Balanced Assessment in Mathematics

TRANSFORMING TEACHING AND LEARNING

CTB McGraw-Hill

Assessments that Focus Instruction

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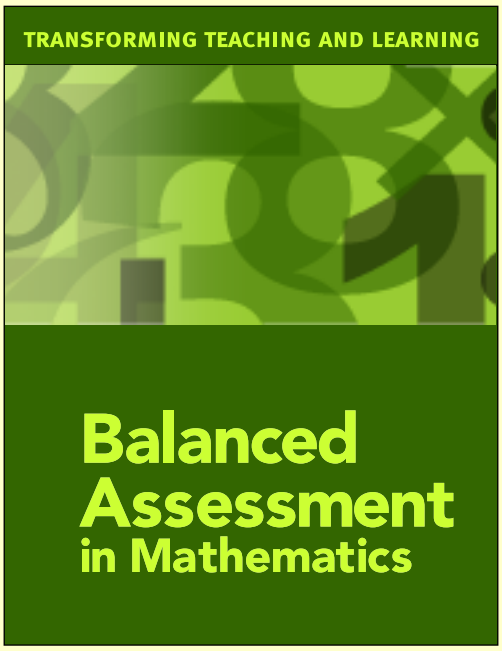

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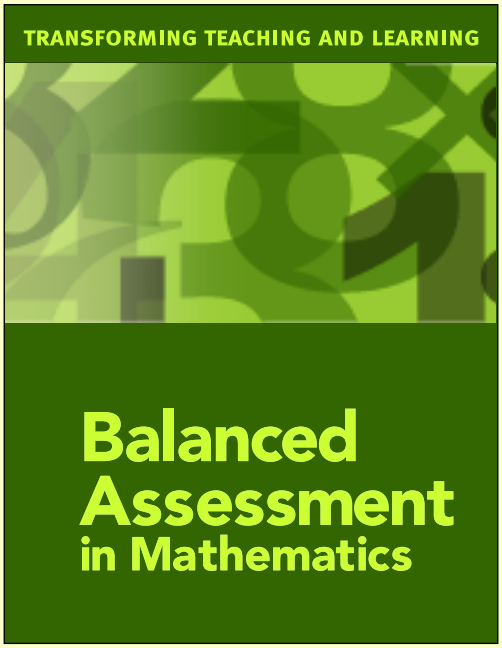

Sales Overview

Balanced Assessment in Mathematics gives teachers a powerful tool to transform learning and instruction. Balanced Assessment was developed in response to teachers' requests for performance tests that show evidence of how well students' grasp complex mathematics concepts.

With this insight, teachers can adapt instruction to match specific skill levels and understanding and more accurately target problem areas.

Balanced Assessment in Mathematics was designed by the prestigious Mathematics Assessment Resource Service (MARS) and approved by a Mathematics Board of international experts. Each year these experts establish new cut scores and approve the new test so you're ensured that material is always fresh and challenging.

CTB—Balanced Assessment in Mathematics

More About the Tests

Starting in 2001, CTB/McGraw-Hill will publish annually a new set of tests in Mathematics, designed by the Mathematics Assessment Resource Service, MARS. The Practice Tests and the 2001 Tests show something of the range and variety of the tasks that these tests will include.These tests are based on the style of assessment used in other countries and in many school districts throughout the United States. The emphasis is on assessing students' performance on worthwhile tasks involving substantial chains of reasoning and practical contexts.

Purpose

These tests are designed for the many school systems that are seeking to improve the teaching and learning of mathematics in their schools by introducing goals and curricula based on national and international standards. The broader range and greater depth of the tasks enables this assessment to recognize, and thus encourage, students' achievements in meeting these higher standards for mathematical performance.

The Tests

For each grade, currently 3 through 10, two alternative tests are offered. A 40-minute test, called Form A, is designed for systems where students will continue to be tested through traditional multiple-choice tests; introducing Form A will help to achieve a better balance in the total assessment. (Form B may be preferred by some for this purpose.) The 80-minute test consists of Form A and Form B, each taking 40 minutes; it is designed to offer a well-balanced assessment for each grade.

Design

This assessment is designed by MARS, under the direction of a Mathematics Board that includes teachers and recognized U.S. and international experts in mathematics education and assessment. MARS is a U.S.-based international team that designs assessments for client states and school districts across the country; the new tests build on this experience, and will continue to do so. MARS also provides support for associated professional development, for and through balanced performance assessment. Its work is supported by, among others, the National Science Foundation. Further information about MARS can be found at its Web sites: www.educ.msu.edu/MARS and www.balancedassessment.com.

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Annual Renewal

New test forms will be published each year, with a release date before which they will be held secure. Client states and districts will make their own decisions on the "time window" within which their students will take the tests. The Practice Tests will be useful in preparing students for the annual tests. Since every year's tests will be different, teachers will be able to review and discuss the test tasks with their students after the tests have been administered; the tasks are designed so that this will be a high-quality learning activity.

Scoring

The tests are designed for local scoring. This scoring guide includes all the materials for scoring the 2001 Tests for Grades 3 through 10. Hands-on scoring training for system leadership and/or each system's scoring teams is designed by MARS and offered through CTB; it is designed to facilitate consistent and accurate scoring. Linkage to national standards is provided through the suggested cut scores that come from the annual standard-setting procedure.

Professional Development

As well as enabling systems to achieve reliable scoring, scoring training activities provide valuable and enjoyable professional development for teachers and others involved. Discussing student work on substantial mathematical problems highlights the major issues—of what mathematics is, of curriculum, and of instruction—in a down-to-earth, practical way that teachers (and, through them, their students) readily understand. Thus the scoring training activities contribute broadly and fundamentally to system improvement. Scoring training forms part of a broader range of professional development support available from MARS and CTB. Further detail on professional development support is available at www.educ.msu.edu/MARS.

Standard Setting

Cut scores for the four-level reporting scheme are set each year by the Mathematics Board. Holistic professional judgment on samples of student work around each provisional cut score between levels of performance is informed both by the description of standards and content, and by qualitative and statistical information on student performance. The standard setting for the various tests (Forms A, B, or A & B) will be linked.

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Reporting

CTB and MARS also offer, to systems that choose to follow these procedures, an independent report on their students' performance, linked to these standards. These reports, based on student scores and other data that the system provides to MARS and CTB, go beyond the statistics to outline the strengths and weaknesses of student performance that the assessment has revealed. If the system chooses to return the work to students, these reports provide valuable complementary information for students, teachers, and parents.

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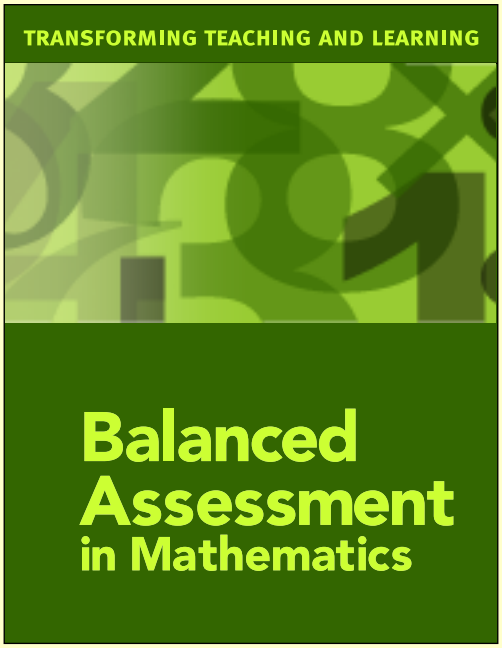

> **PowerPoint Presentation**

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Mary Bouck
371 East Main Street
Farwell , MI 48622
Phone: 989/588-9917
Fax: 989/588-6440
MBOUCK@mail.battle-creek.k12.mi.us

Diane Briars
Division of Instructional Support
Pittsburgh Public Schools
1501 Bedford Avenue
Pittsburgh, PA 15219-3695
Phone: 412-338-8052/8036
Fax: 338-8149
dbriars1@pghboe.net

Hugh Burkhardt
Co-Chairman
MARS
Michigan State University
Erickson Hall Rm 513
East Lansing, MI 48824
Phone: 011-44-115-951-4411
Fax: 951-4413
Hugh.Burkhardt@nottingham.ac.uk

David Foster
Co-Chairman
Robert N. Noyce Foundation
17485 Monterey Road, Suite 301
Morgan Hill, CA 95037
Phone: 408/776-1645
Fax: 408/778-3246
dfoster@cams.edu

Joan Mahon-Powell
Deputy to the Chancellors for BOE/CUNY Collaborations
353 Adelphi Street
Brooklyn, NY 11238
Phone: 718/935-2245|
Fax: 718/935-2692 or 718/935-2786
JEMahon@nycboe.net

Bill Randall
8505 E. Temple Dr. #445
Denver, CO 80237
Phone: 303/721-7556 or 303/619-5493
wbrcorp@aol.com

Barbara Reys
University of Missouri at Columbia
Department of Middle and Secondary Education
303 Townsend Hall
Columbia, MO 65211
Phone: 573/882-8774
reysb@missouri.edu

Diane Schaefer
Office of Instruction
Rhode Island Department of Education
255 Westminster Street
Providence, RI 02903
Phone: 401/222-4600 Ext. 2138
Fax: 401/222-6033
schaefer@ride.ri.net

Alan Schoenfeld
Elizabeth and Edward Conner Professor of Education
Education, EMST, Tolman Hall #1670
University of California
Berkeley, CA 94720-1670
Phone: 510/642-0968
Fax: 510/642-3769
alans@socrates.berkeley.edu

Philip Daro (Associate Member)
Executive Director
University of California
Office of the President
300 Lakeside Drive, 7th floor
Oakland, CA 94612
Phone: 510/987 9508
Phil.Daro@ucop.edu

Professor Edward Silver (Associate Member)
LRDC
University of Pittsburgh
3939 O'Hara St.
Pittsburgh, PA 15
Phone: 412/833 7344
EAS@vms.cis.pitt.edu

Alan Sheinker
CTB McGraw-Hill
1001 Forest Avenue
Pacific Grove, CA 93950
Phone: 831/393-7691
asheinker@ctb.com

Betsy Taleporos
CTB/McGraw-Hill
333 East 23rd Street
New York, NY 10010
Phone: 212/251-0770
btaleporos@ctb.com

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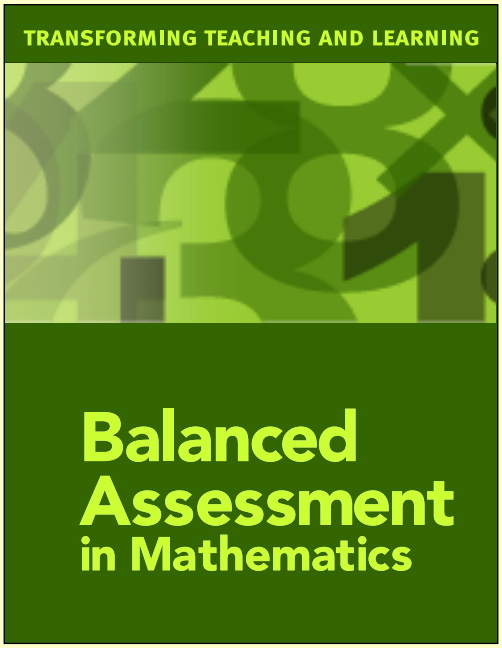

Standards

The standards for the Balanced Assessment tests are based on the Principles and Standards for School Mathematics, developed by the National Council of Teachers of Mathematics (NCTM). Most state and local standards are broadly similar to these, though not all explicitly cover the essential process as well as content aspects of doing mathematics.

CTB/McGraw-Hill publishes two forms of the assessment per grade each year—practice and secure tests. This ensures new content and enables users to offer the tests alone or with existing programs. The forms provide maximum flexibility to cover standards within realistic time constraints. The following are examples of how the assessment's tasks align with NCTM content and process standards.

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These tests will assume that students have been introduced to the following:

Grade 3

Number and Operations

Understand numbers, ways of representing numbers, relationships among numbers, and number systems;

- develop a sense of whole numbers, and represent and use them in flexible ways, including relating, composing, and decomposing numbers;
- develop understanding of the relative magnitude of whole numbers, and make connections among ordinal numbers, cardinal numbers, and the relative positions of numbers in a counting sequence;
- understand the place-value structure of the base-ten number system, including being able to represent and compare whole numbers and decimals;
- connect number words and numerals to the quantities they represent, using various physical models and representations;
- recognize equivalent representations for the same number, and generate them by decomposing and composing numbers;
- develop an understanding of fractions as parts of unit wholes, and as parts of a collection.

Understand the meanings of operations and how they relate to each other

- understand different meanings of addition and subtraction of whole numbers and the relationship between the two operations;
- understand the effects of adding and subtracting whole numbers;
- understand situations that entail multiplication and division, such as equal groupings of objects and sharing equally;
- understand the various meanings of multiplication;
- understand the effects of multiplying and dividing whole numbers.

Compute fluently and make reasonable estimates

- develop fluency in adding and subtracting whole numbers;
- develop and use strategies to estimate and judge the reasonableness of such results;

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- use a variety of methods and tools to compute, including objects, mental computation, estimation, paper and pencil, and calculators.

Algebra

Understand patterns, relations, and functions

- describe, extend, and make generalizations about geometric and numeric patterns;
- represent and analyze patterns and functions, using words, tables, and graphs.

Represent and analyze mathematical situations and structures, using algebraic symbols

- illustrate general principles and properties of operations, such as commutativity, using specific numbers;
- use concrete, pictorial, and verbal representations to develop an understanding of invented and conventional symbolic notations.

Use mathematical models to represent and understand quantitative relationships

- model problem situations with objects, and use representations such as graphs and tables to draw conclusions.

Analyze change in various contexts

- describe qualitative change, such as students growing taller;
- describe quantitative change, such as a student's growing two inches in one year.

Geometry

Analyze characteristics and properties of two- and three-dimensional geometric shapes, and develop mathematical arguments about geometric relationships

- recognize, name, build, draw, compare, and sort two- and three-dimensional shapes;
- describe attributes and parts of two- and three-dimensional shapes;
- investigate and predict the results of putting together and taking apart two- and three-dimensional shapes;
- identify and compare attributes of two-dimensional shapes, and develop vocabulary to describe the attributes;
- classify two-dimensional shapes according to their properties, and develop definitions of classes of shapes such as triangles.

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- Specify location and describe spatial relationships using coordinate geometry and other representational systems
- describe, name, and interpret direction and distance in navigating space, and apply ideas about direction and distance;
- find and name locations with simple relationships such as near to and in coordinate systems such as maps;
- describe location and movement using common language and geometric vocabulary.
- Apply transformations and use symmetry to analyze mathematical situations
- recognize and apply slides, flips, and turns;
- recognize and create shapes that have symmetry;
- identify and describe line symmetry in two-dimensional shapes and designs.
- Use visualization, spatial reasoning, and geometric modeling to solve problems
- create mental images of geometric shapes using spatial memory and spatial visualization;
- build and draw geometric objects;
- create and describe mental images of objects, patterns, and paths;
- use geometric models to solve problems in other areas of mathematics such as number and measurement;
- recognize geometric ideas and relationships, and apply them to other disciplines and to problems that arise in the classroom or in everyday life.

Measurement

Understand measurable attributes of objects, and the units, systems, and processes of measurement

- compare and order objects according to these attributes;
- understand how to measure using nonstandard and standard units;
- understand such attributes as length and weight, and select the appropriate type of unit for measuring each attribute;
- understand the need for measuring with standard units, and become familiar with standard units in the customary system.
- Apply appropriate techniques, tools, and formulas to determine measurements
- use repetition of a single unit to measure something larger than the unit, for instance, measure the length of a room with a single meterstick;

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- develop common referents for measures in order to make comparisons and estimates;
- develop strategies for estimating the perimeters and areas of irregular shapes;
- select and apply appropriate standard units and tools in order to measure length, weight, time, and temperature.

Data Analysis and Probability

Formulate questions that can be addressed with data, and collect, organize, and display relevant data to answer them

- pose questions, and gather data about themselves and their surroundings;
- represent data using concrete objects, pictures, and graphs;
- .design investigations to address a question;
- collect data using observations, surveys, and experiments;
- represent data using tables and graphs such as bar graphs.

Select and use appropriate statistical methods to analyze data

- describe parts of the data and the set of data as a whole to determine what the data show about the questions;
- describe the shape and important features of a set of data.

Develop and evaluate inferences and predictions based on data

- propose and justify conclusions and predictions that are based on data.

Understand and apply basic concepts of probability

- explore data generated randomly, with spinners or number cubes;
- describe events as likely or unlikely, and discuss the degree of likelihood using such words as certain, equally likely, and impossible.

