



COMPASS™

COMPASS Guide to Effective Student Placement and Retention in Mathematics

Setting the Right Course for College Success

ACT®

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Introduction

A recent survey* of educators at two-year public institutions nationwide identified the delivery of course placement services, academic advising, and learning support services as critical to helping students persist in their studies and to achieve academic success. Recognizing this need for strong course placement and advising support services, ACT developed the Computer-adaptive Placement Assessment and Support System (COMPASS) to assist with the delivery of these services.

COMPASS is a comprehensive, computer-adaptive testing program that quickly and accurately assesses students' skill levels in reading, writing skills, writing essay, mathematics, and ESL, provides the information you need to place them in appropriate courses, and connects them to the campus resources they need to achieve their academic goals.

For one low cost, the COMPASS mathematics test provides placement tests in up to five subject areas. In addition, the system includes fifteen (15) diagnostics tests covering key concepts in the areas of pre-algebra and algebra. Over 1,000 postsecondary institutions use COMPASS to help their students start their mathematics studies on a solid footing.

This document provides an overview of the COMPASS mathematics tests, along with suggestions on how to align COMPASS mathematics test scores with the prerequisites you have established for your mathematics courses, with the goal of ensuring that students are placed appropriately, increasing the likelihood they will persist in their studies. Suggestions are also provided regarding placement messages and using COMPASS to connect students with appropriate courses and additional mathematics resources on campus.

* What Works In Student Retention? – Two-Year Public Colleges

<http://www.act.org/path/postsec/droptables/pdf/TwoYearPublic.pdf>

COMPASS Mathematics Test Overview

The COMPASS Mathematics Test consists of five (5) placement domains and fifteen (15) diagnostics tests. Each test item is presented in a multiple-choice format that evaluates students' ability levels in terms of basic skills such as performing a sequence of basic operations, application skills such as applying sequences of basic operations to novel settings or in complex ways, and analysis skills such as demonstrating conceptual understanding of principles and relationships for mathematical operations.

Placement Tests - the COMPASS Mathematics Placement Test offers up to five subject areas:

- Pre-algebra
- Algebra
- College Algebra
- Geometry
- Trigonometry

Diagnostics Tests - the COMPASS Mathematics Diagnostics Test evaluates students' skill levels in up to 15 sub-areas in Pre-algebra and Algebra:

- Numerical Skills/Prealgebra Diagnostic Scores
 - Operations with Integers
 - Operations with Fractions
 - Operations with Decimals
 - Exponents, Square Roots, and Scientific Notation
 - Ratios and Proportions
 - Percentages
 - Averages (means, medians, and modes)
- Algebra Diagnostic Scores
 - Substituting Values
 - Setting Up Equations
 - Basic Operations with Polynomials
 - Factoring Polynomials
 - Linear Equations with One Variable
 - Exponents and Radicals
 - Rational Expressions
 - Linear Equations in Two Variables

With COMPASS, you can specify which content areas are to be included in a specific test package, and the “routing rules” which guide the adaptive nature of the test based upon student performance. The COMPASS software comes preloaded with standard test packages, and you can also build your own. This flexibility helps to ensure that your COMPASS math tests are appropriate to the mathematics courses at your institution.

Effective Placement in Math

The COMPASS Mathematics Test can quickly and accurately assess students' skill levels in mathematics. Once a student completes his or her COMPASS test, the COMPASS software will immediately provide his or her results in the form of a Student Advising Report. The Student Advising Report includes the student's score on each test area completed, and a course placement recommendation based on those scores. Typically course placement messages inform students which math course he or she should take, and how to register for it. The key to helping students achieve academic success is how to use their COMPASS scores to place them in the most appropriate mathematics courses.

Most institutions make placement decisions on the basis of cutoff scores. A cutoff score for a particular course is the *minimum* score a student needs to be adequately prepared to succeed in the course. ACT refers to the initial cutoff scores as "Stage 1" cutoff scores. The COMPASS software comes pre-loaded with "Stage 1" cutoff scores. Please see Table 1. These default cutoff scores are based on national data, and may or may not be appropriate for your institution. Ideally, your math faculty needs to align student proficiency levels, as indicated by their COMPASS scores, with the skill levels required for entering the various courses in your mathematics curriculum.

ACT recommends that you evaluate the effectiveness of your "Stage 1" cutoff scores after you have been able to collect data on students' success in particular courses, and use this information to establish more refined "Stage 2" cutoff scores. The analyses to provide the information needed for this "Stage II" cut score adjustment process may be accomplished by local college staff or they may be completed through use of the Course Placement Service available from ACT.

