



**Balanced
Assessment**
in Mathematics

Transforming Teaching and Learning

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Welcome, and thank you for coming.

We are proud to present to you the new Balanced Assessment in Mathematics program from CTB/McGraw-Hill.



Overview

- Why Is Balance Important?
- What Is Balanced Assessment?
- Who Designed CTB's New Program?
- Does Balanced Assessment Meet Today's Needs?
- What Benefits Does Balanced Assessment Offer?

Balanced Assessment in Mathematics, or BAM, is a dynamic new way to measure math skills. CTB developed the BAM program in cooperation with the internationally respected Mathematics Assessment Resource Service (MARS).

First, I will describe the Balanced Assessment in Mathematics program and talk about how it relates to recent developments in mathematics instruction.

I will also talk about the experts who worked with CTB to design the BAM program, and why their participation makes BAM the best mathematics assessment available.

I will review the key features of our new BAM program, such as scoring, reporting, standard-setting, and a new test each year.

Finally, I will share with you the unique benefits that BAM provides, and why it should be part of every mathematics assessment system.



Why Balanced Assessment?

- Standards-Based Reform Creates New Needs
- Progress Depends On:
 - Assessments matching curriculum goals
 - Students developing mathematical understanding
 - Instruction reflecting specific needs
- Quality Mathematics Assessment Can Help

Balanced Assessment in Mathematics is driven by recent developments in mathematics instruction.

School districts and states across the country are engaged in standards-based reform. They recognize that progress depends on an assessment program that:

- Matches new, broader curriculum goals;
- Focuses on students developing mathematical power; and
- Helps teachers identify the specific areas where students need further instruction.

The new CTB-MARS program provides the ultimate in assessment quality. Balanced Assessment in Mathematics can help schools meet today's goals.



What Is Balanced Assessment?

Quality Assessment Is Balanced in:

- Content—Important Mathematics Knowledge
- Process—Important Mathematics Skills
- Diverse Task Types
- Task Length



Balanced assessment is critical to ensure fairness, accurately identify student needs, and guide instruction to meet today's mathematics goals. Quality mathematics assessment provides balance in:

- **Mathematical content**—the assessment spans the major fields of mathematical study, including number operations, algebra, data analysis and probability, and geometry.
- **Mathematical processes**—the assessment samples key mathematical processes, including critical analysis and problem-solving skills.
- **Tasks**—including diverse problem-solving approaches, contexts, results, goals, and types of tasks.
- **Task length and response form** —task length varies from 5 to 15 minutes, and the assessment includes both working and written-response tasks.



Balanced Assessment's Designers Are

- Mathematics Assessment Resource Service (MARS)
 - Experts from the United States and England
 - Two decades of service and experience
- CTB-MARS Mathematics Board
 - Independent review and approval
 - Record of international success

CTB is proud to introduce an extraordinary professional partnership. To create the Balanced Assessment in Mathematics program, we formed an alliance with the Mathematics Assessment Resource Service, or MARS. MARS is a US-based international team that has an impeccable reputation in the mathematics community. MARS is highly regarded for both student assessment and professional development.

The CTB-MARS design team is uniquely qualified to create CTB's dynamic new assessment program. The main developers for the BAM program include:

- Dr. Hugh Burkhardt, University of Nottingham, Shell Centre for Mathematical Education, UK
- Dr. Philip Daro, University of California, Chancellors Office
- Dr. Jim Ridgway, Durham University, UK
- Dr. Alan Schoenfeld, University of California–Berkeley
- Dr. Sandra K. Wilcox, Michigan State University

MARS has been designing assessments for many years, and is supported by, among others, the National Science Foundation. The MARS group designs the assessments and the CTB-MARS Mathematics Board approves them. This process ensures assessments of the highest quality and instructional relevance.



Standards-Based Assessment

- Aligns with NCTM *Principles and Standards for School Mathematics*
- Advances School Reform
- Provides Accountability
- Parallels Mathematics Tests Worldwide

Balanced Assessment in Mathematics meets every need created by today's new standards and reporting requirements.

The CTB-MARS Mathematics Board aligned the Balanced Assessment in Mathematics program with the recently released NCTM *Principles and Standards for School Mathematics*.