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These tests will assume that students have been introduced to the following:

Grade 4

Number and Operations

Understand numbers, ways of representing numbers, relationships among numbers, and number systems

- develop a sense of whole numbers, and represent and use them in flexible ways, including relating, composing, and decomposing numbers;
- understand the place-value structure of the base-ten number system, including being able to represent and compare whole numbers and decimals;
- recognize equivalent representations for the same number, and generate them by decomposing and composing numbers;
- connect number words and numerals to the quantities they represent, using various physical models and representations;
- develop an understanding of fractions as parts of unit wholes, as parts of a collection, and as a location on a number line;
- use models, benchmarks, and equivalent forms to judge the size of fractions;
- recognize and generate equivalent forms of commonly used fractions and decimals.

Understand the meanings of operations and how they relate to each other

- understand different meanings of addition and subtraction of whole numbers and the relationship between the two operations;
- understand situations that entail multiplication and division, such as equal groupings of objects and sharing equally;
- understand various meanings of multiplication and division;
- understand the effects of multiplying and dividing whole numbers;
- identify and use relationships between operations, such as division as the inverse of multiplication, to solve problems.

Compute fluently and make reasonable estimates

- develop fluency with basic number combinations for multiplication and division, and use these combinations to mentally compute related problems, such as 30 x 50;

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- develop fluency in adding, subtracting, and multiplying whole numbers;
- develop and use strategies to estimate the results of whole-number computations, and to judge the reasonableness of such results;
- use visual models, benchmarks, and equivalent forms to add and subtract commonly used fractions and decimals;
- select appropriate methods and tools for computing with whole numbers from among mental computation, estimation, calculators, and paper and pencil according to the context and nature of the computation, and use the selected method or tools.

Algebra

Understand patterns, relations, and functions

- describe, extend, and make generalizations about geometric and numeric patterns;
- represent and analyze patterns and functions, using words, tables, and graphs.
- Represent and analyze mathematical situations and structures, using algebraic symbols
- identify such properties as commutativity, associativity, and distributivity, and use them to compute with whole numbers;
- use concrete, pictorial, and verbal representations to develop an understanding of invented and conventional symbolic notations, including those for unknown or general numbers.

Use mathematical models to represent and understand quantitative relationships

- model problem situations with objects, and use representations such as graphs and tables to draw conclusions.

Analyze change in various contexts

- describe quantitative change, such as a student's growing two inches in one year.

Geometry

Analyze characteristics and properties of two- and three-dimensional geometric shapes, and develop mathematical arguments about geometric relationships

- recognize, name, build, draw, compare, and sort two- and three-dimensional shapes;
- describe attributes and parts of two- and three-dimensional shapes;

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- investigate and predict the results of putting together and taking apart two- and three-dimensional shapes;
- identify and compare attributes of two-dimensional shapes, and develop vocabulary to describe the attributes;
- classify two- and three-dimensional shapes according to their properties, and develop definitions of classes of shapes such as triangles.
- Specify location and describe spatial relationships using coordinate geometry and other representational systems
- describe, name, and interpret direction and distance in navigating space, and apply ideas about direction and distance;
- describe location and movement using common language and geometric vocabulary;
- make and use coordinate systems (first quadrant) to specify locations and to describe paths.

Apply transformations and use symmetry to analyze mathematical situations

- recognize and apply slides, flips, and turns;
- recognize and create shapes that have symmetry;
- identify and describe line and rotational symmetry in two-dimensional shapes and designs.
- Use visualization, spatial reasoning, and geometric modeling to solve problems
- create mental images of geometric shapes using spatial memory and spatial visualization;
- recognize and represent shapes from different points of view;
- build and draw geometric objects;
- create and describe mental images of objects, patterns, and paths;
- identify and build a two-dimensional representation of a three-dimensional object;
- use geometric models to solve problems in other areas of mathematics such as number and measurement;
- recognize geometric ideas and relationships, and apply them to other disciplines and to problems that arise in the classroom or in everyday life.

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Measurement

Understand measurable attributes of objects, and the units, systems, and processes of measurement

- understand such attributes as length, area, and weight, and select the appropriate type of unit for measuring each attribute;
- understand how to measure using nonstandard and standard units;
- understand the need for measuring with standard units, and become familiar with standard units in the customary system;
- carry out simple unit conversions, such as from centimeters to meters, within a system of measurement.

Apply appropriate techni•ues, tools, and formulas to determine measurements

- use repetition of a single unit to measure something larger than the unit, for instance, measuring the length of a room with a single meterstick;
- develop common referents for measures in order to make comparisons and estimates;
- develop strategies for estimating the perimeters, areas, and volumes of irregular shapes;
- select and apply appropriate standard units and tools in order to measure length, area, weight, time, and temperature;
- select and use benchmarks to estimate measurements;
- develop, understand, and use formulas to find the area of rectangles.

Data Analysis and Probability

Formulate •uestions that can be addressed with data, and collect, organize, and display relevant data to answer them

- pose •uestions, and gather data about themselves and their surroundings;
- represent data using concrete objects, pictures, and graphs;
- design investigations to address a •uestion;
- collect data using observations, surveys, and experiments;
- represent data using tables and graphs such as line plots, bar graphs, and line graphs.
- Select and use appropriate statistical methods to analyze data
- describe the shape and important features of a set of data, and compare related data sets, with an emphasis on how the data are distributed;

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- compare different representations of the same data, and evaluate how well each representation shows important aspects of the data.

Develop and evaluate inferences and predictions based on data

- propose and justify conclusions and predictions that are based on data and design studies to further investigate the conclusions or predictions.

Understand and apply basic concepts of probability

- explore data generated randomly, with spinners or number cubes;
- describe events as likely or unlikely, and discuss the degree of likelihood using such words as certain, e•ually likely, and impossible;
- predict the probability of outcomes of simple experiments, and test the predictions.

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These tests will assume that students have been introduced to the following:

Grade 5

Number and Operations

Understand numbers, ways of representing numbers, relationships among numbers, and number systems

- understand the place-value structure of the base-ten number system, including being able to represent and compare whole numbers and decimals;
- recognize e•uivalent representations for the same number, and generate them by decomposing and composing numbers;
- develop an understanding of fractions as parts of unit wholes, as parts of a collection, and as a location on a number line;
- use models, benchmarks, and e•uivalent forms to judge the size of fractions;
- recognize and generate e•uivalent forms of commonly used fractions, decimals, and percents;
- explore numbers less than 0 by extending the number line, and through familiar applications;
- describe classes of numbers according to characteristics such as the nature of their factors.

Understand the meanings of operations and how they relate to each other

- understand various meanings of multiplication and division;
- understand the effects of multiplying and dividing whole numbers;
- identify and use relationships between operations, such as division as the inverse of multiplication, to solve problems;
- understand and use properties of operations, such as the distributive property of multiplication over addition.

Compute fluently and make reasonable estimates

- develop fluency with basic number combinations for multiplication and division, and use these combinations to mentally compute related problems, such as 30 x 50;
- develop fluency in adding, subtracting, multiplying and dividing whole numbers;

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- develop and use strategies to estimate the results of whole-number computations, and to judge the reasonableness of such results;
- develop and use strategies to estimate computations involving fractions and decimals in situations relevant to students' experience;
- use visual models, benchmarks, and e•uivalent forms to add and subtract commonly used fractions and decimals;
- select appropriate methods and tools for computing with whole numbers from among mental computation, estimation, calculators, and paper and pencil according to the context and nature of the computation, and use the selected method or tools.

Algebra

Understand patterns, relations, and functions

- describe, extend, and make generalizations about geometric and numeric patterns;
- represent and analyze patterns and functions, using words, tables, and graphs.

Represent and analyze mathematical situations and structures, using algebraic symbols

- identify such properties as commutativity, associativity, and distributivity, and use them to compute with whole numbers;
- represent the idea of a variable as an unknown •uantity, using a letter or a symbol;
- express mathematical relationships using e•uations.

Use mathematical models to represent and understand •uantitative relationships

- model problem situations with objects, and use representations such as graphs, tables, and e•uations to draw conclusions.

Analyze change in various contexts

- investigate how a change in one variable relates to a change in a second variable;
- identify and describe situations with constant or varying rates of change, and compare them.

Geometry

Analyze characteristics and properties of two- and three-dimensional geometric shapes, and develop mathematical arguments about geometric relationships

- identify, compare, and analyze attributes of two- and three-dimensional shapes, and develop vocabulary to describe the attributes;

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- classify two- and three-dimensional shapes according to their properties, and develop definitions of classes of shapes such as triangles and pyramids;
- investigate, describe, and reason about the results of subdividing, combining, and transforming shapes;
- explore congruence and similarity;
- make and test conjectures about geometric properties and relationships, and develop logical arguments to justify conclusions.

Specify location and describe spatial relationships using coordinate geometry and other representational systems

- describe location and movement using common language and geometric vocabulary;
- make and use coordinate systems to specify locations and to describe paths;
- find the distance between points along horizontal and vertical lines of a coordinate system.

Apply transformations and use symmetry to analyze mathematical situations

- predict and describe the results of sliding, flipping, and turning two-dimensional shapes;
- describe a motion or a series of motions that will show that two shapes are congruent;
- identify and describe line and rotational symmetry in two- and three-dimensional shapes and designs.

Use visualization, spatial reasoning, and geometric modeling to solve problems

- build and draw geometric objects;
- create and describe mental images of objects, patterns, and paths;
- identify and build a three-dimensional object from two-dimensional representations of that object;
- identify and build a two-dimensional representation of a three-dimensional object;
- use geometric models to solve problems in other areas of mathematics such as number and measurement;
- recognize geometric ideas and relationships, and apply them to other disciplines and to problems that arise in the classroom or in everyday life.

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Measurement

Understand measurable attributes of objects, and the units, systems, and processes of measurement

- understand such attributes as length, area, weight, volume, and size of angle and select the appropriate type of unit for measuring each attribute;
- understand the need for measuring with standard units, and become familiar with standard units in the customary and metric systems;
- carry out simple unit conversions, such as from centimeters to meters, within a system of measurement;
- understand that measurements are approximations, and understand how differences in units affect precision;
- explore what happens to measurements of a 2-dimensional shape, such as its perimeter and area, when the shape is changed in some way.

Apply appropriate techni•ues, tools, and formulas to determine measurements

- develop strategies for estimating the perimeters, areas, and volumes of irregular shapes;
- select and apply appropriate standard units and tools to measure length, area, volume, weight, time, temperature, and the size of angles;
- select and use benchmarks to estimate measurements;
- develop, understand, and use formulas to find the area of rectangles and related triangles and parallelograms;
- develop strategies to determine the surface areas and volumes of rectangular solids.

Data Analysis and Probability

Formulate •uestions that can be addressed with data, and collect, organize, and display relevant data to answer them

- design investigations to address a •uestion and consider how data-collection methods affect the nature of the data set;
- collect data using observations, surveys, and experiments;
- represent data using tables and graphs such as line plots, bar graphs, and line graphs;
- recognize the differences in representing categorical and numerical data.

Select and use appropriate statistical methods to analyze data

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- describe the shape and important features of a set of data, and compare related data sets, with an emphasis on how the data are distributed;
- use measures of center, focusing on the median, and understand what each does and does not indicate about the data set;
- compare different representations of the same data, and evaluate how well each representation shows important aspects of the data.

Develop and evaluate inferences and predictions based on data

- propose and justify conclusions and predictions that are based on data and design studies to further investigate the conclusions or predictions.

Understand and apply basic concepts of probability

- describe events as likely or unlikely, and discuss the degree of likelihood using such words as certain, e•ually likely, and impossible;
- predict the probability of outcomes of simple experiments, and test the predictions;
- understand that the measure of the likelihood of an event can be represented by a number from 0 to 1.

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These tests will assume that students have been introduced to the following:

Grade 6

Number and Operations

Understand numbers, ways of representing numbers, relationships among numbers, and number systems

- understand the place-value structure of the base-ten number system, including being able to represent and compare whole numbers and decimals;
- understand fractions as parts of unit wholes, and as parts of a collection;
- use models, benchmarks, and e•uivalent forms to judge the size of fractions;
- recognize and generate e•uivalent forms of commonly used fractions, decimals, and percents;
- work flexibly with fractions and decimals to solve problems;
- compare and order fractions, decimals, and percents efficiently, and find their approximate locations on a number line;
- use factors, multiples, prime factorization, and relative prime numbers to solve problems.

Understand the meanings of operations and how they relate to each other

- understand the effects of multiplying and dividing whole numbers;
- identify and use relationships between operations, such as division as the inverse of multiplication, to solve problems;
- understand and use properties of operations, such as the distributive property of multiplication over addition;
- understand the meaning and effects of addition and subtraction with fractions and decimals;
- use the associative and commutative properties of addition to simplify computations with fractions, and decimals.

Compute fluently and make reasonable estimates

- maintain fluency in adding, subtracting, multiplying, and dividing whole numbers;
- select appropriate methods and tools for adding and subtracting fractions and decimals

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from among mental computation, estimation, calculators or computers, and paper and pencil, depending on the situation, and apply the selected methods;

- develop and analyze algorithms for adding and subtracting fractions and decimals, and develop fluency in their use;
- develop and use strategies to estimate the results of fraction and decimal computations with addition and subtraction, and judge the reasonableness of the results;
- develop, analyze, and explain methods for solving problems involving proportions, such as scaling and finding e•uivalent ratios.

Algebra

Understand patterns, relations, and functions

- describe, extend, and make generalizations about geometric and numeric patterns;
- represent, analyze, and generalize a variety of patterns with tables, graphs, words.

Represent and analyze mathematical situations and structures using algebraic symbols

- represent the idea of an unknown •uantity, using a letter or a symbol;
- express mathematical relationships using e•uations;
- begin to use symbolic algebra to represent situations and to solve problems, such as area and perimeter problems, use algebraic expressions and solve linear e•uations.

Use mathematical models to represent and understand •uantitative relationships

- model and solve contextualized problems using various representations, such as graphs, tables, and e•uations.

Analyze change in various contexts

- investigate how a change in one variable relates to a change in a second variable;
- identify, and describe situations with constant or varying rates of change and compare them.

Geometry

Analyze characteristics and properties of two- and three-dimensional geometric shapes, and develop mathematical arguments about geometric relationships

- investigate, describe, and reason about the results of subdividing, combining, and transforming shapes;

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- make and test conjectures about geometric properties and relationships, and develop logical arguments to justify conclusions;
- describe, classify, and understand relationships among types of two-dimensional objects, using their defining properties.

Specify location and describe spatial relationships using coordinate geometry and other representational systems

- describe location and movement using common language, and develop geometric vocabulary;
- make and use coordinate systems to specify locations and to describe paths.

Apply transformations and use symmetry to analyze mathematical situations

- predict and describe the results of sliding, flipping, and turning two-dimensional shapes;
- describe a motion or a series of motions that will show that two shapes are congruent;
- identify and describe line and rotational symmetry in two- and three-dimensional shapes and designs.

Use visualization, spatial reasoning, and geometric modeling to solve problems

- create and describe mental images of objects, patterns, and paths;
- identify and build a three-dimensional object from two-dimensional representations of that object;
- identify and build a two-dimensional representation of a three-dimensional object;
- draw geometric objects with specified properties, such as side lengths or angle measures;
- begin to use geometric models to represent and explain numerical and algebraic relationships;
- recognize and apply geometric ideas and relationships in areas outside the mathematics classroom, such as art, science, and everyday life.

Measurement

Understand measurable attributes of objects, and the units, systems, and processes of measurement

- understand both metric and customary systems of measurement;
- understand relationships among units, and convert from one unit to another within the same system;

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- understand, select, and use units of appropriate size and type to measure angles, perimeter, and area;
- understand that measurements are approximations, and understand how differences in units affect precision;
- explore what happens to measurements of a 2-dimensional shape, such as its perimeter and area, when the shape is changed in some way.

Apply appropriate techni•ues, tools, and formulas to determine measurements

- develop strategies for estimating the perimeters, areas, and volumes of irregular shapes;
- use common benchmarks to select appropriate methods for estimating measurements;
- select and apply techni•ues and tools to accurately find length, area, and angle measures to appropriate levels of precision;
- develop and use formulas to determine the circumference of circles and the area of rectangles;
- develop, understand, and use formulas to find the area of rectangles and related triangles and parallelograms;
- develop strategies to determine the surface areas and volumes of rectangular solids.

Data Analysis and Probability

Formulate •uestions that can be addressed with data, and collect, organize, and display relevant data to answer them

- formulate •uestions, and collect data about different characteristics within a population;
- represent data using tables and graphs such as line plots, bar graphs, and line graphs;
- recognize the differences in representing categorical and numerical data.

Select and use appropriate statistical methods to analyze data

- describe the shape and important features of a set of data, and compare related data sets, with an emphasis on how the data are distributed;
- understand what each does and does not indicate about the data set;
- compare different representations of the same data, and evaluate how well each representation shows important aspects of the data;

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- find, use, and interpret measures of center and spread, including mean and range.