The "success rate" for a given course is the percentage of students placed into that course who received a grade of C or higher. If the success rate for a particular course is higher or lower than desired, you may consider adjusting the cutoff score accordingly. For example, if your department targeted a 60% success rate for the college algebra course (60% of enrolled students receive a C or higher grade), but the observed success rate was 48%, you may want to either raise the cutoff score or strongly recommend specific review or tutoring services to students at or slightly above the cut score being used. A follow-up study of the student success rate under the new cutoff score would be highly recommended.

Table One. COMPASS Default cutoff scores that are pre-loaded in the COMPASS software, with related values on the ACT Mathematics test.

ACT Math	COMPASS Scores	Course Recommendations
	PreAlgebra	
0-17	0-43	Arithmetic Review experiences
18-20	44-100	Elementary Algebra or courses with arithmetic prerequisite
	Algebra	
18-20	0-45	Elementary Algebra or courses with arithmetic prerequisite
21-22	46-65	Intermediate Algebra or courses with elementary algebra prerequisite
21-22	46-65	Intermediate Algebra or courses with elementary algebra prerequisite
23-25	66-100	College Algebra or courses with intermediate algebra prerequisite
	College Algebra	
23-25	0-45	College Algebra or courses with intermediate algebra prerequisite
26-27	46-100	Trigonometry or Business Calculus or courses with college algebra prerequisite
	Trigonometry	
26-27	0-45	Trigonometry or Business Calculus or courses with college algebra prerequisite
28-36	46-100	Calculus I or courses with college algebra and trigonometry prerequisites

Effective Retention in Math

Placing students in the proper courses is half the battle. The other half is to ensure they are aware of, and have access to, the academic and advising resources available on your campus. COMPASS can help in this regard as well.

Connecting Students to the Campus Resources

In addition to advising students what courses they should take and how to register, many math departments use the course placement messages to connect students to the campus resources they need to improve their chances for success. These messages can be customized based on students' scores.

If a student's COMPASS score falls just above a certain cutoff score (perhaps 5 to 10 score points), that student will be one of the weaker students in the course and at higher risk of failure. Messages tailored to this type of student's needs may include information about tutorial services, the location and hours of operation of the campus math lab, on-line courseware and resources, etc.

Better Advising through COMPASS Demographics

COMPASS can provide academic advisors with much more information than a single math score. The demographic section of COMPASS includes pre-formed and locally developed demographic items regarding the students' mathematics background and needs. This information can be used to advise individual students more effectively and to evaluate and enhance advising programs through COMPASS research reports.

- a. **Pre-formed Items** - individual student responses reported in the COMPASS Student Advising Report and summarized at the campus, state, and national level in the Entering Student Descriptive Report and the Returning Student Retention Report. Items particularly relevant to mathematics include the following:

Item 8 Type of High School Certificate (includes name of high school attended and year of graduation)

Item 11 Overall High School Grade Point Average

Item 12 Courses Completed and Grades Earned

Item 14 Career Goal

Item 16 Educational Program or Major

Item 22 Would Like Help with Study Skills and Math Skills

- b. **Local Items** - you may develop up to 40 local items at no additional cost. Individual student responses are reported on the COMPASS Student Advising Report and summarized at the campus level in the Entering Student Descriptive Report and Returning Student Retention Report. Due to the local nature of the items, no national response data is available. Suggestions for items related to mathematics include the following:

- Local Item 1: What is the last mathematics course you completed during high school (use local course names that area students will connect accurately to their high school mathematics courses)?
- Basic mathematics (fractions, decimals, %'s, etc)
 - Introductory Algebra
 - Intermediate Algebra
 - Advanced Senior Math or Trigonometry or higher
 - Not Sure
- Local Item 2: What is the last mathematics course you completed after high school (use local course names that area students will connect accurately to their high school mathematics courses)?
- Basic mathematics (fractions, decimals, %'s, etc)
 - Introductory Algebra
 - Intermediate Algebra
 - College Algebra, Trigonometry, or higher
 - Have not taken mathematics courses after high school
- Local Item 3: What is the final grade (approximately) you received in the last mathematics course you completed?
- A, A+, A-
 - B, B+, B-
 - C, C+, C-
 - D+ or lower
 - Other or Not Sure
- Local Item 4: How long ago did you complete your last mathematics course?
- One year ago or less
 - One to two years ago
 - Two to five years ago
 - Five or more years ago
- Local Item 5: For the areas that you have studied, how would you rate your mathematics skills at this time?
- Fairly strong, ready to go on in next course
 - Somewhat rusty, but could rebuild with help
 - Fairly weak, need help in rebuilding skills for next course
 - Not sure
- Local Item 6: If you were to participate in a math refresher experience, what type of approach would you prefer most?
- Work with a mathematics tutor at the college at my own speed
 - Work with computer software to review math skills at my own speed

- c. Take a complete course in a regular college classroom with a group of other students working on the same skills
- d. Some other approach
- e. Not sure

Local Item 7: CCC is considering the development and delivery of a “mathematics study skills” seminar for students (2 or 3 sessions of 2 hours each; no tuition charge, text book costs of \$xx). Would you be interested in participating?

