

## COLLEGE AND WORKFORCE TRAINING READINESS



*ACT's latest research provides empirical evidence that high school graduates need to be educated to a comparable level of readiness whether they plan to enter college or workforce training programs.*

**ACT**<sup>®</sup>

## Ready for College and Ready for Work: Same or Different?

For decades, it has been a commonly held belief that high school students planning to go to college need to take more rigorous coursework than those going directly into the workforce. More recently, however, many employers have suggested that in the growing global economy, entry-level workers need much the same knowledge and skills as college-going students. But these claims have been based mostly on anecdotal rather than empirical evidence. As an organization engaged in promoting both college readiness and workforce readiness, ACT is uniquely positioned to examine the relationship between the two. The question we asked is: Are readiness for college and readiness for work the same, or different?

The primary mission of our public education system is to give every student the opportunity to live a meaningful and productive life, which includes earning a livable wage sufficient to support a small family. Because students increasingly come from a wide range of socioeconomic backgrounds, it is ever more important that all students have the knowledge and skills necessary to have meaningful options in their lives by the time they graduate from high school. Perhaps more important, a person's success in life ought to be a result of individual effort and choice, not limited by an educational process that can sometimes appear to have differing goals for different groups. Educating some students to a lesser standard than others narrows their options to jobs that, in today's economy, no longer pay well enough to support a family of four. Creating access to the American dream through public education, including core courses of sufficient rigor, has always been one of the foundations of our society and it is becoming even more critical to compete in today's global economy.

In the first large-scale empirical study to address these issues, ACT has found that the levels of readiness in reading and mathematics required for entry into college and workforce training are comparable. This level of readiness is needed if students are to succeed in college-level courses without remediation and enter workforce training programs ready to learn job-specific skills.

This finding carries important implications for both high school education and high school graduates in the United States. The results of this study suggest that all high school students should be educated according to a common academic expectation that prepares them for both postsecondary education and the workforce, regardless of whether they belong to the two-thirds of U.S. high school students who choose to enter college directly after graduation or those who choose to enter workforce training programs. Although the context within which these expectations are taught and assessed may differ, the level of expectation for all students must be the same. Anything less will not provide a foundation of academic skills sufficient for workers to learn additional skills to meet new requirements as their jobs change or as they change jobs throughout their careers. The results of this study allow us to move the high school redesign

agenda forward in a direction that will prepare *all* students for success no matter which path they choose.

This research brief summarizes the study conducted by ACT to investigate the relationship between college readiness and workforce training readiness.

## What Is the Expectation for Workforce Training Readiness?

The first question to be answered was how to define workforce readiness. To examine this question, we referred to the Occupational Information Network (O\*NET). The Occupational Information Network (O\*NET) is a comprehensive national database of job and worker attributes developed for the Employment and Training Administration of the U.S. Department of Labor. O\*NET classifies jobs using five zones, each of which is defined by particular education, training, and experiential requirements.

We focused on Job Zone 3 because the occupations in this zone are likely to offer a livable wage sufficient to support a small family<sup>1</sup> and provide the potential for career advancement. The occupations contained in O\*NET Zone 3 may require some combination of vocational training and/or on-the-job experience, or an associate's or higher degree (*O\*NET OnLine Help*, n.d.). Examples include electricians, ship carpenters, construction workers, upholsterers, and plumbers. Zone 3 is the highest O\*NET level that includes jobs that do not require a bachelor's degree, yet offer a livable wage and are projected to grow in number in the future (U.S. Department of Labor, 2004).

By selecting O\*NET Zone 3, we are essentially defining workforce readiness as workforce *training* readiness, since Zone 3 jobs require high school graduates to have the foundational skills necessary on which to build additional, job-specific skills not only after high school, but throughout their careers.

What are the minimum standards that high school graduates need to enter Zone 3 occupations? Using job profiles from ACT's WorkKeys program (see sidebar), expert ratings, and O\*NET occupational data that identify the minimum level of knowledge and skills to enter each of these occupations, we were able to compute a composite job profile that defines the reading and mathematics skills needed for students to be ready to enter the vast majority—90 percent—of the profiled Zone 3 occupations after high school.<sup>2</sup> On a WorkKeys scale that reports scores for Reading for Information and Applied Mathematics ranging from Level 3 to Level 7, this level of knowledge and skills was profiled at a Level 5 for *both* reading and mathematics. The expectations represented by these levels are described next.