Develop and evaluate inferences and predictions based on data

- propose and justify conclusions and predictions that are based on data and design studies to further investigate the conclusions or predictions.

Understand and apply basic concepts of probability

- describe events as likely or unlikely, and discuss the degree of likelihood using such words as certain, e•ually likely, and impossible;
- predict the probability of outcomes of simple experiments, and test the predictions;
- understand that the measure of the likelihood of an event can be represented by a number from 0 to 1;
- compute probabilities, using such methods as organized lists and tree diagrams.

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These tests will assume that students have been introduced to the following:

Grade 7

Number and Operations

Understand numbers, ways of representing numbers, relationships among numbers, and number systems

- understand the place-value structure of the base-ten number system, including being able to represent and compare whole numbers and decimals;
- use models, benchmarks, and e•uivalent forms to judge the size of fractions;
- recognize and generate e•uivalent forms of commonly used fractions, decimals, and percents;
- work flexibly with fractions, decimals, and percents to solve problems;
- compare and order fractions, decimals, and percents efficiently, and find their approximate locations on a number line;
- use factors, multiples, prime factorization, and relative prime numbers to solve problems;
- develop meaning for integers, and represent and compare •uantities with them.

Understand the meanings of operations and how they relate to each other

- understand the meaning and effects of arithmetic operations with fractions, decimals, and integers;
- use the associative and commutative properties of addition and multiplication, and the distributive property of multiplication over addition, to simplify computations with integers, fractions, and decimals;
- understand and use the inverse relationships of addition and subtraction, and multiplication and division, to simplify computations and solve problems.

Compute fluently and make reasonable estimates

- select appropriate methods and tools for computing with fractions and decimals from among mental computation, estimation, calculators or computers, and paper and pencil, depending on the situation, and apply the selected methods;
- develop and analyze algorithms for computing with fractions, decimals, and integers;

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- develop and use strategies to estimate the results of rational-number computations, and judge the reasonableness of the results;
- develop, analyze, and explain methods for solving problems involving simple proportions, such as scaling and finding e•uivalent ratios.

Algebra

Understand patterns, relations, and functions

- describe, extend, and make generalizations about geometric and numeric patterns;
- represent, analyze, and generalize a variety of patterns with tables, graphs, words, and when possible, symbolic rules;
- relate and compare different forms of representation for a relationship.

Represent and analyze mathematical situations and structures, using algebraic symbols

- represent the idea of an unknown •uantity, using a letter or a symbol;
- express mathematical relationships using e•uations;
- develop an initial conceptual understanding of different uses of variables;
- use symbolic algebra to represent situations and to solve problems.

Use mathematical models to represent and understand •uantitative relationships

- model and solve contextualized problems, using various representations, such as graphs, tables, and simple linear e•uations.

Analyze change in various contexts

- investigate how a change in one variable relates to a change in a second variable;
- identify and describe situations with constant or varying rates of change, and compare them.

Geometry

Analyze characteristics and properties of two- and three-dimensional geometric shapes, and develop mathematical arguments about geometric relationships

- describe, classify, and understand relationships among types of two- and three-dimensional objects, using their defining properties;

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- understand relationships among the angles, side lengths, perimeters, and areas of similar objects;
- begin to create and criti•ue inductive and deductive arguments concerning geometric ideas and relationships, such as congruence and similarity.

Specify location and describe spatial relationships using coordinate geometry and other representational systems

- make and use coordinate systems to specify locations and to describe paths.

Apply transformations and use symmetry to analyze mathematical situations

- predict and describe the results of sliding, flipping, and turning two-dimensional shapes;
- describe a motion or a series of motions that will show that two shapes are congruent;
- identify and describe line and rotational symmetry in two- and three-dimensional shapes and designs.

Use visualization, spatial reasoning, and geometric modeling to solve problems

- create and describe mental images of objects, patterns, and paths;
- draw geometric objects with specified properties, such as side lengths or angle measures;
- use two-dimensional representations of three-dimensional objects to visualize and solve problems such as those involving surface area and volume;
- use geometric models to represent and explain numerical and algebraic relationships;
- recognize and apply geometric ideas and relationships in areas outside the mathematics classroom, such as art, science, and everyday life.

Measurement

Understand measurable attributes of objects, and the units, systems, and processes of measurement

- understand both metric and customary systems of measurement;
- understand relationships among units, and convert from one unit to another within the same system;
- understand, select, and use units of appropriate size and type to measure angles, perimeter, area, surface area, and volume;
- understand that measurements are approximations, and understand how differences in units affect precision;

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- explore what happens to measurements of a 2-dimensional shape, such as its perimeter and area, when the shape is changed in some way.

Apply appropriate techni•ues, tools, and formulas to determine measurements

- develop strategies for estimating the perimeters, areas, and volumes of irregular shapes;
- use common benchmarks to select appropriate methods for estimating measurements;
- select and apply techni•ues and tools to accurately find length, area, volume, and angle measures to appropriate levels of precision;
- develop and use formulas to determine the circumference of circles, and the area of triangles, parallelograms, trapezoids, and circles, and develop strategies to find the areas of more-complex shapes;
- develop strategies to determine the surface area and volume of selected prisms, pyramids, and cylinders.

Data Analysis and Probability

Formulate •uestions that can be addressed with data, and collect, organize, and display relevant data to answer them

- formulate •uestions, and collect data about different characteristics within a population;
- represent data using tables and graphs such as line plots, bar graphs, and line graphs;
- recognize the differences in representing categorical and numerical data.

Select and use appropriate statistical methods to analyze data

- find, use, and interpret measures of center and spread, including mean and range;
- understand what each does and does not indicate about the data set;
- discuss and understand the correspondence between data sets and their graphical representations, especially stem-and-leaf plots.

Develop and evaluate inferences and predictions based on data

- propose and justify conclusions and predictions that are based on data and design studies to further investigate the conclusions or predictions.

Understand and apply basic concepts of probability

- describe events as likely or unlikely, and discuss the degree of likelihood using such words as certain, e•ually likely, and impossible;

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- predict the probability of outcomes of simple experiments, and test the predictions;
- understand that the measure of the likelihood of an event can be represented by a number from 0 to 1;
- compute probabilities, using such methods as organized lists and tree diagrams.

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These tests will assume that students have been introduced to the following:

Grade 8

Number and Operations

Understand numbers, ways of representing numbers, relationships among numbers, and number systems

- work flexibly with fractions, decimals, and percents in order to solve problems;
- compare and order fractions, decimals, and percents efficiently, and find their approximate locations on a number line;
- develop meaning for percents greater than 100 and less than 1;
- understand and use ratios and proportions to represent •uantitative relationships;
- develop an understanding of large numbers, and recognize and appropriately use exponential, scientific, and calculator notation;
- use factors, multiples, prime factorization, and relative prime numbers to solve problems;
- develop meaning for integers, and represent and compare •uantities with them.

Understand the meanings of operations and how they relate to each other

- understand the meaning and effects of arithmetic operations with fractions, decimals, and integers;
- use the associative and commutative properties of addition and multiplication, and the distributive property of multiplication over addition, to simplify computations with integers, fractions, and decimals;
- understand and use the inverse relationships of addition and subtraction, multiplication and division, and s•uaring and finding s•uare roots to simplify computations and solve problems.

Compute fluently and make reasonable estimates

- select appropriate methods and tools for computing with fractions and decimals from among mental computation, estimation, calculators or computers, and paper and pencil, depending on the situation, and apply the selected methods;
- develop and analyze algorithms for computing with fractions, decimals, and integers, and develop fluency in their use;

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- develop and use strategies to estimate the results of rational-number computations, and judge the reasonableness of the results;
- develop, analyze, and explain methods for solving problems involving proportions, such as scaling and finding e•uivalent ratios.

Algebra

Understand patterns, relations, and functions

- represent, analyze, and generalize a variety of patterns with tables, graphs, words, and when possible, symbolic rules;
- relate and compare different forms of representation for a relationship;
- i• identify functions as linear or nonlinear, and contrast their properties from tables, graphs, or e•uations.

Represent and analyze mathematical situations and structures using algebraic symbols

- develop an initial conceptual understanding of different uses of variables;
- explore relationships between symbolic expressions and graphs of lines, paying particular attention to the meaning of intercept and slope;
- use symbolic algebra to represent situations and to solve problems, especially those that involve linear relationships;
- recognize and generate e•uivalent forms for simple algebraic expressions, and solve linear e•uations.

Use mathematical models to represent and understand •uantitative relationships

- model and solve contextualized problems, using various representations, such as graphs, tables, and e•uations.

Analyze change in various contexts

- use graphs to analyze the nature of changes in •uantities in linear relationships.

Geometry

Analyze characteristics and properties of two- and three-dimensional geometric shapes, and develop mathematical arguments about geometric relationships

- precisely describe, classify, and understand relationships among types of two- and three-dimensional objects, using their defining properties;

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- understand relationships among the angles, side lengths, perimeters, areas, and volumes of similar objects;
- create and criti•ue inductive and deductive arguments concerning geometric ideas and relationships, such as congruence, similarity, and the Pythagorean relationship.

Specify location and describe spatial relationships using coordinate geometry and other representational systems

- use coordinate geometry to represent and examine the properties of geometric shapes;
- use coordinate geometry to examine special geometric shapes, such as regular polygons or those with pairs of parallel or perpendicular sides.

Apply transformations and use symmetry to analyze mathematical situations

- describe sizes, positions, and orientations of shapes under informal transformations such as flips, turns, slides, and scaling;
- examine the congruence, similarity, and line or rotational symmetry of objects, using transformations.

Use visualization, spatial reasoning, and geometric modeling to solve problems

- draw geometric objects with specified properties, such as side lengths or angle measures;
- use two-dimensional representations of three-dimensional objects to visualize and solve problems such as those involving surface area and volume;
- use visual tools such as networks to represent and solve problems;
- use geometric models to represent and explain numerical and algebraic relationships;
- recognize and apply geometric ideas and relationships in areas outside the mathematics classroom, such as art, science, and everyday life.

Measurement

Understand measurable attributes of objects, and the units, systems, and processes of measurement

- understand both metric and customary systems of measurement;
- understand relationships among units, and convert from one unit to another within the same system;
- understand, select, and use units of appropriate size and type to measure angles, perimeter, area, surface area, and volume.

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Apply appropriate techni•ues, tools, and formulas to determine measurements

- use common benchmarks to select appropriate methods for estimating measurements;
- select and apply techni•ues and tools to accurately find length, area, volume, and angle measures to appropriate levels of precision;
- develop and use formulas to determine the circumference of circles, and the area of triangles, parallelograms, trapezoids, and circles, and develop strategies to find the areas of more-complex shapes;
- develop strategies to determine the surface area and volume of selected prisms, pyramids, and cylinders;
- solve problems involving scale factors, using ratio and proportion;
- solve simple problems involving rates and derived measurements for such attributes as velocity and density.

Data Analysis and Probability

Formulate •uestions, design studies, and collect data about a characteristic shared by two populations or different characteristics within one population;

- select, create, and use appropriate graphical representations of data, including histograms, box plots, and scatterplots.

Select and use appropriate statistical methods to analyze data

- find, use, and interpret measures of center and spread, including mean and inter•uartile range;
- discuss and understand the correspondence between data sets and their graphical representations, especially histograms, stem-and-leaf plots, box plots, and scatterplots.

Develop and evaluate inferences and predictions based on data

- use observations about differences between two or more samples to make conjectures about the populations from which the samples were taken;
- make conjectures about possible relationships between two characteristics of a population on the basis of scatterplots of the data and approximate lines of fit;
- use conjectures to formulate new •uestions and plan new studies to answer them.

Understand and apply basic concepts of probability

- understand and use appropriate terminology to describe complementary and mutually exclusive events;

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- use proportionality and a basic understanding of probability to make and test conjectures about the results of experiments and simulations;
- compute probabilities for simple compound events, using such methods as organized lists, tree diagrams, and area models.

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These tests will assume that students have been introduced to the following:

Grade 9

Number and Operations

Understand numbers, ways of representing numbers, relationships among numbers, and number systems

- develop a deeper understanding of very large and very small numbers, and of various representations of them;
- compare and contrast the properties of numbers and number systems, including the rational and real numbers;
- use number theory arguments to justify relationships involving whole numbers.

Understand the meanings of operations and how they relate to each other

- judge the effects of operations such as multiplication, division, and computing powers and roots on the magnitudes of •uantities;
- understand permutations and combinations as counting techni•ues.

Compute fluently and make reasonable estimates

- develop fluency in operations with real numbers and simple vectors, and matrices, using mental computation or paper-and-pencil calculations for simple cases, and technology for more complicated cases;
- judge the reasonableness of numerical computations and their results.

Algebra

Understand patterns, relations, and functions

- generalize patterns, using explicitly defined functions;
- understand relations and functions and select, convert flexibly among, and use various representations for them;
- analyze functions of one variable by investigating local and global behavior, including slopes as rates of change, intercepts and zeros;
- understand and perform transformations such as arithmetically combining and

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composing commonly used functions; (more complicated symbolic expressions, for which technology would normally be used, will not appear in the assessment);

- understand and compare the properties of classes of functions, including linear, •uadratic, reciprocal, and exponential functions.

Represent and analyze mathematical situations and structures using algebraic symbols

- understand the meaning of e•uivalent forms of expressions, e•uations, ine•ualities, or relations;
- write e•uivalent forms of e•uations, ine•ualities and systems of e•uations and solve them;
- use symbolic algebra to represent and explain mathematical relationships;
- judge the meaning, utility, and reasonableness of the results of symbolic manipulations, including those carried out by technology.

Use mathematical models to represent and understand •uantitative relationships

- identify essential •uantitative relationships in a situation, and determine the class or classes of functions that might model the relationships;
- use symbolic expressions to represent relationships arising from various contexts;
- draw reasonable conclusions about a situation being modeled.

Analyze change in various contexts

- approximate and interpret rates of change, from graphic and numeric data.

Geometry

Analyze characteristics and properties of two- and three-dimensional geometric shapes and develop mathematical arguments about geometric relationships

- analyze properties and determine attributes of two- and three-dimensional objects;
- explore relationships (including congruence and similarity) among two- and three-dimensional geometric objects, make and test conjectures about them, and solve problems involving them.

Specify location and describe spatial relationships using coordinate geometry and other representational systems

- use Cartesian coordinates to analyze geometric situations;

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- investigate conjectures and solve problems involving two-dimensional objects represented with Cartesian coordinates.

Apply transformations and use symmetry to analyze mathematical situations

- understand and represent translations, reflections, rotations, and dilations of objects in the plane by using sketches and coordinates;
- use various representations to help understand the effects of simple transformations and their compositions.

Use visualization, spatial reasoning, and geometric modeling to solve problems

- use geometric models to gain insights into, and answer •uestions in, other areas of mathematics;
- use geometric ideas to solve problems in, and gain insights into, other disciplines and other areas of interest such as art and architecture.

Measurement

Understand measurable attributes of objects, and the units, systems, and processes of measurement

- make decisions about units and scales that are appropriate for problem situations involving measurement.

Apply appropriate techni•ues, tools, and formulas to determine measurements

- analyze precision and accuracy in measurement situations;
- understand and use formulas for the area, surface area, and volume of geometric figures, including cylinders;
- use unit analysis to check measurement computations.

Data Analysis and Probability

Formulate •uestions that can be addressed with data, and collect, organize, and display relevant data to answer them

- understand the differences among various kinds of studies and which types of inferences can legitimately be drawn from each;
- know the characteristics of well-designed studies, including the role of randomization in surveys and experiments;

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- understand the meaning of measurement data and categorical data, and of the term variable;
- understand histograms, parallel box plots, and scatterplots, and use them to display data;
- compute basic statistics.

Select and use appropriate statistical methods to analyze data

- for univariate measurement data, be able to display the distribution, describe its shape, and select and calculate summary statistics;
- for bivariate measurement data, be able to display a scatterplot, and describe its shape;
- display and discuss bivariate data where at least one variable is categorical;
- identify and describe trends in bivariate data.

Develop and evaluate inferences and predictions based on data

- evaluate reports that are based on data by examining the design of the study, the appropriateness of the data analysis, and the validity of conclusions.

Understand and apply basic concepts of probability

- understand the concepts of sample space and probability distribution, and construct sample spaces and distributions in simple cases;
- use simulations to construct empirical probability distributions;
- compute and interpret the expected value of random variables in simple cases;
- understand the concepts of conditional probability and independent events;
- understand how to compute the probability of a compound event.

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These tests will assume that students have been introduced to the following:

Grade 10

Number and Operations

Understand numbers, ways of representing numbers, relationships among numbers, and number systems

- develop a deeper understanding of very large and very small numbers, and of various representations of them;
- compare and contrast the properties of numbers and number systems, including the rational and real numbers;
- use elementary number theory arguments to justify relationships involving whole numbers.