The assessment reflects national standards, supports state standards, and can be tailored to meet specific local needs. This ensures the linkage of assessment, curriculum, and classroom instruction.

CTB's BAM program is an effective school reform tool. With Balanced Assessment in Mathematics, you can:

- Measure mathematics achievement against national and international standards.
- Build on an existing system to develop a comprehensive mathematics assessment.
- Track student, school, and district progress—and guide instruction to meet established goals.



Comprehensive Coverage

- The Only Annual Mathematics Assessment
- Eight Levels— Assesses Performance from Grades 3–10
- Consistent Progression from Grade to Grade
- Most Complete Program Available
- Fills Gaps in Three-Level Testing Programs

Balanced Assessment in Mathematics (BAM) measures student performance at eight levels. It is the only assessment that provides evidence of mathematics learning throughout the critical years from Grades 3 through 10.

CTB's new BAM program offers consistent coverage from grade to grade, with a smooth progression of skills in mathematics content and processes.

Balanced Assessment in Mathematics is the most complete program available today. Harcourt's New Standards Reference Mathematics Examination is intended to be used at only three levels—Grades 4, 8, and 10. CTB's new mathematics assessment can be used to complement the New Standards Reference Exam.



Structure for Student Learning

- Helps Teachers Address New Standards
- Guides Learning Over Time
- Provides Detailed Diagnostic Information
- Builds Understanding of Complex Mathematics
- Aids Balanced Representation of Skills

Because the BAM program aligns with the NCTM *Principles and Standards*, it offers an effective framework to help teachers structure mathematics instruction.

Balanced Assessment in Mathematics provides a dynamic balance of tasks, skills, and processes that guides student learning over time. The program goes beyond conventional one-shot testing to help schools meet new curriculum goals.

Because it is in-depth and ongoing, the assessment provides diagnostic information to help teachers identify and teach to student needs.

The tasks involve complex reasoning and are demanding. They typically require formulation, interpretation, evaluation, and communication.

As students move through the program from year to year, Balanced Assessment in Mathematics helps build their understanding of complex math content and processes. Over time, the assessment aids in development of balanced skills in mathematics content and problem-solving processes.



Support for Professional Development

Helps Teachers Build Professional Skills

- Training Aid for New Teachers
- Immediate Teaching Feedback
- Common Language for Assessment
- Practice Materials
- Information for Parent-Teacher Conferences

In addition to providing a structure for student learning, the assessment can help schools improve the effectiveness of mathematics instruction by building teachers' mathematics skills. The BAM program can improve teaching effectiveness by:

- Providing immediate feedback to help teachers address student and class areas of need;
- Establishing a common language for assessment among teachers and teaching teams;
- Offering practice tasks and activities to ensure consistent teaching of important skills;
- Recording tangible information for parent-teacher conferences; and
- Helping new teachers become familiar with today's demanding mathematics curriculum.



Key Features

- Secure Tests
- Practice Tests
- Annual Renewal
- All Constructed-Response
- Scoring and Reporting
- Professional Development

Baking Pies

This problem gives you the chance to:

- figure out how many pies need to be baked
- explain your thinking

Sixteen people are having a party at Sarita's house this weekend. Sarita will bake some pies for dessert. She wants to bake enough pies for each person to have two pieces. If she cuts each pie into eight pieces, how many pies does she need to bake?

Show or explain how you worked it out. You may find it helpful to use these diagrams. You may not need to use all of them.

I cut 4 pies into 8 pieces and figured out that she needs to bake 4 pies

Page 9 Baking Pies Grade 4 Item 4

Key features of Balanced Assessment include:

- A secure test. The test will be new each year and will remain secure for one year.
- Practice tests that emulate the secure tests, to familiarize students with the complex, constructed-response item testing format.
- Each year a new scoring guide will also be available to ensure that teachers score the tests accurately and reliably.
- Along with the scoring guides, CTB-MARS offers scoring training to promote reliability in scoring and support professional development.