## Do College Readiness and Workforce Training Readiness Represent a Common Expectation?

With the workforce training readiness for 90 percent of the profiled occupations that require training after high school now defined, we then examined whether the level of readiness for workforce training programs is the same as or different than the level of readiness needed for success in college.

### The WorkKeys® System

WorkKeys is a job skills assessment system measuring the “real-world” skills that employers believe are critical to job success. The skills are valuable for any occupation—skilled or professional—and at any level of education. WorkKeys is used by businesses, workforce development groups, and schools to find, hire, train, and retain qualified employees.

Components include:

#### Job Analysis (Profiling)

Identify the skill requirements and WorkKeys skill levels an individual must have to perform successfully. The WorkKeys job profile database currently includes profiles for more than 12,000 jobs across all industry verticals.

#### WorkKeys Assessments

Measure the current skills of individuals in nine key areas. WorkKeys tests in Reading for Information and Applied Mathematics were used for the present study.

#### Training

Improve skills making individuals more employable and business more competitive through a better trained workforce.

### *Commonalities: Readiness Levels*

Because WorkKeys and the ACT are measures of workforce and college readiness, respectively, we based our analysis on WorkKeys and ACT scores from a statewide sample of high school eleventh-grade students over a four-year period. We conducted a statistical concordance between the respective college and workforce training readiness levels in reading and mathematics from both programs.<sup>3</sup> The concordance between WorkKeys Level 5 and the ACT College Readiness Benchmarks<sup>4</sup> shows that the levels of readiness in reading and mathematics are comparable. Therefore, it is reasonable to conclude that the expectations of students who choose to enter workforce training programs for jobs that are likely to offer a livable wage and potential career advancement should be no different from the expectations of students who choose to enter college after high school graduation. See Table 1 for a summary of the comparability analysis.

**Table 1**  
**Comparability between WorkKeys Job Profile Level 5 and ACT College Readiness Benchmarks in Reading and Mathematics<sup>5</sup>**

WorkKeys Test	WorkKeys Readiness Level	Comparable ACT Score Range and College Readiness Benchmark
Reading for Information	5	19–23 Benchmark = 21
Applied Mathematics	5	18–21 Benchmark = 22

### *Commonalities: Skills*

The practical implication of this analysis is that we now have empirical evidence supporting the contention that college and workforce training readiness expectations in reading and mathematics are comparable. The empirical comparability between college readiness and workforce training readiness is further supported by the similarities seen in the skills defined for workforce and college readiness, as shown in Tables 2 (reading) and 3 (mathematics). Each table contains all of the ACT College Readiness Standards in the 20–23 range (the score range that contains the College Readiness Benchmarks for Reading and Mathematics) and all of the WorkKeys skills at Level 5. Because WorkKeys and the ACT reflect what businesses and colleges expect of their entering workers and students, respectively, they have uniquenesses in what they measure and in the scores they report. However, there are commonalities in the expectations for readiness in the two tests, as shown by the skill groupings in these tables.

#### **WorkKeys Level Scores**

Developed with input from employers, labor organizations, educators, and policymakers, the WorkKeys tests are criterion-referenced tests anchored to the skills needed for workforce readiness in nine areas.

Jobs are profiled using the same levels to assess individuals' workforce readiness skills. In this way, an individual's readiness for a particular job can be compared to the requirements of the job, as defined through the job profiling process. In this study, the level of knowledge and skills considered to represent work readiness was profiled at a Level 5 for both reading and mathematics.



In addition, Level 5 WorkKeys Applied Mathematics and Reading for Information scores are often used in state and community workforce readiness certificate programs across the nation that are used to qualify prospective worker readiness for a majority of jobs in a particular locale.