Understand the meanings of operations and how they relate to each other

- judge the effects of operations such as multiplication, division, and computing powers and roots on the magnitudes of •uantities;
- understand permutations and combinations as counting techni•ues.

Compute fluently and make reasonable estimates

- develop fluency in operations with real numbers, using mental computation or paper-and-pencil calculations for simple cases, and technology for more complicated cases;
- judge the reasonableness of numerical computations and their results.

Algebra

Understand patterns, relations, and functions

- generalize patterns, using explicitly defined functions;
- understand relations and functions and select, convert flexibly among, and use various representations for them;
- analyze functions of one variable by investigating local and global behavior, including slopes as rates of change, intercepts and zeros;
- understand and perform transformations such as arithmetically combining and

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composing commonly used functions; (more complicated symbolic expressions, for which technology would normally be used, will not appear in the assessment);

- understand and compare the properties of classes of functions, including linear, •uadratic, reciprocal, exponential, polynomial, and rational functions.

Represent and analyze mathematical situations and structures using algebraic symbols

- understand the meaning of e•uivalent forms of expressions, e•uations, ine•ualities, or relations;
- write e•uivalent forms of simple e•uations and systems of e•uations, and solve them;
- use symbolic algebra to represent and explain mathematical relationships;
- judge the meaning, utility, and reasonableness of the results of symbolic manipulations, including those carried out by technology.

Use mathematical models to represent and understand •uantitative relationships

- identify essential •uantitative relationships in a situation, and determine the class or classes of functions that might model the relationships;
- use symbolic expressions to represent relationships arising from various contexts;
- draw reasonable conclusions about a situation being modeled.

Analyze change in various contexts

- approximate and interpret rates of change, from graphic and numeric data.

Geometry

Analyze characteristics and properties of two- and three-dimensional geometric shapes, and develop mathematical arguments about geometric relationships

- analyze properties and determine attributes of two- and three-dimensional objects;
- explore relationships (including congruence and similarity) among classes of two- and three-dimensional geometric objects, make and test conjectures about them, and solve problems involving them;
- establish the validity of geometric conjectures using deduction; prove theorems, and criti•ue arguments made by others;
- use trigonometric relationships to determine lengths and angle measures.

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Specify location and describe spatial relationships using coordinate geometry and other representational systems

- use Cartesian coordinates and other coordinate systems, such as navigational, polar, or spherical systems, to analyze geometric situations;
- investigate conjectures and solve problems involving two- and three-dimensional objects represented with Cartesian coordinates.

Apply transformations and use symmetry to analyze mathematical situations

- understand and represent translations, reflections, rotations, and dilations of objects in the plane by using sketches, coordinates, vectors, function notation, and matrices;
- use various representations to help understand the effects of simple transformations and their compositions.

Use visualization, spatial reasoning, and geometric modeling to solve problems

- draw and construct representations of two- and three-dimensional geometric objects using a variety of tools;
- visualize three-dimensional objects from different perspectives and analyze their cross sections;
- use vertex-edge graphs to model and solve problems;
- use geometric models to gain insights into, and answer •uestions in, other areas of mathematics;
- use geometric ideas to solve problems in, and gain insights into, other disciplines and other areas of interest such as art and architecture.

Measurement

Understand measurable attributes of objects, and the units, systems, and processes of measurement

- make decisions about units and scales that are appropriate for problem situations involving measurement.

Apply appropriate techni•ues, tools, and formulas to determine measurements

- analyze precision, accuracy, and approximate error in measurement situations;
- understand and use formulas for the area, surface area, and volume of geometric figures, including spheres and cylinders;
- use unit analysis to check measurement computations.

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Data Analysis and Probability

Formulate •uestions that can be addressed with data, and collect, organize, and display relevant data to answer them

- understand the differences among various kinds of studies and which types of inferences can legitimately be drawn from each;
- know the characteristics of well-designed studies, including the role of randomization in surveys and experiments;
- understand the meaning of measurement data and categorical data, of univariate and bivariate data, and of the term variable;
- understand histograms, parallel box plots, and scatterplots and use them to display data;
- compute basic statistics, and understand the distinction between a statistic and a parameter.

Select and use appropriate statistical methods to analyze data

- for univariate measurement data, be able to display the distribution, describe its shape, and select and calculate summary statistics;
- for bivariate measurement data, be able to display a scatterplot, describe its shape, and determine regression coefficients, regression e•uations, and correlation coefficients, using technological tools;
- display and discuss bivariate data where at least one variable is categorical;
- recognize how linear transformations of univariate data affect shape, center, and spread;
- identify trends in bivariate data, and find functions that model the data or transform the data so that they can be modeled.

Develop and evaluate inferences and predictions based on data

- use simulations to explore the variability of sample statistics from a known population, and construct sampling distributions;
- understand how sample statistics reflect the values of population parameters, and use sampling distributions as the basis for informal inference;
- evaluate published reports that are based on data by examining the design of the study, the appropriateness of the data analysis, and the validity of conclusions;
- understand how basic statistical techni•ues are used to monitor process characteristics in the workplace.

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Understand and apply basic concepts of probability

- understand the concepts of sample space and probability distribution, and construct sample spaces and distributions in simple cases;
- use simulations to construct empirical probability distributions;
- compute and interpret the expected value of random variables in simple cases;
- understand the concepts of conditional probability and independent events;
- understand how to compute the probability of a compound event.

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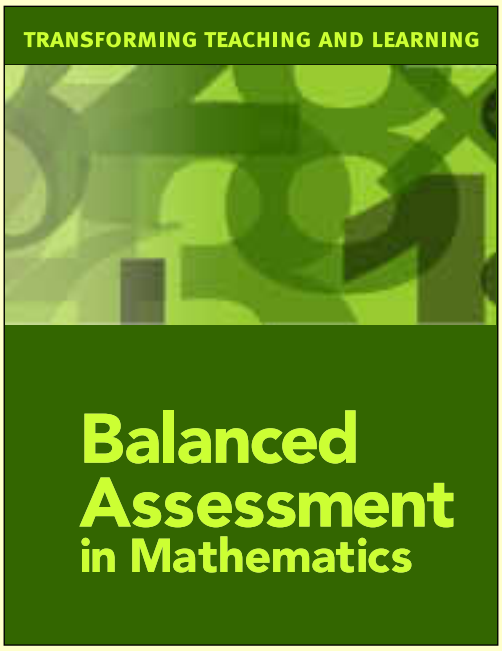

Alignment of Balanced Assessment in Mathematics Tasks to NCTM Content and Process Standards

> *2000 Practice Content*

> *2002 Secure Content*

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Alignment of Balanced Assessment in Mathematics Tasks to NCTM Content and Process Standards–2000 Form

BOOK	TASK	NUM	ALG	GEOM	MEAS	DATA	PS	REAS	REP	CONN	COMM
3A	Carmen's Party	A					*	*			*
3A	Computer Game	A	B			B			*	*	*
3A	Same Day of the Week		A		B			*		*	*
3A	Toothpick Squares		A		B			*	*		*
3A	Trang's Number	A	B				*	*	*		*
3A	Shaded Shapes			B	A		*	*			*
3B	Short Questions	A	B		B		*		*	*	
3B	Hamburgers			B	A		*	*			*
3B	Addition Pyramids	B	A				*	*			*
3B	Halve It	B		B	A		*	*	*	*	*
3B	Magazine Cover		B	A							*
3B	Staircase	B			A		*	*		*	*
4A	Candy Bar	A			B		*	*			*
4A	Arranging Desks	B	A			B	*	*	*	*	*
4A	Cooking Eggs	B				A			*		
4A	School Trip	A				B	*	*			*
4A	Pears and Bananas	A	B						*	*	*
4B	Short Questions	A	B			B	*	*			
4B	Alice's Height	A	B				*	*			*

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4B	Baking Pies	B			A		*	*	*		*
4B	Favorite Sports	B				A		*	*		*
4B	Summer Camp	B	B			A		*	*		
4B	Tim's Number	A	B				*	*	*		*
5A	On the Line	A						*	*		*
5A	Candy Bar Survey	B				A		*	*		*
5A	Desks and Students	B	A			B	*	*	*	*	*
5A	Garden Plan	B		B	A		*	*		*	*
5A	Paper Clips	A			B			*			*
5B	Short Questions	A	B		B		*	*			
5B	Candies	B				A	*	*			*
5B	Elevator	A	B				*	*			*
5B	Flower Beds		A					*	*		*
5B	Ice Cream	B				A		*	*		*
6A	Checkout	B				A	*	*			*
6A	Building Units	B	A	B			*	*	*	*	*
6A	Pam's Number	A	B				*	*	*		*
6A	Pet Food	A	B		B		*	*		*	*
6A	Sponsored Run	A	B				*	*			*

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6A	Sports	B				A		*	*		*
6B	Short Tasks	A	B	B	B			*			
6B	Describing a Game Board		B	A	B						*
6B	Cupcakes for Sale	A					*	*	*	*	*
6B	Sodas	B				A		*	*		*
6B	Good Deal Meals	A				B	*	*	*		*
6B	Elevators	B	A		B		*	*			*
7A	Quilt		B	B	A		*	*			*
7A	Aunt Mabel	B	A					*	*		*
7A	Choose a Cube	B				A		*			*
7A	Languages	B				A		*	*	*	*
7A	Pentagons		A	B			*	*	*	*	*
7B	Short Tasks	A	B		B	B		*		*	
7B	Computers	A									*
7B	Lockers	A	B					*			
7B	Stacking Plastic Cups		A		B		*	*	*	*	*
8A	Paper Waste	A								*	
8A	A Swimming Race		A			B		*	*	*	*
8A	Apartment Numbers	B	A				*	*	*		*

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8A	Cube Shapes	B	A				*	*	*		*
8A	Land and Water	A			B				*	*	*
8B	Short Tasks	A		B	B	B		*		*	
8B	Designing Sweatshirts	B			B	A		*	*	*	*
8B	Take a Cube	B				A		*			*
8B	Fish Ponds		A		B		*	*	*	*	*
8B	The Puzzle	B	A				*	*	*		
9A	Bookmark				A		*	*		*	*
9A	Consecutive Odd Numbers	B	A					*	*	*	*
9A	Fun Size Can				A			*		*	*
9A	Shopping	B			B	A		*	*	*	*
9A	Triangles			A			*	*			*
9B	Short Tasks	A	B		B		*	*		*	
9B	Odd and Even	B				A	*	*	*		*
9B	Number Pattern	B	A					*	*	*	*
9B	Rope				B	A		*	*	*	*
9B	Straw Triangles		A	B			*	*	*	*	*
10A	Glass			A	B		*	*	*	*	*
10A	Patchwork		A	B			*	*	*	*	*

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10A	Hang Gliding		B	B	A			*	*	*	
10A	Sale	A	B				*			*	*
10A	Bottle			B	A		*	*			*
10A	Dropping a Cup	B				A		*			
10B	Short Tasks	A	B		B	B	*	*	*	*	
10B	Calendar Patterns	B	A					*	*	*	*
10B	School Fair	B				A		*		*	*
10B	Courthouse Steps		A	B			*	*	*		*
10B	Swimming Race		A			B		*	*	*	*

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BOOK	TASK	NUM	ALG	GEOM	MEAS	DATA	PS	REAS	REP	CONN	COMM
3A	Calendar		B			A	*	*	*	*	*
3A	Flowers		A		B	B	*	*	*	*	
3A	Math Shapes		B	A	B		*	*	*		
3A	Get Clued Up	A	A				*	*	*		
3A	Spring Flowers	B				A			*	*	*
3B	Short Questions	A	B		B		*		*	*	
3B	Circle Fun	A	B				*		*		*
3B	Jennifer's Cats	A	B		B		*			*	*
3B	Fences	B	A			B	*	*		*	*
3B	Rectangle		B	B	A		*		*		*
3B	Race Cars		B	B	A			*		*	*
3B	Jane's Pens	A	B		B		*			*	*
4A	Shells	B				A	*		*		*
4A	Clues	A	B			B	*	*	*		*
4A	Sally's Muffins	A	B		B				*	*	*
4A	Rectangle			B	A		*			*	*
4A	Pens and Pencils	A						*		*	*
4B	Short Questions	A			A				*	*	
4B	Karl's Money	A			B			*	*	*	*
4B	Pizza	A	B				*	*		*	*

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BOOK	TASK	NUM	ALG	GEOM	MEAS	DATA	PS	REAS	REP	CONN	COMM
4B	Let It Snow!				B	A		*	*	*	*
4B	Tiling Patterns		A	B			*		*	*	*
5A	Fractions	A					*	*	*		
5A	Keeping Cats	A	B				*			*	*
5A	T-Shirts	A				B	*	*		*	*
5A	Shapes			A			*	*			
5A	The Race	B	A			B	*	*		*	*
5B	Short Questions	A	A		A			*		*	
5B	Is It Likely?	B				A		*		*	
5B	Race Track	A	A	A	A	A		*	*	*	*
5B	Working with Dots			B	A		*	*	*		*
5B	Square Patterns		A		B	B		*	*	*	*
5B	Martin's Motorcycle	A	A		B		*	*		*	*
6A	Basketball	B				A		*			*
6A	Grandpa's Knitting	B			A		*				*
6A	A Trip to the Movies	B	A				*	*		*	*
6A	Pick a Cube					A	*	*		*	*
6A	Tank			B	A		*	*		*	*
6B	Short Tasks	A	B					*		*	
6B	Pete's Number	A	B				*	*	*		

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6B	Machine										
6B	Design a Logo		A		B		*	*		*	*
6B	Triangles			A	A			*		*	*
6B	Travel to School					A		*	*	*	*
7A	Dice Game					A	*	*	*	*	*
7A	Cups		A			B	*		*		*
7A	Triangles			A	B			*	*		*
7A	TV Hours	B				A	*			*	*
7A	Leaky Faucet	A	B					*	*	*	*
7B	Short Tasks	A			B	B		*	*		
7B	Ages	B				A	*	*		*	*
7B	Geometric Shapes			A	B		*		*		
7B	Apartments		A				*	*	*	*	*
7B	Dollars					A		*	*	*	*
8A	Right Triangles			A	B			*			*
8A	Tiling Squares		A				*	*	*	*	*
8A	Best Guess					A	*	*		*	*
8A	Differences	B	A				*	*	*		*
8A	Traffic	B			B	A	*			*	*
8B	Short Tasks	A	B		B			*		*	

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8B	Family Tree	B				A		*		*	*
8B	Design a Garden		A	B	B			*	*	*	*
8B	Emma's Models		A			B	*		*	*	*
8B	Tape	B	A		A	B	*			*	*
9A	Pizza Sales					A		*	*	*	*
9A	Make Half	A	B				*	*			*
9A	Toothpick Stairs		A		B		*	*		*	*
9A	Number Machines	A	B				*	*			*
9A	Making a Puzzle			A	B		*	*			*
9B	Short Tasks	B			A		*			*	*
9B	Boxes of Candy				B	A	*	*	*	*	*
9B	Tile Patterns		A	B	B		*	*		*	*
9B	Posters		B			A		*	*	*	
9B	Students	A	A				*			*	*
10A	Disks					A	*	*		*	*
10A	Logos			B	A			*	*		*
10A	Shaded Shapes			B	A		*	*	*		*
10A	Square Peg			A	B			*	*	*	*
10A	Painted Cubes		A	B	B		*	*			*
10B	Short Tasks	A			B		*		*	*	

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10B	Miles per Gallon				A		*	*	*	*	*
10B	Z Logos		A	B	B			*	*		*
10B	Cube			A	B		*			*	*
10B	Calculations	A						*			*

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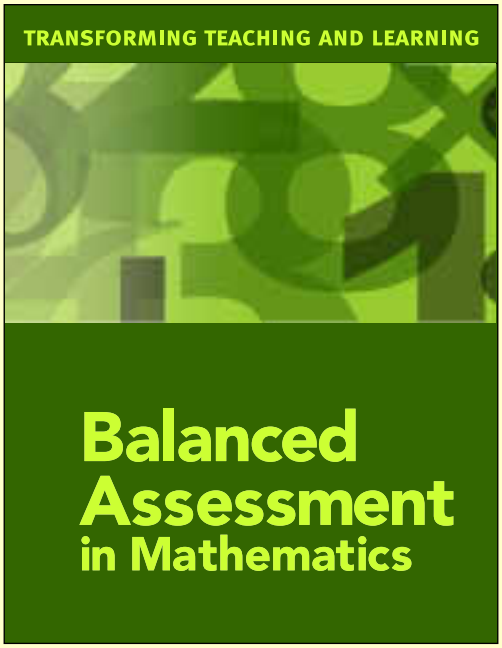

Task Descriptions

> *Practice Task Descriptions Grades 3—10*

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Practice Task Descriptions

Grade 3
Form A

Carmen's Party

In the context of a girl's party, students are asked to determine the combined cost of the party's food and drink for a given number of people. The student chooses and applies correct number operations in a multi-step problem. The process emphasis is on Problem Solving. The main content is Number and Operations, specifically understanding situations that require multiplication and addition.