Improving Student Performance in Math

The following suggestions may help create an overall context at your institution that is more conducive to successful course placement and retention in mathematics.

- a. Deliver all new student assessment services within a “success planning” approach, as an expression of the mission and service orientation of the college. As part of the invitation to participate in the Success Planning Services for New Students, provide new students with a leaflet introducing the student to the “Success Planning Services” of the college, including the testing process and services. Include examples of COMPASS test items (available on ACT web page at <http://www.act.org/compass/sample/index.html>) in the leaflet, with references to the mathematics advising and instructional support services provided by your college.
- b. In all communications to potential new students, actively recommend early involvement in the admissions and assessment process, to allow more time for best advising and support services, and more time for involvement in “skill brush-up” activities followed by retesting (with the aim of moving “rusty” students one course upward in the placement ladder when possible.)
- c. For students whose COMPASS scores fall somewhat below the cut score selected by the college as necessary to enter the next course (perhaps 8-10 score points), include a message on the COMPASS Student Score Report which notes this fact and describes what the student could do by way of skills “brush-up” followed by retesting, with the student’s new score level being used to make a revised course placement recommendation.
- d. Consider the use of the COMPASS Mathematics Diagnostics Test to point marginal students to the areas of weakness. Link the results of the diagnostics to the development of a study plan for the student (include references to local resources, such as PLATO, etc., and where they are available at your college).
- e. Consider delivering “pre-planning assessment” services to juniors in targeted area feeder high schools, with the objective of maximizing the quality of career and educational planning and related senior year course choice planning by the students as they plan for their senior year of high school. Also consider similar adult outreach services perhaps in a seminar approach at area businesses which include assessment and advising services. These approaches can deliver highly supportive student development information and experiences for the participants, with positive community service and student recruitment benefits for the college.

Math Program Evaluation with COMPASS Research Reports

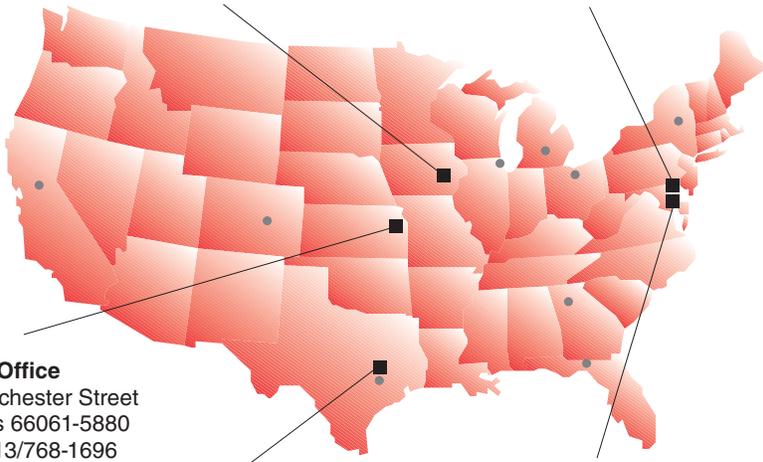
COMPASS offers a rich variety of research reports that you can use to evaluate and improve your mathematics course placement and advising.

- **Entering Student Descriptive Report** – describes the characteristics, needs, plans, and skills of students who initiate the "becoming a student" process; includes options for creating subgroup reports for groups of students of special interest
- **Returning Student Retention Report** – identifies the retention patterns occurring at the institution, and identifies the student characteristics that are related to those retention patterns, includes options for creating subgroup reports
- **Course Placement Service** – describes and evaluates the outcomes of course placement practices on campus, providing information to assist in the setting or fine-tuning of placement cutoff scores; also provides an option for developing placement cutoff score linkages between pairs of placement measures from different tests (COMPASS/ACT, COMPASS/ASSET, COMPASS/local instruments)
- **Under-prepared Student Follow-up Report** – identifies the success of under-prepared students in standard courses following their participation in preparation or development courses.

For more information on the COMPASS mathematics test, please visit our web site at www.act.org/compass or contact your regional COMPASS representative, as indicated on the back cover of this document.

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