**Table 2**  
**Reading Skills for College and Workforce Training Readiness**

Skill Group	ACT Reading Test College Readiness Standards (20-23 Range)	WorkKeys Reading for Information Test Skills (Level 5)
<b>Main Ideas and Supporting Details</b>	<p>Infer the main idea or purpose of straightforward paragraphs</p> <p>Understand the overall approach taken in a passage (e.g., point of view, kinds of evidence used)</p> <p>Locate important details</p> <p>Make simple inferences about how details are used in a passage</p>	<p>Understand main ideas, topic sentences, and the relationships among sentences in a paragraph</p> <p>Correctly use technical terms when describing the main idea and supporting details in a passage</p> <p>Recognize organizational structures of passages to identify pertinent details and recognize appropriate applications</p> <p>Select important details to clarify meaning</p>
<b>Sequential, Comparative, and Cause-Effect Relationships</b>	<p>Order simple sequences of events</p> <p>Identify clear relationships between people, ideas, and events</p> <p>Identify clear cause-effect relationships</p>	<p>Apply straightforward instructions to new situations</p> <p>Apply complex instructions that include conditionals to situations described in a passage</p>
<b>Meaning of Words</b>	<p>Use context to determine the appropriate meaning of some figurative and nonfigurative words, phrases, and statements</p>	<p>Figure out the correct meaning of a word based on how the word is used</p> <p>Understand the definitions of acronyms defined in a passage</p> <p>Identify the appropriate definition of words with multiple meanings based on context</p>
<b>Generalizations and Conclusions</b>	<p>Draw generalizations and conclusions about people, ideas, and events</p> <p>Draw simple generalizations and conclusions using details that support the main point of a passage</p>	<p>Apply technical terms to stated situations</p> <p>Apply given information to new situations</p>

**Table 3**  
**Mathematics Skills for College and Workforce Training Readiness**

Skill Group	ACT Mathematics Test College Readiness Standards (20-23 Range)	WorkKeys Applied Mathematics Test Skills (Level 5)
<b>Algebra and Algebraic Thinking</b>	<p>Solve routine two-step or three-step arithmetic problems involving concepts such as rate and proportion, tax added, percentage off, and computing with a given average</p> <p>Exhibit knowledge of elementary number concepts including rounding, the ordering of decimals, pattern identification, absolute value, primes, and greatest common factor</p>	<p>Solve problems that include a considerable amount of extraneous information</p> <p>Calculate using several steps of logic</p> <p>Perform single-step conversions within or between systems of measurement</p> <p>Look up and use a single formula</p> <p>Calculate using mixed units (e.g., 3.5 hours and 4 hours 30 minutes)</p>

Skill Group	ACT Mathematics Test College Readiness Standards (20-23 Range)	WorkKeys Applied Mathematics Test Skills (Level 5)
<p style="text-align: center;"><b>Algebra and Algebraic Thinking (cont'd.)</b></p>	<p>Evaluate algebraic expressions by substituting integers for unknown quantities</p> <p>Add and subtract simple algebraic expressions</p> <p>Solve routine first-degree equations</p> <p>Perform straightforward word-to-symbol translations</p> <p>Multiply two binomials</p> <p>Evaluate quadratic functions, expressed in function notation, at integer values</p>	<p>Find the best deal using one-and two-step calculations and then comparing results</p> <p>Calculate percentages, percentage discounts, or percentage markups</p> <p>Divide negative numbers</p> <p>Decide what information, calculations, or unit conversions to use to solve the problem</p> <p>Use exponents, including exponents in fractions and formulas</p>
<p style="text-align: center;"><b>Geometry and Geometric Thinking</b></p>	<p>Compute the area and perimeter of triangles and rectangles in simple problems</p> <p>Use geometric formulas when all necessary information is given</p> <p>Locate points in the coordinate plane</p> <p>Comprehend the concept of length on the number line</p> <p>Exhibit knowledge of slope</p> <p>Find the measure of an angle using properties of parallel lines</p> <p>Exhibit knowledge of basic angle properties and special sums of angle measures (e.g., 90°, 180°, and 360°)</p>	<p>Solve geometric problems that include a considerable amount of extraneous information</p> <p>Calculate using several steps of logic</p> <p>Calculate perimeters and areas of basic shapes (rectangles and circles)</p> <p>Look up and use a single formula</p> <p>Decide what information, calculations, or unit conversions to use to solve the problem</p>
<p style="text-align: center;"><b>Data Representation and Statistical Thinking</b></p>	<p>Calculate the missing data value, given the average and all data values but one</p> <p>Translate from one representation of data to another (e.g., a bar graph to a circle graph)</p> <p>Determine the probability of a simple event</p> <p>Exhibit knowledge of simple counting techniques</p>	<p>Averaging of hours and minutes or other mixed units in one system</p> <p>Solve problems that include a considerable amount of extraneous information</p> <p>Calculate using several steps of logic sometimes involving graphs, charts, or tables</p>