Computer Game

A girl's computer game scores from several days are displayed in a table. Students are required to interpret and compare quantitative changes of the displayed data. The process emphasis is Representation, in analyzing a data display. The main content is Number and Operations, and also Algebra in that students generalize about the numeric pattern of the game scores.

Same Day of the Week

In this task, students determine the formula for determining the number of days between 2 different weekdays, moving both forwards and backwards on the calendar. The process emphasis is Communication, as students consolidate their mathematical thinking by expressing their pattern in words. The main content is Algebra.

Toothpick Squares

A diagram of toothpicks arranged in rows of increasing numbers of squares is shown. Students correlate the geometric pattern with a numerical pattern. The process emphases are on Representation and Communication. The main content is Algebra, describing and extending patterns. The task also involves Geometry.

Trang's Number

An unknown number between 1 and 100 is to be identified by following 5 clues that describe characteristics of the number. A chart of numbers 1 to 100 is given for a visual aid. The process emphases are Connections and Problem Solving, specifically solving a problem through interconnecting given information. The main content is Number and Operations.

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Shaded Shapes

A drawing is shown of 2 shaded shapes on a grid. The task is to compare the areas and perimeters of the 2 shapes, and to draw geometric shapes with similar measurements. The process emphasis is on Problem Solving, especially in forming shapes to specified areas and perimeters. The main content is Measurement. Geometry is also involved in the problem.

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Grade 3
Form B

Short Questions

Five short questions are asked involving one-step computation in context, converting number words to numerals, and determining elapsed time. The process emphasis is on Problem Solving. The main content is Number Operations, selecting and using appropriate operations to solve problems.

Hamburgers

Hamburgers and a cook's grill are diagrammed with their diameter and length/width given respectively. The student is asked to find how many hamburgers would be able to fit on the grill. The process emphases are Problem Solving and Representation. The main content is Measurement. Number and Operations is also involved.

Addition Pyramids

An addition pyramid is diagrammed and its number pattern is explained. Three more addition pyramids, with missing numbers on varying levels of the pyramids, are given for the student to complete. The process emphasis is on Problem Solving. The main content is Algebra, understanding and extending numeric patterns. Number and Operations is also involved.

Halve It

This task is about dividing a gridded square into two equal parts in different ways. The process emphases are on Communication and Representation. Some Reasoning and Proof is also involved. The main content is Measurement and Geometry.

Magazine Cover

In the context of describing to an editor over the phone the cover design for a magazine, students write a description of a 2-dimensional geometric design. The process emphasis is on Communication. The main content is Geometry, describing in words the attributes and relative positions of the shapes.

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Staircase

In the context of measuring how far a snail would travel to crawl up a staircase, the student determines the perimeter and height of a staircase. The process emphases are Problem Solving and Communication, with the student expressing in words and mathematical symbols how to solve the problems. The main content is Geometry, particularly using geometric models to solve problems. Number and Operations is also involved.

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Grade 4
Form A

Candy Bar

Using a drawing of a candy bar divided into pieces, students find the total fraction of a candy bar each friend eats. The student also determines the amount of the cost of the bar each should pay. The process emphases are on Problem Solving, translating and using visual Representations, and Communication of mathematical thinking. The main content is Number and Operations, demonstrating an understanding of fractions as parts of wholes and computing with fractions.

Arranging Desks

This task asks for the extension of the numerical pattern of the number of students who can sit at rows of varying numbers of desks. The process emphases are on creating and using Representations to model and interpret phenomena, and on Communication. The main content is Algebra. Another content covered is Data Analysis and Probability, representing data using tables and graphs, and proposing and justifying conclusions and predictions that are based on data.

Cooking Eggs

In this task, students are asked to complete a table and a graph summarizing data on "How We Like Our Eggs Cooked". The process emphasis is on Representation, creating a table and a graph to model and organize information. The main content is Data Analysis, representing data using tables and graphs.

School Trip

In this task, students are asked to use and interpret a table of data showing the prices of different sizes of different drinks available on a school trip. The process emphases are on Problem Solving, Reasoning, and Communication, as students explain the reasoning behind their solutions to real-world problems. The main content is Data Analysis, as students analyze the data in a table, and Number and Operations, as they must understand situations that entail multiplication and division, such as sharing equally, and compute fluently using subtraction, multiplication, and division.

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Pears and Bananas

Students write questions to illustrate number sentences relating to the cost of fruit. The process emphases are on Problem Solving, Connections, and Communication, as students communicate their solutions connecting mathematics to real-world problems. The main content is Number and Operations, demonstrating an understanding of operations and how they relate to real-life contexts.

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Grade 4
Form B

Short Questions

In the short questions the process emphasis is on Problem Solving. The main content is Number and Operations, filling in blanks in number sentences, using addition, division and multiplication to solve problems, and finding percentages and fractional parts of whole numbers.

Alice's Height

Alice has shrunk to a fraction of her former height. Students must find the correct order in which to apply given operations to restore Alice to her original height. The process emphases are on Reasoning and Communication, communicating their mathematical reasoning clearly. The main content is Number and Operations, understanding the meanings of operations and how they relate to each other.

Baking Pies

Students must find how many pies will be needed for a party, given three pieces of information. The process emphases are on Problem Solving, Communication, and Representation, as students use pictures of pies to help them solve the problem, then communicate the reason for their solution. The main content is Number and Operations, understanding and using fractions, multiplication, and division.

Favorite Sports

Students interpret a circle graph showing their favorite sports. The process emphases are on Problem Solving and Communication. The main content is Number and Operations, understanding fractions as parts of a collection.

Summer Camp

Students complete a table of colors of T-shirts, and construct a graph based on the table. The process emphasis is on Representation, creating a graph to model phenomena. The main content is Data Analysis, representing data using graphs, and Number and Operations, computing fluently.

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Tim's Number

Students are given clues they must use to find a number between 1 and 100, and explain how they reached their conclusion. The process emphases are on Reasoning, Problem Solving, and Communication. The main content is Number and Operations, using multiples, odd/even, and relative magnitude.

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Grade 5
Form A

On the Line

Students are required to locate verbal, numeric, and pictorial representations of simple fractions and decimals. The process emphases are Representation, using a number line to organize mathematical values; Connections, understanding the connection between different forms of numbers; and Communication, explaining the meaning of decimal numbers. The main content is Number and Operations, understanding the place-value structure of the base-ten number system, comparing whole numbers, decimals, and fractions, and connecting number words and numerals to the quantities they represent using a number line.

Candy Bar Survey

Students are given raw data about how many candy bars are eaten each week by various boys and girls. They are asked to complete graphs summarizing the data and critique a conclusion made from the data. The process emphases are using graphs as Representations to model and interpret phenomena, Reasoning to investigate mathematical conjectures, and Communication, analyzing and evaluating the mathematical thinking of others. The main content is Data Analysis, representing data using graphs, evaluating inferences based on data.

Desks and Students

This task asks for the extension of the numerical pattern of the number of students who can sit at rows of varying numbers of desks. The process emphases are using Representation to model and interpret phenomena, and using appropriate strategies for Problem Solving. The main content is Algebra, describing and extending patterns, representing and analyzing patterns using words, tables, and graphs, and using representations to draw conclusions.

Garden Plan

Given a map of a garden and some information, students find the area of the garden and the lengths of its sides. The process emphases are Problem Solving and Connections, especially connections between areas of different geometric shapes, and between perimeter and the lengths of the sides of a figure. The main content is Measurement, understanding and using formulas to find the area of rectangles and related triangles, and understanding and using perimeter. Another content covered is Geometry, using geometric models to solve problems.

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Paper Clips

In the context of making paper clips, students solve problems requiring the application of simple operations. The process emphasis is Problem Solving. The main content is Number and Operations, demonstrating fluency in multiplying and dividing.

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Grade 5
Form B

Short Questions

In the short questions the process emphasis is on Problem Solving. The main content is Number and Operations, filling in blanks in number sentences, using multiplication, division, addition, subtraction, and percentages. Also, Measurement is tested, applying standard units of time.

Candies

Given a plate of candy with differing numbers of various colored candies, students are asked to determine the probability of randomly choosing each color and explain their results. The process emphases are Problem Solving and Communication. The main content is understanding and applying basic concepts of Probability.

Elevator

This task describes an elevator that can only go up or down a fixed number of floors. Students determine combinations of operations to arrive at various floors. The process emphases are Reasoning and Communication of their mathematical thinking. The main content is Algebra, representing and analyzing patterns using words. Also, Number and Operations is tested, developing fluency in adding and subtracting whole numbers.

Flower Beds

Students are shown an increasing pattern of flowerbeds surrounded by hexagonal paving stones and asked to continue the pattern graphically, and in a table, and answer questions related to the pattern. The process emphases are graphical and tabular Representations, and Reasoning. The main content is Algebra, describing, extending, and making generalizations about patterns, using words, tables, and graphs, and modeling problem situations to draw conclusions.

Ice Cream

Students are given raw data about the flavors of ice cream preferred by different individual students. They are asked to summarize the data in a graph, and then make predictions of ice cream sales based on the data. The process emphases are Representation and Problem Solving. The main content is Data Analysis, representing data using graphs, and proposing and justifying conclusions and predictions based on data.

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Grade 6
Form A

Checkout

A supermarket manager is giving a prize to the checkout person who works at the fastest rate. Using a table, the student determines who should receive the prize. The process emphases are on Problem Solving, determining each person's rate, and on Reasoning and Proof. The main content is Data Analysis, analyzing data in a table, and Number and Operations, solving a problem involving proportions.

Building Units

In this task, a pattern of the number of rods in scaffolding units of varying heights is diagrammed. The student completes the pattern in a table and expresses the pattern while explaining why a given incorrect extension is wrong. The process emphases are on Problem Solving, Reasoning and Proof, and Communication. The main content is Algebra, both in extending a pattern, and in representing it in words and mathematical symbols.

Pam's Number

Three unknown numbers between 1 and 100 are to be identified by following clues that describe characteristics of the numbers. The process is then reversed and the student interprets a marked number chart by writing the rule being diagrammed. The process emphases are Problem Solving, Communications, and Representation. The main content is Number and Operations.

Pet Food

The amount of food that each of Ricardo's pets eats, using fractions, is given in a table, along with the bags of food he bought for them. The student must determine which bag of food will get used up first. The process emphasis is on Problem Solving. The main content is Number and Operations, specifically computing with fractions.

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Sponsored Run

Three friends are sponsoring a student's fundraising run. The task is to determine and compare how much each friend pays for three different possible numbers of miles the student will run. The process emphases are on Problem Solving, and Connections. Reasoning and Proof and Communication are also used. The main content is Algebra, specifically in comparing functions. Another content covered is Number and Operations.

Sports

A partially completed table and circle graph depict the percentage of people at a sports center participating in different sports. The first task is to complete the circle graph using given information, and to estimate percentages. The process emphases are on Representation and Connections. The main content is Data Analysis, specifically representing data using graphs, and Number and Operations.

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Grade 6
Form B

Short Tasks

In the short tasks the process emphasis is on Problem Solving. The main content is Number and Operations, including working flexibly with fractions, decimals, and percents to solve problems, and Measurement, understanding and applying customary units of time, calculating using angle measurements, finding perimeter of square, and using the perimeter of a square to find the area.

Describing a Board Game

Students are shown a geometric shape, and must describe it as precisely as possible. The process emphasis is on Communication. The main content is Geometry, analyzing the characteristics and properties of two-dimensional geometric shapes.

Cupcakes for Sale

A girl is baking cupcakes to sell. Students solve several number problems using fractions and proportions. The process emphasis is Problem Solving in real life contexts using a variety of appropriate strategies. The main content is Number and Operations, solving problems involving proportions, multiplying and dividing whole numbers, and using factors and multiples.

Sodas

Students are given a table of data about the flavors of sodas drunk by individual students. They are asked to compare the data in the table to the summary to a bar graph, and to find measurement of central tendency. The process emphases are on Communication, evaluating the mathematical thinking of others and expressing their own ideas precisely, and on translating among Representations. The main content is Data Analysis, representing data using tables and graphs.

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Good Deal Meals

Students must find all possible combinations of a meal pushes, and explain their answer. The process emphases are on Problem Solving and Representation of options using pictures or diagrams. The main content is Number and Operations, understanding relationships between numbers and number systems. Also tested is computing Probabilities, using such methods as organized lists and tree diagrams.

Elevators

Two elevators are moving up several floors of a building. Students use clues to discover how long each elevator takes and when they pass each other. The process emphasis is on Problem Solving, applying and adapting appropriate strategies. The main content is Number and Operations, fluently adding, subtracting, multiplying, and dividing; and Algebra, modeling and solving contextualized problems using various representations.

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Grade 7
Form A

Quilt

Students are asked how increasing the length and width of a quilt affects that perimeter and area of parts of the quilt. The process emphases are Problem Solving and Communication of mathematical thinking. The main content is recognizing and applying geometric ideas in areas outside mathematics, and Algebra, extending patterns.

Aunt Mabel

Aunt Mabel offers to give money to her nephew in one of three increasing or decreasing patterns. Students are asked to extend the patterns and choose which option would give the nephew the most money. The process emphases are Reasoning, making and investigating mathematical conjectures, and Communicating mathematical thinking. The main content is Algebra, extending and making generalizations about numeric patterns.

Choose a Cube

In the context of a bag containing black and white cubes, students are asked various questions about basic probability. The process emphases are Reasoning and Communication, analyzing and evaluating the mathematical thinking and conjectures of others. The main content is understanding and applying the basic concepts of Probability.

Languages

Students are asked to evaluate generalizations made about data given in a table, and to use the table to complete a circle graph. The process emphases are translating among Representations, and Communication, analyzing the thinking of others. The main content is Number and Operations, solving problems involving simple proportions, and Data Analysis, organizing and displaying relevant data.

Pentagons

Students are asked to recognize, continue, and generalize a number pattern occurring in a geometric situation. They must describe the rule for generalizing the pattern for any number. The process emphases are Problem Solving, Reasoning, and Communication. The main content is Algebra, understanding patterns, relations, and functions, and expressing mathematical relationships using equations.

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Grade 7
Form B

Short Tasks

Students are asked to solve several problems involving basic computation skills. The process emphasis is Problem Solving. The main content is Number and Operations, computing fluently, and Algebra, modeling and solving contextualized problems.

Computers

Students are asked to solve problems involving percents in a context of computer prices. The process emphases are Problem Solving and Communication of mathematical ideas. The main content is Number and Operations, computing fluently.

Lockers

Students are asked to use clues involving multiples, odd and even, and greater than and less than, to determine locker numbers. The process emphases are Connections, understanding how mathematical ideas interconnect, and Problem Solving. The main content is Number and Operations, understanding numbers, relationships among numbers, and number systems.

Stacking Plastic Cups

A drawing of six plastic cups is shown with a centimeter ruler. The task is to measure the stack of cups and use the information to determine a pattern that will enable the student to find the height of any number of plastic cups in a stack. The process emphases are on Connections, Communication, and Problem Solving, understanding how mathematical ideas interconnect to build new mathematical knowledge. The main content is Algebra, understanding and generalizing patterns and representing these structures using symbols; and Measurement, applying techniques and tools to find length.

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Grade 8
Form A

Paper Waste

In the context of the amount of waste paper produced in the United States per year, students are asked to solve various real-world problems involving calculation with large numbers and percents. The process emphasis is Problem Solving in mathematical and other contexts. The main content is Number and Operations, computing fluently.

Swimming Race

Students are asked to interpret a graph showing the distances of competitors in a race from the starting point as a function of time. The process emphases are organizing and consolidating mathematical thinking through Communication, and using Representations to interpret physical phenomena. The main content is Algebra, modeling and solving conceptualized problems.

Apartment Numbers

Students are shown the beginning of a pattern of numbering apartments in a long row of houses. They are asked to continue the pattern, and to find and use numeric rules describing the pattern. The process emphases are Reasoning, creating and using Representations, and Communication of mathematical thinking. The main content is Algebra, describing, extending, and making generalizations about numeric patterns, and modeling conceptualized problems.

Cube Shapes

Given a pattern of blocks arranged in increasingly large geometric shapes, students are asked to extend the pattern and to find a rule describing the pattern. The process emphases are Reasoning, creating and using Representations, and Communication of mathematical thinking. The main content is Algebra, describing, extending, and making generalizations about geometric patterns, and expressing mathematical relationships using equations.

Land and Water

Students are asked to solve various real-world problems involving calculation with large numbers in scientific notation and with percents. The process emphasis is Problem Solving. The main content is Number and Operations, computing fluently and understanding number systems.

