it, says, 'This is the last straw.'/**And it is. We're all clutching**." ("You Didn't Fit," p. 635)

Part three: Essay question
Refer to stories we have read ("How," "Hills Like White Elephants," "No One's a Mystery," "The Country Husband," and "Our Friend Judith") as well as several poems ("The Tally Stick," "love poem," "Wedding-Ring," and "What lips my lips have kissed, and where, and why" or any other 20th-century poem we have read) and write an essay on the following topic:

The nature of love and marriage (these are TWO topics), as depicted in 20th-century fiction and poetry, IS or IS NOT consistent. (Choose whichever point of view you think you can best defend by using the above stories and poems as your "support.") You will first have to identify WHAT is the nature of love and the nature of marriage and state each definition. You also need to explain how you understand the term "is consistent" or "is not consistent."

Mathematics Benchmarks

The ADP mathematics benchmarks are organized into four strands: Number Sense and Numerical Operations; Algebra; Geometry; and Data Interpretation, Statistics, and Probability. In addition, because the study of mathematics is an exercise in reasoning, the report lists a set of critical reasoning skills that are woven throughout the four strands. These include checking for errors and reasonableness of solutions, distinguishing between relevant and irrelevant information, and making judgments about which operations and procedures to apply in order to solve a particular problem. Shown here are the algebra benchmarks that all students should master. In the full report there are additional higher-level algebra benchmarks that are required for students who plan to take calculus in college, a requisite for mathematics and many mathematics-intensive majors. To make it easy for readers to refer back and forth between the full report and this excerpt, we have preserved ADP's original numbering system.

Algebra
Mathematicians regularly identify sources of change, distinguish patterns in that change, and seek multiple representations—verbal, symbolic, numeric, and graphic—to express what transpires. The language of algebra provides a means of operating with these concepts at an abstract level and extending specific examples to broad generalizations. Predicting savings based on a rate of interest, projecting business revenues, knowing how costs will increase as the square footage of a building increases, and estimating future world populations based on known population growth rates are all possible once a pattern has been identified. Such relationships can be described in terms of what has changed and how it has changed.

Benchmarks. The high school graduate can:

1. Perform basic operations on algebraic expressions fluently and accurately:

1.1. Understand the properties of integer exponents and roots and apply these properties to simplify algebraic expressions.

Example: Simplify the expression

$$\left(\frac{a}{b}\right)^{m} \cdot c^{2m} \text{ to obtain either } \frac{(ac^2)^m}{b^m} \text{ or } \left(\frac{ac^2}{b}\right)^{m}.$$

1.3. Add, subtract, and multiply polynomials; divide a polynomial by a low-degree polynomial.

Example: Divide $x^3 - 8$ by $x - 2$ to obtain $x^2 + 2x + 4$; divide $x^4 - 5x^3 - 2x$ by x^2 to obtain $x^2 - 5x - 2/x$.

1.4. Factor polynomials by removing the greatest common factor; factor quadratic polynomials.

1.5. Add, subtract, multiply, divide, and simplify rational expressions.

Example: Express $1/x + 1/y$ as a single fraction to obtain $x + y/xy$.

1.6. Evaluate polynomial and rational expressions and expressions containing radicals and absolute values at specified values of their variables.

2. Understand functions, their representations, and their properties:

2.1. Recognize whether a relationship given in symbolic or graphical form is a function.

2.3. Understand functional notation and evaluate a function at a specified point in its domain.

3. Apply basic algebraic operations to solve equations and inequalities:

3.1. Solve linear equations and inequalities in one variable including those involving the absolute value of a linear function.

Example: A pipe is to be cut to a length of 5 meters accurate to within a tenth of a centimeter. Recognize that an acceptable length x (in meters) of the pipes satisfies the inequality $|x-5| \leq 0.001$.

3.2. Solve an equation involving several variables for one variable in terms of the others.

Example: If C represents the temperature in degrees Celsius and F represents the temperature in degrees Fahrenheit, then $C = 5/9 (F - 32)$. Solve this equation for F to obtain $F = 9/5 C + 32$.

3.3. Solve systems of two linear equations in two variables.

3.5. Solve quadratic equations in one variable.

Example: Solve $x2 - x - 6 = 0$ by recognizing that $x2 - x - 6 = (x - 3)(x + 2)$ can be factored to obtain the two solutions $x = 3$ and $x = -2$.

4. Graph a variety of equations and inequalities in two variables, demonstrate understanding of the relationships between the algebraic properties of an equation and the geometric properties of its graph, and interpret a graph:

4.1. Graph a linear equation and demonstrate that it has a constant rate of change.

4.2. Understand the relationship between the coefficients of a linear equation and the slope and x- and y-intercepts of its graph.

4.3. Understand the relationship between a solution of a system of two linear equations in two variables and the graphs of the corresponding lines.

4.4. Graph the solution set of a linear inequality and identify whether the solution set is an open or a closed half-plane; graph the solution set of a system of two or three linear inequalities.

Example: Graph the solution set of the system of linear inequalities:

$2x + y \leq 4$
$x \geq 1.$

4.5. Graph a quadratic function and understand the relationship between its real zeros and the x-intercepts of its graph.