***Commonalities: Sample Test Questions***

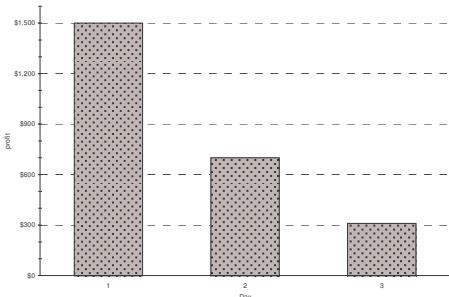
Further parallels in the levels of college and workforce training readiness can be seen in the test questions used to assess the skills measured in the two tests. Following are several pairs of questions. The first pair (Table 4) contains examples from the ACT Reading Test and the WorkKeys Reading for Information Test. Although the contexts of the passages are unique—the ACT passage is a prose selection and the WorkKeys passage is a workplace communication—the underlying reading skills being measured by the sample questions are similar.

**Table 4**  
**Comparison of College and Workforce Training Readiness:**  
**Reading Test Questions**

ACT Reading 20-23 Range [Order simple sequences of events]	WorkKeys Reading for Information Level 5 [Apply straightforward instructions to new situations]
<p><i>Excerpt from passage*:</i></p> <p>Mr. Brook had come home early and lighted a fire in the little grate in his sitting room. He felt comfortable and at peace that evening. He sat before the fire in his stocking feet, with a volume of William Blake on the table by his side, and he had poured himself a halfglass of apricot brandy. At ten o'clock he was drowsing cozily before the fire, his mind full of cloudy phrases of Mahler and floating half-thoughts. . . . He had been walking across the campus that afternoon when Madame Zilensky stopped him and began some preposterous rigmarole, to which he had only halflistened: he was thinking about the stack of canons turned in by his counterpoint class. Now the words, the inflections of her voice, came back to him with insidious exactitude. Madame Zilensky had started off with the following remark: "One day, when I was standing in front of a <i>pâtisserie</i> (pastry shop), the King of Finland came by in a sled."</p> <p>Mr. Brook jerked himself up straight in his chair and put down his glass of brandy. The woman was a pathological liar. Almost every word she uttered outside of class was an untruth. . . .</p> <p>Mr. Brook finished off the rest of his brandy. And slowly, when it was almost midnight, a further understanding came to him. The reason for the lies of Madame Zilensky was painful and plain. All her life long Madame Zilensky had worked—at the piano, teaching, and writing those beautiful and immense twelve symphonies. Day and night she had drudged and struggled and thrown her soul into her work, and there was not much of her left over for anything else. Being human, she suffered from this lack and did what she could to make up for it. . . . Through the lies, she lived vicariously. The lies doubled the little of her existence that was left over from work and augmented the little rag end of her personal life.</p> <p><i>Question:</i></p> <p>The <i>first</i> insight about Madame Zilensky that came to Mr. Brook during his cozy evening was that she was a great:</p> <p>A. composer.  B. teacher.  C. performer.  <u>D. liar.</u></p> <p><small>* Adapted from Carson McCullers, "Madame Zilensky and the King of Finland." ©1955 by Carson McCullers.</small></p>	<p><i>Passage:</i></p> <p><b>MEMO</b>  <b>TO:</b> Publications Department Assistants  <b>FROM:</b> Publications Department Manager</p> <p>Thank you in advance for helping the editors proof the Valve Adjustment manual and documents associated with the new line of valves. The following instructions are for proofing the manuscript copy of the manual scheduled for the beginning of next week. Additional instructions will be provided when the preliminary copy with typefaces, graphics, copy placement, and headings is proofed.</p> <p><b>Team Proofing Stage</b>  You will be paired with another proofer, the <i>reader</i>, and you will be issued two versions of the same section. One version is the marked-up copy, which contains modifications in handwritten red ink. The reader will read aloud each word, punctuation mark, and number on the marked-up section.</p> <p>The other copy is the new version, and it should incorporate all edits from the marked-up version. The proofer must mark in red ink any missed edits and any additional modifications. Most likely further corrections will be needed.</p> <p><b>Single Proofing Stage</b>  After the corrections have been made and checked from the team proofing stage, you should do a single proof on the new copy. Mark corrections in red ink. Continue to repeat this process until the materials are error free.</p> <p>During your single proof, read every word aloud. In this way you will both see and hear the copy, which will enable you to better detect a missing word or number.</p> <p><i>Reminder:</i>  Spell-check programs have reduced misspellings considerably, but you should be aware of specialized terms that the computer's dictionary does not know.</p> <p>Once the manual is ready to print, I will need you to follow the same instructions to proof the technical specification sheets for each valve type. If you have any questions, please speak to me or to one of the editors.</p> <p><i>Question:</i>  You are an assistant. According to the memo shown, during the team proofing stage, what is the next step after you mark any needed modifications?</p> <p><u>A. Further clerical corrections will be made.</u>  B. The proofing stages will reveal no further corrections.  C. The proofing time on the project will be reduced.  D. The editors will meet the printer deadline.</p>