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Grade 8
Form B

Short Tasks

Students are asked to solve several problems using skills such as estimation, geometry, and calculating with time, percents, and decimals. The process emphases are Problem Solving and Representation. The main content is Number and Operations, calculating fluently; applying formulas to determine Measurement; and Geometry, congruence and similarity.

Designing Sweatshirts

Students are asked to analyze and interpret scatter graphs showing the relationship between neck and back measurements for boys and girls. The process emphases are using Representations to model and interpret physical phenomena, and Communication of mathematical thinking. The main content is Data Analysis, interpreting data displays and proposing and justifying conclusions based on data.

Take a Cube

In the context of bags containing black and white cubes, students are asked various questions about basic probability. The process emphases are Problem Solving, Communication, and Representation. The main content is Probability.

Fish Ponds

Students are shown square paving stones surrounding a fishpond. They are asked to find the number of paving stones required to surround different sizes of fishponds, and to find and use numeric rules describing the pattern. The process emphases are Reasoning and Communication of mathematical ideas. The main content is Geometric ideas and relationships, and Algebra, geometric and numeric patterns, and expressing mathematical relationships using equations.

The Puzzle

Students are asked to solve a puzzle in which symbols represent numbers. The process emphasis is using various types of Reasoning. The main content is Algebra, developing an initial conceptual understanding of different uses of variables.

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Grade 9
Form A

Bookmark

In this task, students investigate the proportional relationship between the thickness of a book and the number of pages in the book. In addition, students consider the effect of measurement error in the estimation process. The main process emphasis is Reasoning—particularly proportional reasoning in estimating the location of a bookmark. The main content is Measurement, both in using given measurements and proportion to measure indirectly, and in the application of measurement error.

Consecutive Odd Numbers

A sequence of consecutive odd numbers is presented in a triangular array. In this task, students are asked to evaluate various conjectures and find a formula to model one of the patterns in the sequence. The process emphases are Reasoning, Representation, and Communication. The main content is Algebra.

Fun Size Can

In this task, students investigate the relationships between the radii, heights, surface areas, and volumes of two cylindrical cans. Students apply these relationships to the problem of selecting dimensions that minimize the amount of aluminum needed to produce the cans. The process emphasis is on the Connections between mathematical ideas and business applications. The main content is Measurement.

Shopping

In this task, students draw conclusions from a statistical study of the shopping habits of adults who shop in the city of Redford. Students analyze information presented in a table and a scatter graph. The process emphases are on Reasoning from quantitative data and Connections between data and its uses in the real world. The main content is Data Analysis.

Triangles

In this task, students classify triangles according to the number of congruent sides and the number of right angles. Students demonstrate an example of a triangle satisfying given conditions, or use geometric properties to explain why such a triangle does not exist. The process emphases are on Problem Solving and Reasoning. The main content is Geometry.

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Grade 9
Form B

Short Tasks

Students are asked to solve several problems using skills such as estimation, geometry, and calculating with time, percents, and decimals. The process emphases are Connections, Problem Solving and Representation. The main content is Number and Operations, Algebra, and Geometry.

Odd and Even

In this task, students study a board game that uses two spinners. Given the rules of the game, students apply probability to develop their understanding of the game. Students also consider various ways to improve the game. The process emphases are on Reasoning using probability, Communication of mathematical ideas, and Connections between probability and the study of a game. The main content is Data Analysis.

Number Pattern

In this task, students are presented with several patterns, arranged by column. Students investigate properties of the patterns, formulate conjectures, and model the patterns algebraically. The process emphases are on Connections, Representation, Problem Solving and Reasoning. The main content is Algebra—describing, extending, and modeling number patterns. This task also involves Number and Operations—relating the patterns to properties of prime numbers.

Rope

Students are presented with a scatter graph showing the lengths and weights of various pieces of rope. Students use the data in the scatter graph to draw conclusions about the thickness of each piece of rope. The process emphases are on Connections between data and measurement, Reasoning from data, and Communication of mathematical ideas. The main content is Data Analysis, in the context of Measurement.

Straw Triangles

In this task, students investigate geometric and numeric patterns produced by sets of straws and pins. Students evaluate a conjecture, and then generalize from this conjecture to arrive at more sophisticated conjectures. The process emphases are on Problem Solving, Reasoning, Connections, Representation, and Communication. The main content is Algebra.

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Book 10
Form A

Glass

In this task, a large rectangular piece of glass must be fit through a smaller doorway. Given the dimensions of the glass and the dimensions of the doorway, students develop a geometric model for the situation and use their model to investigate whether or not the piece of glass will fit through the doorway. The process emphases are on Connections—applying geometry to a practical situation, and Reasoning using geometric models. The main content is Geometry.

Patchwork

In this task, students investigate geometric and numeric patterns produced by patchwork cushions made from right triangles and squares. Students use a table to organize data and present relationships between the number of triangles and squares. Students then develop formulas to model these relationships. The process emphases are on Problem Solving, Reasoning, Connections, Representation, and Communication. The main content is Algebra.

Hang Gliding

Students are presented with the design and measurements of a hang glider. Students use given dimensions and properties of geometry to determine additional measurements used in the design, and relate the area of the hang glider to the hang glider's lift. The process emphases are on Connections between Measurement, Geometry, Algebra, and a practical problem. The main content is Measurement—finding areas and angles. Geometry and Algebra are also used in the indirect measurement of angles and the application of the lift formula.

Sale

In the context of a Going Out of Business Sale, students investigate the prices of items sold at various times during the sale. The process emphases are on Reasoning and Communication, and the Representation of the sale prices using a number pattern. The main content is Number and Operations, calculating sale prices using percent, and Algebra, extending a geometric sequence.

Bottle

A partially filled bottle is shown right side up and upside-down. In each case, the height of the liquid in the bottle is given. Students use geometric properties and measurement

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formulas to calculate the amount of liquid in the bottle and the total capacity of the bottle. The process emphases are on Reasoning, using spatial reasoning and proportion, and Problem Solving, developing a strategy to solve a complex problem. The main content is Measurement. Geometry is also used in determining a suitable model for the task.

Dropping a Cup

In this task, students study a game involving a dropped cup. Students analyze data to determine relative frequencies and experimental probabilities for the various ways the cup can fall. Students apply probabilistic models to draw conclusions about the outcome of the game. The process emphases are on the Connections between probability and a practical situation, and Reasoning using data. The main content is Data Analysis.

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Book 10

Form B

Short Tasks

Students are asked to solve several problems involving distance and rate, geometry, algebraic formulas, and percents. The process emphases are Connections, Problem Solving and Representation. The main content is Number and Operations, Algebra, and Geometry.

Calendar Patterns

In this task, students are presented with a calendar for the month of May along with three patterns that appear in the calendar. Students consider rules for each pattern and conjecture whether each rule will always work. The process emphases are on the Connections between number patterns and the calendar, the Representation of these patterns using algebra, and Reasoning mathematically to evaluate conjectures. The main content is Algebra.

School Fair

In the context of a school fair, students investigate a game involving balls and barrels. Students are presented with the rules of the game and information about the number of balls in each barrel. From this information, students calculate the probability of winning a prize, determine the amount of money likely to be raised by the game, and consider how changes to the game will affect the amount of money raised. The process emphases are on the Connections between probability and a practical situation, Reasoning using probability, and Communication of mathematical ideas. The main content is Data Analysis.

Courthouse Steps

Students are presented with a patchwork design called "Courthouse Steps." The design contains geometric and numeric patterns. Students find a formula for one of the patterns in the design and use their formula to determine where a particular piece of the design will be located. The process emphases are on the Connections among numbers and geometry in art, the Representation of a pattern using algebra, and Reasoning and Communication. The main content is Algebra.

Swimming Race

In this task, students study a graph showing the positions of two swimmers in a race and use the information in the graph to interpret commentary on the race. The process emphasis is Representation—connecting verbal and graphical accounts of the race. The main content is Data Analysis and Algebra—relating the slope of the graph to the speed of the racers.

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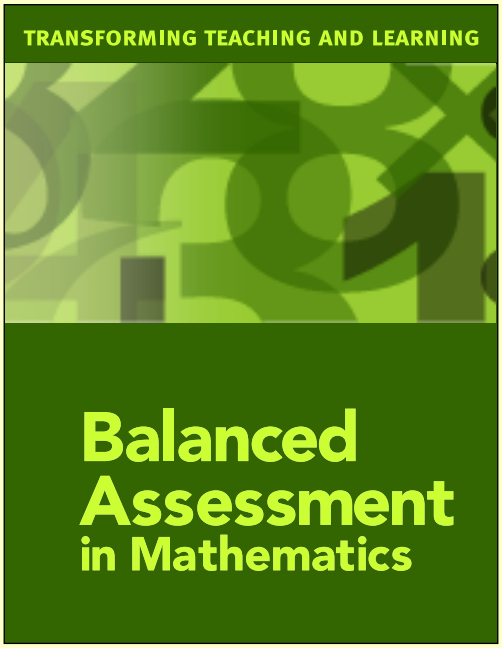

> Scoring and Reporting Overview

CTB McGraw-Hill

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Scoring Balanced Assessment

This scoring guide is designed to facilitate the accurate and reliable scoring of the 2001 Tests for Balanced Assessment in Mathematics.

At each grade, from 3 through 10, two Forms, A and B, are offered. Either one or both forms may be taken. They are designed for local scoring, following standardized rubrics that specify how points are to be awarded.

This introductory section explains the basis of the design, development, and use of the scoring. It is illustrated with a simple task for Grade 3, Magazine Cover. Scoring procedures are described in the How to Score the Tests section.

The essential materials for scoring are provided in the Resources for Each Grade section. They comprise, for each task:

• the scoring rubric

• 5 student "training papers," selected to illustrate the use of the rubric across the range of performance. These training papers are provided in both unscored and scored form.

• 10 student "standardizing papers." These papers are provided in both unscored and scored form as well. They are provided to help scorers practice applying the rubric to achieve consistent scoring.

Access to all these elements is through the Home Page on this CD and through the contents page for each particular grade. It should be recognized that no written rubric can cover all possible student responses. Scorers will sometimes need to use their professional and mathematical judgment in following the rubric. By using these materials to train scorers, and with appropriate monitoring of scorers, high reliability can be achieved.

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Principles of Scoring

Performance assessment provides students with an opportunity to show what they know, understand, and can do on a balanced sample of tasks from the range and variety that constitute mathematical performance. Scoring is where we value the different aspects of that performance.

All assessment embodies value judgments. For example, if one values only accuracy in computation and manipulation, credit will be given only for those aspects of performance. If, however, one also values students' abilities to decide how to tackle an unfamiliar problem, or interpret and evaluate solutions, or communicate results and reasoning to others, credit will be given for these aspects as well. In performance assessment, these value judgments are explicit, as set out in the scoring rubrics for each task.

The scoring rubric for each task was developed along with the task. This process involved detailed discussion of the elements of performance that the task demands, as well as analysis of samples of student work, leading to a consensus. The rubric represents one carefully considered evaluation of student performances on the task. While other approaches are possible, consistency of scoring requires that all scorers apply this rubric carefully and conscientiously, even if they do not agree with some aspects of it.

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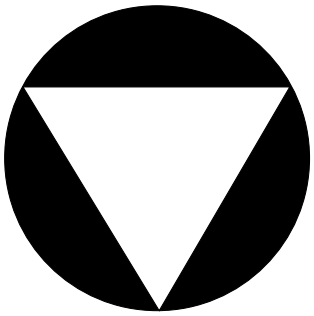
Magazine Cover

This problem gives you the chance to:
- describe a given geometric pattern

This pattern is to appear on the front cover of the school magazine.



You need to call the magazine editor and describe the pattern as clearly as possible in words so that she can draw it.

Write down what you will say on the phone.

(space for students to write follows here)

The Scoring Rubrics

These rubrics use a point system. Each rubric is an expansion of the description of the *core elements of performance* of the task, and is listed under the title (as in *Magazine Cover*, shown above).

The total points available are chosen to be equal to the length of time (in minutes) it takes a typical successful student to complete the task. The total points for each task are then distributed among the different aspects of performance, so that each aspect is given a weight appropriate to its importance.

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This process is illustrated in the rubric design for *Magazine Cover*, which shows the various elements that are credited. The maximum score is 6 because this is a 6-minute task. For each of the two simple technical terms, circle and triangle, 1 point is assigned. (Most students get these points.) For each of the key geometric insights on the triangle (equal sides, point down, touching the circle), 1 point is given, but further technical terms (e.g., equilateral) are not required at grade 3. For the color contrast, seen as a key feature in the context of the task (cover design), 1 point is given, and 1 point is given for some size information. To keep within the total, a maximum of 6 of the 7 points cited above may be awarded.

Magazine Cover	Test 3 Form B Rubric	
The core elements of performance required by this task are: • describe a given geometric pattern Based on these, credit for specific aspects of performance should be assigned as follows:	**Points**	**Section Points**
Allow 1 point for each feature correctly described, up to a maximum of 6 points.		
A **circle.**	1	
A **triangle.**	1	
All corners of triangle on (circumference of) **circle.**	1	
Triangle is equilateral. Accept: All sides are equal/the same.	1	
Triangle is standing on one corner. Accept: Upside/going down.	1	
Describes measurements of circle/triangle.	1	
Describes color: **black/white.**	1	
Total Points		**6**

In more complex tasks, more than one point may be assigned for an important and substantial part of the task, such as for an explanation. The rubric will give guidance on assigning partial credit (e.g., for a correct but incomplete explanation). Partial credit points are shown in parentheses.

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The Student Papers

The meaning of the rubric is illustrated through five pieces of student work, referred to as "training papers" and labeled T1 through T5. These papers have been chosen to show a range of performance that is to be expected, and to draw attention to important points of interpretation of the rubric.

The following comments apply to the five training papers for the task *Magazine Cover,* T1 through T5, reproduced at the end of this section. The check marks on the papers show where the scorer has found *evidence* that merits a point. The points are recorded down the right-hand side in rubric order.

> T1 has 5 points; it makes no reference to equal sides or size.
>
> T2 has 4 of the points; the phrase "millimeter away from the edge" is judged to be equivalent to touching the circle.
>
> T3 has 4 of the points: 3 for triangle, upside down, and color; the phrase "1/2 oval on each side of the . . . triangle" is judged to cover the touching the circle point, but not the circle point. The scorer notes BOD (benefit of the doubt) on the paper. (See the How to Score the Tests section.)
>
> T4 has 3 of the points for circle, triangle, and point down.
>
> T5 has only the 2 points for circle and triangle.

This simple example illustrates the straightforward process of using a rubric, and the search for evidence in borderline cases.

In this scoring guide, for each task, five training papers appear first without score points. Follow the rubric, and give points based on it. Then look at the same five training papers, presented again, with score points assigned by expert scorers. This second set will enable you to check your ability to interpret the rubric in the standard way.

In order to promote greater accuracy and reliability of scoring, ten additional standardizing papers are provided for each task. These additional papers are again presented in unscored and scored fashion. They are designed to ensure the ability of all scorers to apply the rubrics in the standard way.

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Aggregation and Reporting

When all the student papers for a test have been scored, the information has to be interpreted so that it is in a form that is useful and clear. From the scored student papers, teachers and their students will get detailed information on individual strengths and weaknesses, as well as valuable experience with this kind of assessment. For accountability or other external assessment purposes, standardized scores and a well-defined reporting structure may be needed. For these tests, a standard-setting procedure to establish cut scores between the four reporting levels will take place in May each year under the direction of the CTB-MARS Mathematics Board, following the scoring, data entry, and data processing of a substantial sample of student work from different districts. The main sources of information that guide this standard setting are the published standards for these tests, the Board's view of students' performance on them, and a range of statistical information. While these national cut scores will be available to all users, some districts may prefer to use their own standard-setting procedures, based on local standards.

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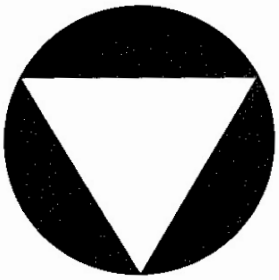
Magazine Cover

This problem gives you the chance to:
- describe a given geometric pattern

This pattern is to appear on the front cover of the school magazine.



You need to call the magazine editor and describe the pattern as clearly as possible in words so that she can draw it.

Write down what you will say on the phone.

"The design is a black circle with a big white upside down triangle that barely touches the edge of the circle.

5

6

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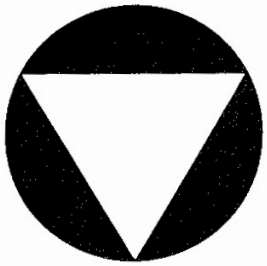
Magazine Cover

T2

This problem gives you the chance to:
- describe a given geometric pattern

This pattern is to appear on the front cover of the school magazine.