Secure Tests

- Accurate Measure of Student Progress
- Grades 3–10
- Two Forms—A and B
- 40- or 80-minute Test (A, B, or A + B)
- Secure to Release Date

The secure test will be available in February and may be used any time during that year. Each year there will be a new test to rebalance the assessments. This will allow additional released items. The previous year's test will also be available for purchase as a practice test.

Balanced Assessment offers eight levels of assessments, with five tasks per test. There are two forms of the test, each designed for a 40-minute testing window. The difference is that Form B has short-answer questions on technical mathematics.

Either form of the test can be used alone, or both forms can be used to make an 80-minute test.



Practice Tests

- Classroom Tests
- Tools to Follow-up in Class
- Grades 3–10
- Two Forms—A and B
- 40- or 80-minute Test (A or A + B)

Practice tests can be used at the end of instruction for quality assignments that are tied to standards. This provides a framework to ensure that students are familiar with complex problems before they are assessed.

Like the secure tests, the practice tests are available in two forms, A and B. Form A can be used alone, for a 40-minute test, or with Form B, for an 80-minute test. Form B is not intended to be used alone.



Annual Renewal

- New Test Forms Every Year
- Paper or Electronic Format
- All New Content
- All New Scoring Guides
- Released Items for Practice Bank

There will be a new test each year. As with international tests, the design is for teachers and students to have discussions about complex mathematics. These tests will still be available in print and may be available in an electronic format; the practice test item bank may also be available in electronic format. These tests will provide additional items for curriculum and instruction.



Superior Assessment Quality

- Expert Test Development
- Balanced, Up-to-Date Content
- Standards-Based Models for Instruction
- Maximum Flexibility and Security
- Valid, Reliable Results

Balanced Assessment in Mathematics is the best mathematics performance assessment available today. The new CTB-MARS program was developed by leading experts, critiqued by teachers, and field-tested.

Balanced Assessment in Mathematics offers the most balanced, up-to-date content possible. The balance of the assessments changes to reflect educational developments and goals from year to year. After use, assessments are public, providing a choice of standards-based models for instruction.

Multiple test forms offer maximum testing flexibility to allow coverage of standards within local time constraints. Since a new test is developed each year, every assessment remains secure until the day of release.



Constructed-Response Tasks Measure

Understanding of Important Content

- Number and Operations
- Measurement
- Algebra
- Data Analysis and Probability
- Geometry



Balanced Assessment in Mathematics measures student performance in critical mathematics content domains, including:

- Number and operations
- Measurement
- Algebra
- Data analysis and probability; and
- Geometry



Constructed-Response Tasks Also Test

Mastery of Important Skills

- Problem-Solving
- Reasoning and Proof
- Representation
- Connections
- Communication

Glass
The problem gives you the chance to use geometry in a practical situation.

Olivia wants to put some new glass in a window in her apartment.
The glass is a rectangle, measuring 7 feet by 6 feet 8 inches.
The problem is that the door to her apartment is only 6 feet 4 inches high and 2 feet 6 inches wide.

Is it possible for Olivia to get the glass through the doorway?
Show clearly how you use geometry to find your answer.

If it is possible, if she puts the 7 ft side on the floor and slides the glass, it will fit. Since the hypotenuse of the right triangle formed by the door is more than the width of the short end of the glass.

$$2.5^2 + 4.67^2 = c^2$$

$$6.25 + 21.81 = c^2$$

$$28.06 = c^2$$

$$5.3 = c$$

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Balanced Assessment in Mathematics samples key phases in mathematical problem-solving, including:

- Modeling and formulating,
- Transforming and manipulating,
- Drawing conclusions,
- Checking and evaluating, and
- Reporting.

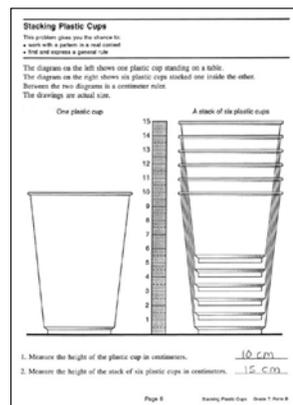
The assessment samples key *processes* of problem-solving, including:

- Reasoning and proof,
- Representation,
- Connections, and
- Communications.