The commonalities in mathematics skills can also be illustrated by sample questions from the ACT Mathematics Test and the WorkKeys Applied Mathematics Test. Two pairs of questions are shown in Table 5. While the questions present problems in different contexts, the underlying mathematics skills each pair requires for their solutions are similar.

**Table 5**  
**Comparison of College and Workforce Training Readiness:**  
**Mathematics Test Questions**

ACT Mathematics 20-23 Range [Evaluate algebraic expressions by substituting integers for unknown quantities; solve routine first-degree equations]	WorkKeys Applied Mathematics Level 5 [Look up and use a single formula; perform single-step conversions within or between systems of measurement]
<p>The number of bricks, <math>B</math>, needed to build a wall of uniform length <math>L</math> feet and uniform height <math>H</math> feet can be found by the equation <math>B = 7LH</math>. A wall of uniform height that is 20 feet long is constructed using 350 bricks. What is the height, in feet, of the wall?</p> <p>A. 1.75  <u>B. 2.5</u>            C. 17.5            D. 50</p>	<p>A refrigeration system at your company uses temperature sensors fixed to read Celsius (<math>^{\circ}\text{C}</math>) values, but the system operators in your control room understand only the Fahrenheit scale. You have been asked to make a Fahrenheit (<math>^{\circ}\text{F}</math>) label for the high temperature alarm, which is set to ring whenever the system temperature rises above <math>-10^{\circ}\text{C}</math>. What Fahrenheit value should you write on the label?</p> <p>A. <math>-23^{\circ}\text{F}</math>            B. <math>-18^{\circ}\text{F}</math>  <u>C. <math>14^{\circ}\text{F}</math></u>            D. <math>26^{\circ}\text{F}</math></p>
[Solve routine two-step or three-step arithmetic problems involving concepts such as rate and proportion, tax added, percentage off, and computing with a given average]	[Calculate percentages, percentage discounts, or percentage markups]
<p>The Sunrise Preschool held its annual book fair for 3 days. The total profit for the 3 days was \$2,525. The profit, in dollars, is shown for each of the 3 days in the bar graph below.</p>  <p>Approximately what percent of the book fair's profit over the 3 days did the preschool make on Day 1 ?</p> <p>A. 25%  <u>B. 33%</u>            C. 50%            D. 60%</p>	<p>As a dietitian, you help clients manage their sugar intake. A popular fruit drink contains a total of 28 grams of carbohydrates. Of that total, 19 grams are sugar. About what percent of the total carbohydrates is the sugar?</p> <p>A. 7%            B. 9%            C. 15%  <u>D. 68%</u></p>

## Summary

This study provides empirical evidence that the levels of readiness that high school graduates need to be prepared for college and for workforce training programs are comparable. These empirical results are also supported by commonalities seen in the types of knowledge and skills students need to be ready for college and workforce training programs, even though these skills are taught and assessed in different contexts. All of these skills can be acquired through rigorous high school courses, regardless of the context (academic or career focused) within which they are taught. The results of this study underscore the importance of having a common expectation for all students when they graduate from high school: one that prepares *all* high school graduates for both credit-bearing college-entry courses and workforce training programs associated

with jobs that are likely to offer a livable wage and the potential for career advancement.

It is important to guarantee every student the opportunity to live a meaningful and productive life, one that is predicated on having a sound foundation of knowledge and skills so that they can enter college or workforce training programs ready to learn. Giving every high school graduate the opportunity to live a meaningful and productive life with a livable wage is not only a cornerstone of our society, but is also critical for us as a nation if we are to be competitive in today's global economy.