You need to call the magazine editor and describe the pattern as clearly as possible in words so that she can draw it.

Write down what you will say on the phone.

THE PATERN I WANT IS A BLACK CIRCLE WITH A BIG WHITE TRIANGLE IN THE MIDDLE. EVERY CORNER SHOULD BE A MILLIMETER AWAY FROM THE EDGE OF THE CIRCLE.

1 1 1 0 0 0 1

4

6

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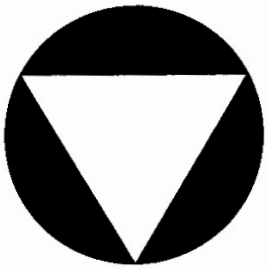
Magazine Cover

This problem gives you the chance to:
- describe a given geometric pattern

T3

This pattern is to appear on the front cover of the school magazine.



You need to call the magazine editor and describe the pattern as clearly as possible in words so that she can draw it.

Write down what you will say on the phone.

To draw this figure draw an upsidown triangle after that you draw a solid black ½ oval on each side of the upsidown triangle.

BOO

0 1 1 0 1 0 1

4

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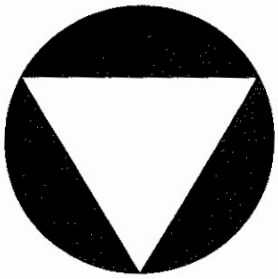
Magazine Cover

This problem gives you the chance to:
- describe a given geometric pattern

T4

This pattern is to appear on the front cover of the school magazine.



You need to call the magazine editor and describe the pattern as clearly as possible in words so that she can draw it.

Write down what you will say on the phone.

you make a couple of lines in a circle sides of the tragle on the top and the point on the bottom

1
1
0
0
1
0
0

3

6

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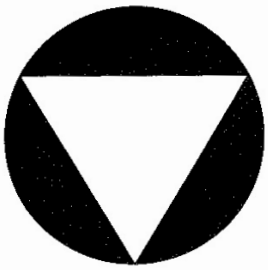
Magazine Cover

This problem gives you the chance to:
- describe a given geometric pattern

TS

This pattern is to appear on the front cover of the school magazine.



You need to call the magazine editor and describe the pattern as clearly as possible in words so that she can draw it.

Write down what you will say on the phone.

The pattern is a circle with a triangle in it.

1
1
0
0
0
0
0

2

6

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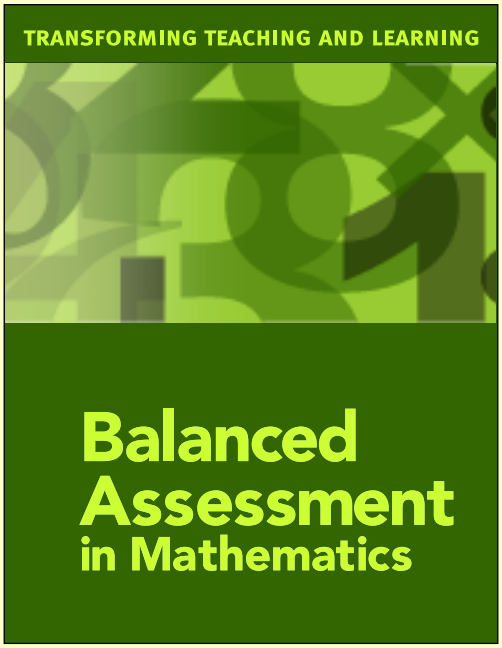

> How to Score the Tests

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How to Score the Tests

This section of the scoring guide provides detailed given first, followed by some practical conventions that help the scoring proceed smoothly and reliably.

This section defines the standard scoring procedures for the annual tests for 2001 and beyond. Of course, if these tests are to be used informally by teachers in their classrooms, such rigorous control is inappropriate. However, even here, many of the procedural details can be helpful to teachers in expediting the important, but often laborious, process of scoring student work.

Scoring rubrics are designed and developed in such a way as to recognize positive achievement. It may be that you do not entirely agree with a particular decision regarding the scoring, but it is vitally important that everyone follow the rubric and any points of interpretation decided upon at training sessions.

It should be recognized that no written rubric can cover all possible student responses. Scorers will sometimes need to use their professional and mathematical judgment in following the rubric. By using these materials to train scorers, and with appropriate monitoring of scorers, high reliability can be achieved.

Before scorers start scoring, it is essential that they thoroughly understand the rubric. Working through the training papers is a crucial part of this process. In actual scoring training, after an introduction to the rubric, the teacher or scorers score these papers. They are then discussed in detail, point by point, to clarify the standard interpretation of the rubric to be applied by scorers. Scored copies of the papers are available for checking. It is essential for each individual scorer, working alone or with a colleague, to go through this process.

Scoring Essentials

The following are essential:

- A correct answer, which appears anywhere on the page and is unambiguous, should be rewarded.
- All tasks and parts of tasks must be scored.
- Only whole points may be awarded.

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Before scoring a student response to a task in detail, read through the whole of the response and form a holistic impression of the work, particularly its structure. Always look for evidence of performance.

- Care should be taken to ensure that all work has been scored. No page should be left without evidence that it has been read and assessed.
- If there is no response to part of the task, but student work later in the task implies a correct response to the earlier missing part, credit should be given for the missing part.
- Work crossed out and not replaced must be scored as long as it is readable.
- Crossed-out work must be scored if the student has not made a second attempt on that part of the task. When a second attempt has been made, the crossed out answer should be ignored. • If a student offers two or more answers, only one of which is correct, credit cannot be given for the correct response.
- Points awarded are not taken away if students make errors when they continue working; work beyond that required by the task is referred to as "further work."
- Errors made by students are penalized only once; subsequent correct work is credited and treated as "follow through."
- Alternative correct solutions should always be given full credit for the aspects of the rubric they cover.
- If, after these rules have been carefully applied, uncertainty remains, the student should be given the benefit of any remaining doubt. (Write BOD in the margin.)
- If you are unsure about interpreting the rubric for an unusual student response, then you may be able to check with the person who has overall responsibility for the scoring process within which you are working—the Lead Scorer.

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Notations for scoring

The symbols to be used in scoring include:

c a o in the rubric where "correct answer only" is acceptable.

e e in the rubric for "each error" (or omission).

dep means the point is awarded, "dependent on" achieving the previous point.

f t "follow through" points—incorrect work at the beginning of a question may be followed through, so that positive achievement later can be awarded despite previous errors.

s c "special case" points may be awarded for an individual correct method different from what is shown on the rubric.

mr "misreads" occasionally occur; the scorer must be convinced that the candidate's work shows a genuine misread and not a misunderstanding. The answer is scored taking into account the misread, and then two points at most are deducted.

f w ignore "further work," once the correct answer is seen.

BOD where a borderline response has been given the "benefit of the doubt."

Useful Conventions

The following conventions for recording score points are helpful:

- Write the numerical point scores for each part of the student response identified in the rubric in the right-hand margin.
- Circle the total score for each task in the margin, level with the end of the task.
- When you have finished scoring each task, transfer the task total to the back cover of the test book.
- When you have finished scoring the last task in the test book, transfer the task total to the back cover and add up the task totals to give the final score.

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The following conventions will help the scoring process go smoothly:

- Score with a red pen.
- Check or underline evidence that earns the award of a point, wherever it occurs.
- Show that incorrect answers, rough work, or a few lines that may have gained no points have been read, by putting a mark in the margin.
- Make some mark on every page where there is student work, to show you have considered it.
- Cross through, with a single diagonal line, any page that has been left completely blank.

Sometimes it is easier to subtract points from the total for a nearly correct response; this process may also be used for checking.

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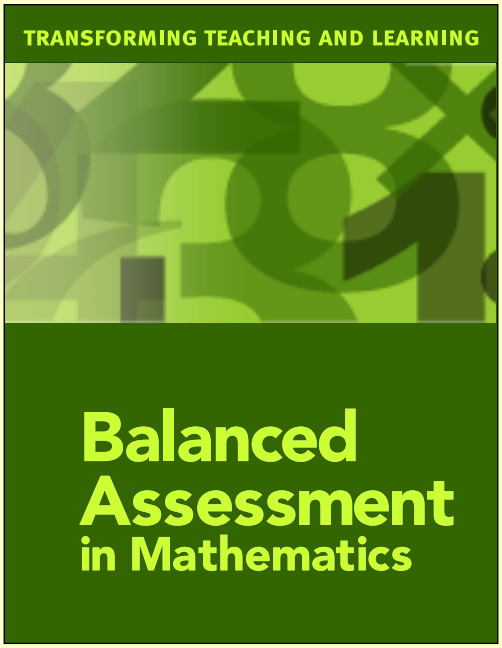

Performance Level Descriptions

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CTB-MARS Balanced Assessment in Mathematics

Descriptions of the Performance Levels

Users often find it helpful to have general descriptions of the kind of performance that is required at each reporting level. The Mathematics Board has approved the following performance descriptions for these tests.

Performance is reported at four levels: 1 through 4, with 4 as the highest.

Level 1

The student's response shows few of the elements of performance that the tasks demand.

Level 2

The student's response shows some of the elements of performance that the tasks demand and some signs of a coherent attack on the core of some of the problems. However, the shortcomings are substantial and the evidence suggests that the student would not be able to produce high-quality solutions without significant further instruction.

Level 3

For most tasks, the student's response shows the main elements of performance that the tasks demand, organized as a coherent attack on the core of the problems. There are errors or omissions, some of which may be important, but of a kind that the student could well fix, with more time for checking and revision and some limited help.

Level 4

The student's response meets the demands of nearly all of the tasks, with few errors. With some more time for checking and revision, excellent solutions would seem likely.

Cut scores

For Form A of the 2001 Tests, the Board has established the following **minimum scores:**

Form	Level 2	Level 3	Level 4
3A	17	23	33
4A	13	21	30
5A	12	22	32
6A	12	24	31
7A	12	20	30
8A	10	21	29
9A	11	22	32
10A	13	24	33

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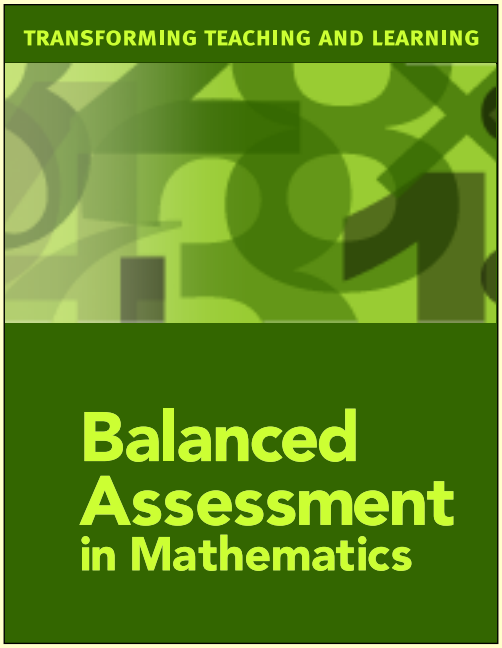

Student Work

> *Sample Excercise : Grade 3—Form A*

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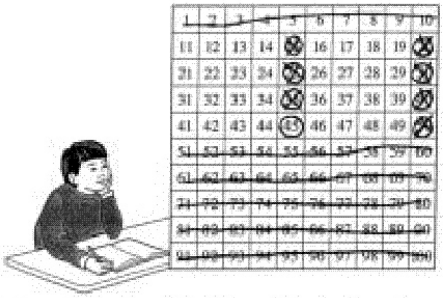
Trang's Number

T1

This problem gives you the chance to:
- solve a problem by using clues
- explain how you used the clues to solve the problem

Trang is thinking of a number between 1 and 100.



Use the chart above and the clues below to help you find Trang's number.

Clue A
If he counts by fives, starting at five, he will say the number.

Clue B
His number is the largest number that fits all the other clues.

Clue C
His number is an odd number.

Clue D
His number is smaller than fifty.

Clue E
His number is larger than 4en.

1a. Write down Trang's number. 45 T1

1b. Explain how you used each clue to figure out Trang's number.

First I read Clue D, then Clue E.
I use Clue C - count by 5's.
I read Clue C - and cross out 20, 30, 40, 50.
Clue B - it is the largest number.

10

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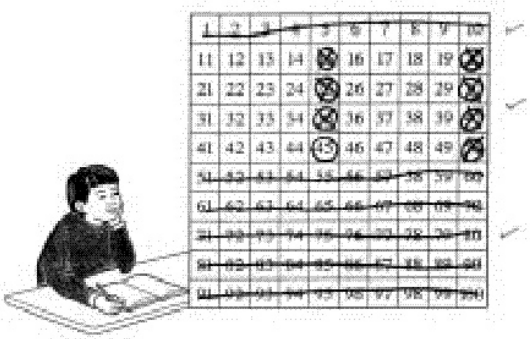
Trang's Number

T1

This problem gives you the chance to:
- solve a problem by using clues
- explain how you used the clues to solve the problem

Trang is thinking of a number between 1 and 100.



Use the chart above and the clues below to help you find Trang's number.

Clue A
If he counts by fives, starting at five, he will say the number.

Clue B
His number is the largest number that fits all the other clues.

Clue C
His number is an odd number.

Clue D
His number is smaller than fifty.

Clue E
His number is larger than ten.

T1

1a. Write down Trang's number. 45 ✓ S

1b. Explain how you used each clue to figure out Trang's number.

First I read Clue D, then Clue E. 1
I use Clue C - count by 5's. ✓ 1
I read Clue C - and cross out 20, 30, 40, 50. ✓ 1
Clue B - it is the largest number. ✓

Check 1
Check 1

10

10

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Trang's Number	Grade 3 Form A Rubric	
The core elements of performance required by this task are: • solve a problem by using clues • explain how you used the clues to solve the problem Based on these, credit for specific aspects of performance should be assigned as follows:	**Points**	**Section points**
1a. Gives correct answer as: **45**	5	5
1b. Allow 1 point for each clue correctly used in the chart **or** in the explanation. Evidence on chart **or** Explanation	5×1 **or** 5×1	5
Total Points		**10**

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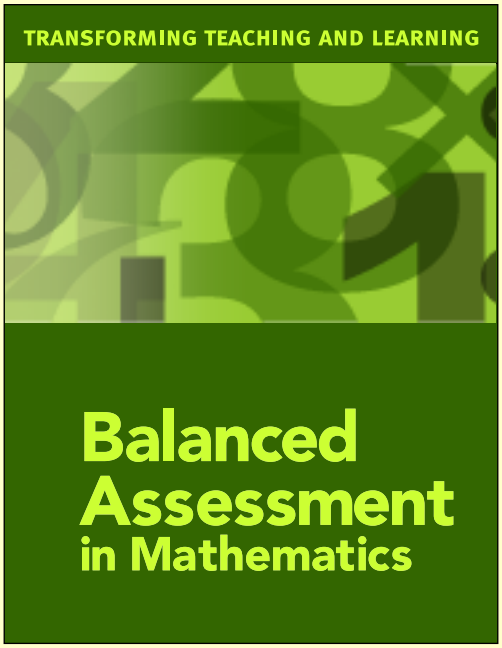

Student Work

> *Sample Excercise : Grade 6—Form A*

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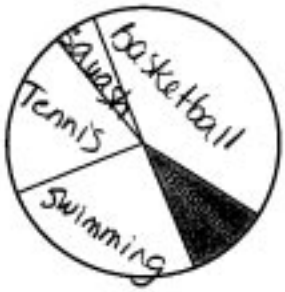
Sports

T1

This problem gives you the chance to:
- use percentages
- interpret a circle graph

At a sports center, everyone takes part in one of five different sports.
This table shows the percentage of people who played badminton, basketball, and squash on Monday.

MONDAY	
Badminton	10%
Basketball	40%
Squash	5%
Swimming	?
Tennis	?



1. On the circle graph, label the two sections that represent basketball and squash. Badminton has been labeled for you.

2. On Monday, more people went swimming than played tennis. On the circle graph, label the sections for swimming and tennis.

3. Use the circle graph to estimate the percentage of people who went swimming. Explain how you figured it out.

I think the percentage of the people who went swimming is about 25%. I got this by adding up all the percents (55) and subtracting it from 100 (-45). I divided the answer in to two unequal parts (20 + 25) and chose the larger part.

4. Use the circle graph to estimate the percentage of people who played tennis. Show how you figured it out.

I think the percentage of people who played tennis is about 20%. I basically did the same thing I did for swimming, except I chose the smaller part.

5

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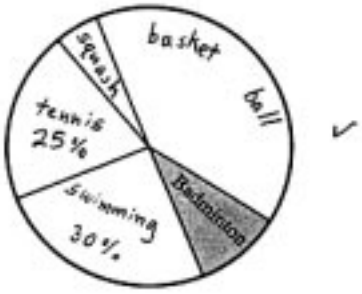
Sports

T1

This problem gives you the chance to:
- use percentages
- interpret a circle graph

At a sports center, everyone takes part in one of five different sports.
This table shows the percentage of people who played badminton, basketball, and squash on Monday.