Scoring

- Local Secure Scoring
- Scoring Guides
 - Easy-to-use CD-ROM format
 - Spans three grades
 - Student work for secure and practice tests
- Scoring Training
- CTB Scoring



Balanced Assessment in Mathematics is designed for local scoring, providing maximum security and control. Complete, task-specific scoring guides provide well-developed rubrics to ensure accurate scoring.

- Scoring Guides are available on one CD-ROM for the practice tests. The secure test Scoring Guides are available on three CD-ROMs.
- Each guide is divided into three grade spans—covering grade levels 3–6, 6–8, and 8–10.
- There are approximately 550 samples of student work on the practice tests. The secure guides have more than 2,400 samples of student work. The guides include everything needed to score the tasks accurately.

CTB provides scoring training to ensure that local districts have the capability to score the assessment accurately. We are looking into providing scoring at a later date.



Standard-Setting

- Four Performance Levels
- New Performance Levels Every Year
- Based on Holistic Judgments and Test Data
- Linked to National Standards
- Cut Scores Defined by Mathematics Board

Standards for the Balanced Assessment in Mathematics program will be set each year, using CTB's quality scoring guides and proven technical expertise.

The CTB-MARS board will set four performance levels for the assessment, using a holistic scoring method and statistical data. Cut scores will be set through a process similar to CTB's widely respected Bookmark standard-setting procedure, with final judgments from the Board.

Performance levels for the assessment will be linked to national performance standards, so local districts can compare their test results to national performance. This process ensures that Balanced Assessment in Mathematics will deliver defensible, high-quality results.



Reporting

- Task-by-Task Information
- Student, School, and District Tracking
- Local Spreadsheet or Database Systems
- TestMate Clarity® Solution
- MARS Custom Reporting Service
- CTB Reports Planned

Balanced Assessment in Mathematics reports provide a clear picture of student strengths and weaknesses. Task-by-task information documents student, school, and district progress over time. Scoring is compatible with most school data management systems. The CTB-MARS program is the only math assessment that supports detailed longitudinal tracking from Grade 3 through Grade 10.

TestMate Clarity® is an electronic data system that aggregates and disaggregates testing data for specific districts or schools. This solution offers a variety of customizable reports. It is hoped that by fall of 2001 CTB will offer a Clarity solution for reporting of Balanced Assessment in Mathematics results.

For those who choose not to manage their own testing data, MARS offers a custom service. For more information, contact Alan Sheinker at asheinker@ctb.com.



Opportunities for Professional Development

- Training
- Scoring Guides
- Student Work
- Regional Workshops
- CTB-MARS Consultation Available



Balanced Assessment in Mathematics provides many opportunities for training teachers and administrators in scoring and understanding standards. When teachers understand the objectives, they can incorporate these strategies into the curriculum. The result is improved teaching—and improved student learning.

The Scoring Guides provide excellent opportunities for professional development. Scoring training clarifies the interpretation of the rubric, and ensures that different scorers interpret it accurately. Training also ensures that all scorers understand the scoring procedures and documentation.

MARS and CTB provide comprehensive training in the scoring process. Professional development will be available from MARS and CTB trainers.

Anyone interested in training should contact Alan Sheinker.



Dynamic Standards-Based Math Assessment

The Only Assessment That Provides

- Yearly Information About Student Progress
- Yearly Structure for Instruction
- Internationally Renowned Contributors
- Consistent Reliability and Validity
- Complete Support for New Testing Requirements

Balanced Assessment in Mathematics is the only performance test that has so many features. No other assessment provides:

- The latest in standards-based content every year—the key to helping students understand the latest mathematics developments.
- Yearly evidence of students' mastery of complex mathematics content and problem-solving processes—enabling consistent longitudinal tracking and effective mathematics program design.
- A detailed structure for instruction that assists educators link curriculum, assessment, and learning—to meet specific student, class, and district needs.
- Reliable, valid results for every assessment.
- Complete compliance with new testing requirements—whether a primary assessment or as a supplement to an existing program.

Curriculum goals are changing, so are testing requirements and priorities. CTB's new Balanced Assessment in Mathematics program can help students meet new goals and help schools build effective mathematics programs—now and in the future.



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