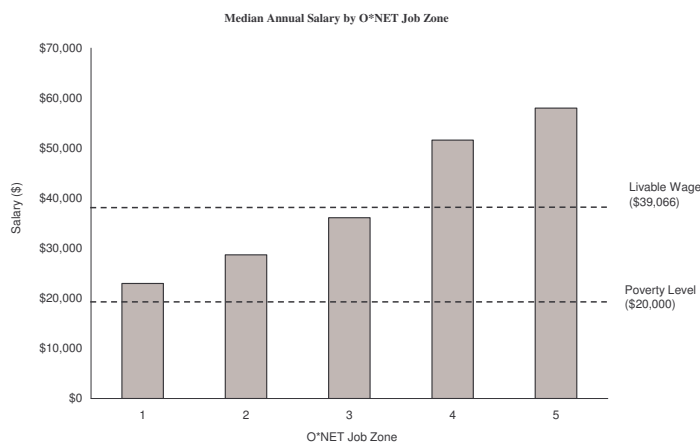
## **Action Steps for Policymakers**

Following are recommended action steps that state policymakers can take toward achieving a common expectation of college and workforce training readiness for *all* students:

- Use the common expectation to establish a statewide commitment that all students will be prepared for college and workforce training programs when they graduate from high school.
- Hold schools and states accountable for preparing all students for college and workforce training through rigorous core courses.
- Ensure that state standards reflect the skills needed for college and workforce training readiness for all students.
- Include measures of foundational college and workforce training readiness skills within statewide assessments.
- Begin measuring student progress with aligned assessments as early as the eighth grade to monitor, intervene, and maximize the number of high school graduates who are ready for college and workforce training.
- Use the common expectation of college and workforce training readiness as a prerequisite for entry into funded training or development programs (e.g., incumbent worker training) and offer remediation for those who do not meet these expectations.
- Communicate the common expectation of college and workplace training readiness to all stakeholders, including businesses, workforce and economic development associations, and educational institutions.

## Notes

<sup>1</sup> Comparison of median wages for O\*NET job zones were based on the following chart (O\*NET Consortium - Production Database, n.d.):



Livable wage based on median recommended budget for a family of 4 (two parents two children) averaged across 2,600 U.S. communities (Economic Policy Institute, 2005). Poverty level provided by U.S. Department of Health and Human Services (2006).

A livable wage is typically defined as the money needed to meet basic needs such as food, housing, utilities, clothing, child care, and health care plus a small allowance for personal expenses and savings.

<sup>2</sup> ACT's WorkKeys is a standardized job skills and assessment system that is used by businesses for employee selection and training. WorkKeys includes a job profiling/job analysis component used to identify the critical skills required to enter a job and perform it effectively. There are 120 O\*NET Zone 3 jobs for which ACT has a WorkKeys profile estimate based on either the WorkKeys job profile database or expert ratings. These jobs cover the vast majority of Zone 3 occupations. The WorkKeys profile estimates for these jobs were used to derive a composite profile for Zone 3 occupations.

<sup>3</sup> To determine how workforce training readiness compares to college readiness, we analyzed data from 476,847 high school juniors in Illinois who took the ACT, the WorkKeys Reading for Information Test, and the WorkKeys Applied Mathematics Test between 2001 and 2004. These tests are administered as part of the Illinois Prairie State Achievement Examination program, a statewide assessment administered annually to all eleventh-grade students. We statistically aligned the scores on the two WorkKeys Tests (which represent workforce training readiness) to the scores on the ACT Reading and Mathematics tests (which represent college readiness).

<sup>4</sup> ACT has defined college readiness empirically by establishing College Readiness Benchmarks. These Benchmarks represent the minimum ACT test scores required for students to have a high probability of success in corresponding credit-bearing first-year college courses. The ACT Benchmarks are based on course placement data from a nationally representative sample of postsecondary institutions. The Benchmarks reflect the ACT scores students need to earn to have at least a 75 percent or greater chance of obtaining a course grade of C or better. The College Readiness Benchmarks for Reading and Mathematics are:

Reading College Readiness Benchmark:	21
Mathematics College Readiness Benchmark:	22

<sup>5</sup> The statistical concordance reveals that the Level 5 score on the Reading for Information test corresponds to an ACT score range that includes the ACT College Readiness Benchmark for Reading as its midpoint; the Level 5 score on the Applied

Mathematics test corresponds to an ACT score range that is just one score point below the ACT College Readiness Benchmark for Mathematics. However, because WorkKeys and the ACT do not measure the same things and are not perfectly correlated, scores on the two tests are not interchangeable.

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