4.7. Graph exponential functions and identify their key characteristics.

Example: Graph the exponential function $y(x) = 2^x$. Recognize that $y(x+1)$ is twice as large as $y(x)$ since $y(x + 1) = 2^{x+1} = 2 \cdot 2x = 2 \cdot y(x)$.

4.8. Read information and draw conclusions from graphs; identify properties of a graph that provide useful information about the original problem.

5. Solve problems by converting the verbal information given into an appropriate mathematical model involving equations or systems of equations; apply appropriate mathematical techniques to analyze these mathematical models; and interpret the solution obtained in written form using appropriate units of measurement:

5.1. Recognize and solve problems that can be modeled using a linear equation in one variable, such as time/rate/distance problems, percentage increase or decrease problems, and ratio and proportion problems.

5.2. Recognize and solve problems that can be modeled using a system of two equations in two variables, such as mixture problems.

Example: A chemist has available two solutions of acid. The first solution contains 12% acid, and the second solution contains 20% acid. He wants to mix the two solutions to obtain a 500-milliliter mixture containing 15% acid. How many milliliters of each solution should he mix?

5.3. Recognize and solve problems that can be modeled using a quadratic equation, such as the motion of an object under the force of gravity.

Example: A stone is dropped off a cliff 660 feet above the ground. When will the stone hit the ground if its height in feet at time t seconds after it is dropped is given by $h(t) = 660 - 16 \cdot t^2$?

5.4. Recognize and solve problems that can be modeled using an exponential function, such as compound interest problems.

5.6. Recognize and solve problems that can be modeled using a finite geometric series, such as home mortgage problems and other compound interest problems.

Example: How much money will you have in a retirement fund if you deposit $1,000 each year for 20 years and the interest rate remains constant at 4%?

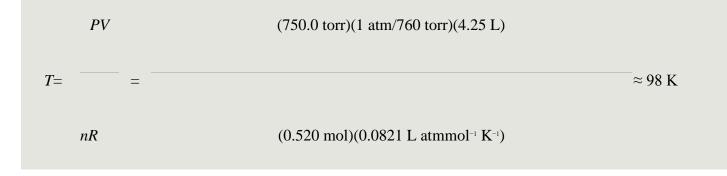Sample Postsecondary Assignment in Introductory Chemistry

Introductory chemistry at Ball State University, a moderately selective institution in Muncie, Ind., (with average

SAT scores around 1050) that offers both associate's and bachelor's degrees, challenges students to interpret, manipulate, process, and present quantitative information accurately and present solutions in the appropriate unit of measure or dimension. Students must have a solid foundation in mathematics in order to concentrate on learning chemistry. In this sample, students are being taught about the ideal gas law, but they are not being taught the algebra involved in applying that law; to succeed in this course, they must have learned all the necessary mathematics in high school, In the following assignment, students must have mastered algebra benchmarks 1.5 and 5, as well as language benchmark 7.

Use Formulas such as the ideal gas law ($P \cdot V = nR \cdot T$) to calculate unknown quantities such as pressure, temperature, volume, molar mass, density, or molecular formula.

Problem: What is the temperature of 0.520 mol of argon gas that occupies 4.25 L at 750 torr?

Solution: Use the ideal gas law: $PV = nRT$. Solve the ideal gas law for T, and substitute the known information.

$$T = \frac{PV}{nR} = \frac{(750.0 \text{ torr})(1 \text{ atm}/760 \text{ torr})(4.25 \text{ L})}{(0.520 \text{ mol})(0.0821 \text{ L atm mol}^{-1} \text{ K}^{-1})} \approx 98 \text{ K}$$

* * *

Incremental Steps Will Bring the Benchmarks Within Reach

What will it take to make the high school diploma signify readiness for college or a good job in the high-performance job sector? First, state policymakers need to anchor high school graduation requirements and assessments to the standards of the real world: to the knowledge and skills that colleges and these employers actually expect if young people are to succeed in their institutions. In return, colleges and employers need to start honoring and rewarding student achievement on state standards-based assessments by using these performance data in their admissions, placement, and hiring practices. Although most states have worked hard in the last 10 years to raise the quality of academic standards and the rigor of assessments, the ADP benchmarks may seem even more demanding. For example, no state currently requires all students to take Algebra II to graduate, and few high school exit tests measure much of what ADP suggests that students need to know. In some cases, the knowledge and skills in the benchmarks are not sampled at all on state tests. Incorporating ADP benchmarks into state education systems is a long-term agenda, and progress will be measured by incremental steps rather than radical shifts. State education and business leaders must devise strategies that build on, rather than discard, ongoing standards-based reforms; that sensibly ratchet up the rigor of standards, assessments, and course-taking requirements over time; and that blend them into a coherent system of requirements for earning a high school diploma that signifies college and workplace readiness.

The American Diploma Project is a partnership of Achieve, Inc., the Education Trust, and the Thomas B. Fordham Foundation. To read the full report, go to [www.achieve.org](link is external).

*These skills, although critical to the study of English, are also necessary to the study of many academic subjects. Therefore, the study and reinforcement of these skills should not be confined to the English classroom or coursework. ([back to article](#))