MONDAY	
Badminton	10%
Basketball	40%
Squash	5%
Swimming	30% ?
Tennis	25% ?



1. On the circle graph, label the two sections that represent basketball and squash. Badminton has been labeled for you. 1

2. On Monday, more people went swimming than played tennis. On the circle graph, label the sections for swimming and tennis. 1

3. Use the circle graph to estimate the percentage of people who went swimming. Explain how you figured it out.

I compared it to basketball and estimated it was about 10% less. 0

4. Use the circle graph to estimate the percentage of people who played tennis. Show how you figured it out.

I compared it to swimming and estimated it was about 5% less. 0

0

2

5

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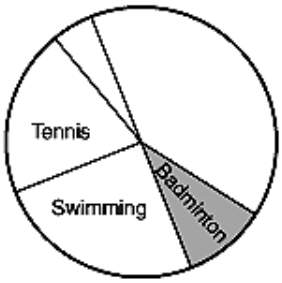
Sports	Grade 6 Form A Rubric	
The core elements of performance required by this task are: • use percentages • interpret a circle graph Based on these, credit for specific aspects of performance should be assigned as follows:	Points	Section points
1. Award 1 point for 2 correct labels.	1	1
2.  Award 1 point for 2 correct labels.	1	1
3. Gives an acceptable explanation based on comparison such as: Swimming is about 90°: 25% or Swimming is around 30% because Badminton is 10% and it fits into swimming about 3 times. Accept 25% to 30%.	1 or 1	1
4. Gives correct answer as: Tennis 20% or 15%. Accept 20% to 15%. Award 1 point if total of Swimming and Tennis is 45%.	1 1	2
Total Points		5

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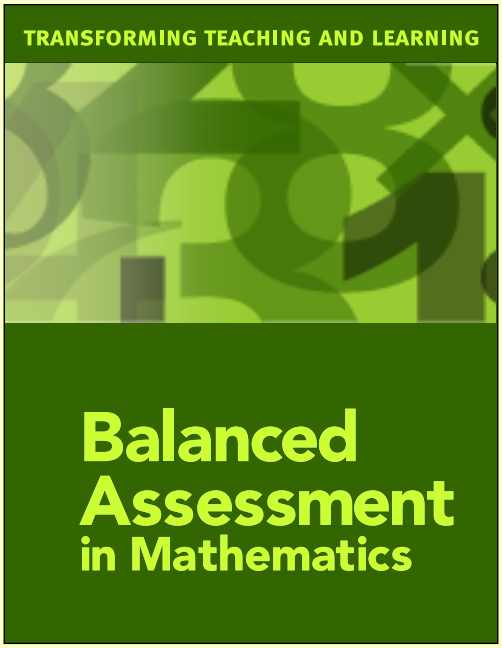

Student Work

> *Sample Excercise : Grade 10—Form A*

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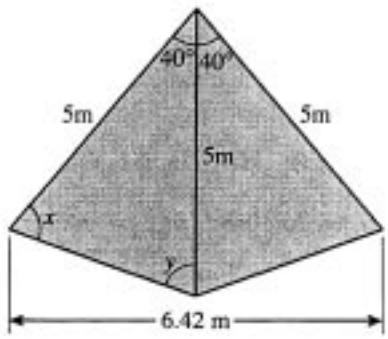
Hang Gliding

T1

This problem gives you the chance to:
- find angles and area
- use a formula in a practical situation

Alison is designing a new sail for a hang glider.



1. Find angles x and y.

$x = y = \frac{180 - 40}{2} = 70°$

2. Find the total area of the sail.

Area rectangle $= 5 \times 6.42$
Area sail $= 5 \times 3.21$
$= 16.05\,m \simeq 16\,m^2$

3. In a moderate breeze, the weight a hang glider can lift is given by this formula:

$$w = 5(a - 3)$$

w = the weight of the person in kilograms
a = the area of the sail in square meters

What area of sail is needed to lift a person with a weight of 70 kilograms?

$70 = 5(a - 3) = 5a - 15$

$\frac{85}{5} = a = 17$ kg.

5

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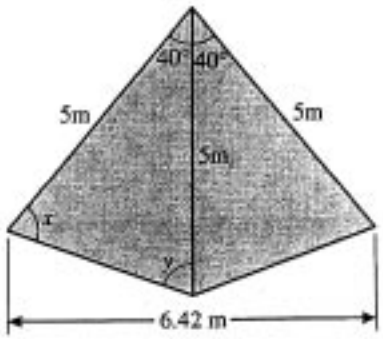
Hang Gliding

T1

This problem gives you the chance to:
- find angles and area
- use a formula in a practical situation

Alison is designing a new sail for a hang glider.



1. Find angles x and y.

$x = y = \frac{180 - 40}{2} = 70°$ ✓ 1

2. Find the total area of the sail.

Area rectangle $= 5 \times 6.42$
Area sail $= 5 \times 3.21$
$= 16.05\text{m} \simeq 16\text{m}^2$ ✓ 2

3. In a moderate breeze, the weight a hang glider can lift is given by this formula:

$$w = 5(a - 3)$$

w = the weight of the person in kilograms
a = the area of the sail in square meters

What area of sail is needed to lift a person with a weight of 70 kilograms? 1

$70 = 5(a-3) = 5a - 15$ ✓ _____ 1

$\frac{85}{5} = a = 17$ kg ✓

5

5

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Hang Gliding	Grade 10 Form A Rubric	
The core elements of performance required by this task are: • finding angles and area • using a formula in a practical situation Based on these, credit for specific aspects of performance should be assigned as follows:	Points	Section points
1. Gives correct answer and gives explanation or shows work such as: Angles x and y are equal because the triangle they are in is isosceles. Since one angle in the triangle is 40˚, this means that x and y satisfy $x + y = 140˚$. Answer: x and y are both equal to 70˚	1	1
2. Gives correct answer as: 16.05 sq. m. *Partial credit:* Does not obtain a correct answer, but shows correct method.	2 (1)	2
3. Gives correct answer as: A sail with an area of 17 square meters will lift a person weighing 70 kilograms. *Partial credit:* Does not obtain a correct answer, but substitutes correctly in the equation $70 = 5(a - 3)$	2 (1)	2
Total Points		5

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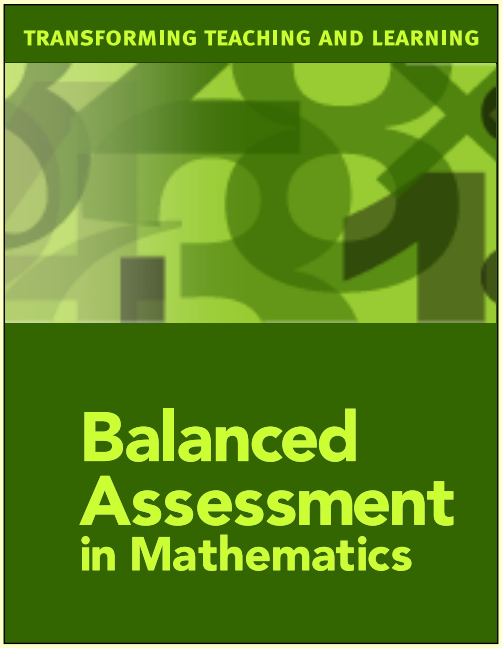

Resources

> *TestMate Clarity®*

> *Frequently Asked Questions*

> *Glossary*

> *Acronyms*

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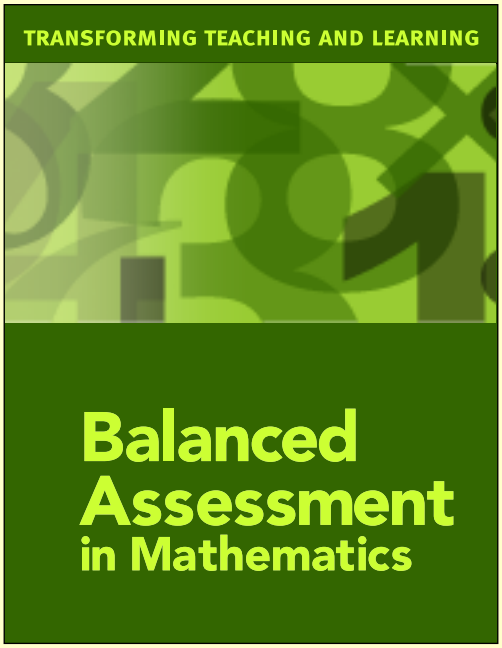

TestMate Clarity®

TestMate Clarity® is a sophisticated reporting tool that allows you to create custom classroom, school, and district reports. With TestMate Clarity, the user can disaggregate data and print custom reports based on specific reporting needs. You can also use TestMate Clarity to score electronically, by scanning of test documents for easy computer-based scoring. TestMate Clarity (available for the Balanced Assessment in Mathematics in 2002), provides a proven way to monitor strengths and weaknesses of individuals and groups.

TestMate Clarity® is a member of the TestMate™ family of CTB reporting products. It is an innovative database software system that offers complete data storage and reporting of Balanced Assessment test results for districts, schools, and classrooms.

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Frequently Asked Questions About Balanced Assessment in Mathematics

Q. Do these tests (Balanced Assessment in Math) match our standards?

A. Yes. Standards list some of the main elements needed to do mathematics effectively. These elements are sampled in each Balanced Assessment test. But performance in mathematics is more than this—it demands the ability to choose and use appropriate elements effectively in tackling the broad range of substantial problems that may arise in everyday life and work. In performance, the whole is more than the sum of the parts (just as driving a car is more than turning the steering wheel, using the brakes, etc.; or playing a good game of tennis is more than a serve, forehand, backhand, volley, etc. One usually prefers to judge performances as a whole – whether driving or playing a game.

These tests, like all good performance assessments, present students with substantial tasks that enable them *to show what they know, understand, and can do*. This involves assessing how they use all the mathematics they have learned up to this time, not just the topics they have recently been taught. Indeed, it takes most students a while to assimilate recent learning fully enough to be able to use it effectively on substantial problems—rather than short exercises, which closely imitate those they have practiced in meeting the topic or skill. Balanced Assessment has some short exercise items but focuses on a balanced sample of substantial problems that represent mathematical performance, as described in national and international standards.

The detailed standards for these tests are based on the *Principles and Standards for School Mathematics*, developed by the National Council of Teachers of Mathematics in consultation with the major US societies of mathematicians. Most state and local standards are broadly similar to these, though not all explicitly cover the essential process as well as content aspects of doing mathematics.

Q. Can you train my teachers to score locally?

A. Yes, scoring training is available through CTB. The Mathematics Assessment Resource Service (MARS) will initially provide training. MARS is training a CTB team that will be located regionally. The cost for training is $1,200 a day for a single trainer, with a second trainer available at an additional $800 a day. Scoring training generally requires half a day per test to be scored. Training costs do not include travel and expenses. Anyone interested in training should contact Alan Sheinker at **asheinker@ctb.com**.

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Q. Can we use Balanced Assessment Mathematics as a classroom practice piece for our state exam?

A. The Balanced Assessment in Mathematics tests provide excellent classroom practice. The CTB-MARS Mathematics Board aligned these tests to the National Council of Teachers of Mathematics (NCTM) *Principles and Standards for School Mathematics*. Copies of that alignment are included on your Balanced Assessment in Mathematics CD-ROM. Each individual task has been aligned for both content and process. Because there will be a new test each year, CTB will perform a new alignment each year.

Q. Is scoring available from CTB?

A. Scoring is not available currently through CTB. However, we are pursuing that option, and scoring may soon be available. In the meantime, a TestMate Clarity® software solution is near completion. This solution will allow local districts to score their own tests and print customized reports.

Q. Is there a table that references test items to content objectives, the way the Teacher's Guide to *TerraNova* does?

A. CTB will provide this information every year in a document that maps each BAM task to the NCTM *Principles and Standards*. Remember that because there is a new test each year, this document will be critical to enable customers to interpret the test results. Also keep in mind that not all standards are covered each year, only a sample. This system ensures that the entire domain of mathematics is taught over a period of years.

Q. Are Balanced Assessment in Mathematics norms available?

A. There are no norms for Balanced Assessment in Mathematics.

Q. Can we do functional (off-level) testing?

A. Off-level testing may be appropriate for several reasons. If you test in the fall and want diagnostic information, testing should be one grade-level below student's current (entering) grade; then spring testing can be on grade-level. Off-level testing is also appropriate in cases where students have not been exposed to the types of complex problems contained in Balanced Assessment in Mathematics tests. Off-level Balanced Assessment in Mathematics testing could be used in instruction to provide practice tasks for these students.

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Q. Is a Spanish version of Balanced Assessment in Mathematics available?

A. The Mathematics Assessment Collaborative (MAC) in Morgan Hill, California, worked with CTB to develop a Spanish translation of the Balanced Assessment program. MAC is currently using this program with Spanish-speaking students in the San Francisco Bay Area. CTB is working with MAC to explore opportunities to adapt this version for broader distribution.

Q. Is human scoring reliable?

A. Yes, provided the scorers are appropriately trained in using the scoring rubrics, interrater consistency is excellent. There are many detailed studies that show this, both in the US and around the world, where human scoring is used in the great majority of educational assessment.

Experience shows that well-designed rubrics, developed with real samples of student work, are important for reliability, as is scoring training on the test. The purpose of training is to ensure that all scorers interpret the rubric in the same way. Monitoring of scorers is also useful in increasing reliability, particularly in the early stages of their scoring after training. While there are many approaches to monitoring, checking by a lead scorer of a small sample of each scorer's papers is probably the most efficient. There is a trade-off between these two aspects—the more thorough the training, the less monitoring effort will be needed. The total effort required depends on the accuracy that is sought. Scoring of high-stakes assessment for accountability requires high precision. In other circumstances, detailed information, rather than standardized precision, is sometimes more important—for instance, when the assessment is used by the teacher in the classroom to guide instruction.

The main sources of error in assessment rarely lie in the scoring process; rather they come from not testing what you are really interested in—testing students on a too-narrow set of task types that do not cover the goals of education in a balanced way. The emphasis in Balanced Assessment in Mathematics is on this key issue—the *validity* of the task set, and the scoring rubrics.

Q. How is the validity of Balanced Assessment in Mathematics established?

A. The essence of validity (though many facets and variants have been separately identified and technically defined) is that the tasks should provide all students with a fair and balanced opportunity to show what they know, understand, and can do across the range of performance in the subject. Ensuring this balance is a joint responsibility of the test designers and, ultimately, the appropriate professional peer group, represented for

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these tests by the Mathematics Board. The Board is similarly responsible for the scoring rubrics, which embody value judgments on the relative importance of the various aspects of performance that each task demands, and the cut-scores, which establish the boundaries between reporting levels.

In balancing the tests, the Board is informed in several ways:

- The standards set down for the assessment, covering both process aspects and grade content limits
- Comments from the trials on the characteristics of student performance on each task, both strengths and weaknesses
- Statistical information, notably score distributions from the trials, for each task and for the proposed test as a whole
- An analysis of the balance of each task, and of the test as a whole, in the important dimensions of mathematical performance—content, processes, task context, etc.

The decisions are based on their professional judgment, and thus on the skill and experience for which each was invited to join the Board.

Q. How do these tests compare with the usual multiple-choice tests?

A. They look at different things. Many multiple-choice tests are built of large numbers of short 'items', each focused on a particular ingredient of mathematical performance—often a specific skill or concept. Balanced Assessment is mainly built from a smaller number of substantial non-routine tasks (typically about 5 or 6 tasks, ranging from 5 to 15 minutes in length), each of which involves the student in choosing and using appropriately a variety of such ingredients. This also assesses the various *processes* of mathematical performance—working out how to solve the problem, as well as carrying the solution through.

Statistical studies confirm the difference—in one study, for example, the correlation between Balanced Assessment and SAT9 was 0.65, so that more than half the variance in scores was due to differences in what is assessed in the two tests. (See Validity.)

All of which confirms the importance of using multiple measures of different kinds in making assessments. This has long been recognized as *essential*, educationally and probably legally, where actions of significance to the student, teacher, school or system are to be based on the assessment.

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Q. How does Balanced Assessment in Mathematics relate to the curriculum in our schools?

A. Balanced Assessment is designed to recognize quality in mathematical performance at all levels. It is aligned with standards-based curricula that reflect the broad and rigorous goals of the *Principles and Standards for School Mathematics*, developed by NCTM in consultation with the major US societies of mathematicians. It is thus an important element of support in reform programs that seek to improve the quality of the learning or teaching of mathematics. Without such well-aligned assessments, teachers' achievements will not be recognized by the accountability system, which discourages many from moving their practice in the way the standards require.

Standards-based assessment can also be used to *lead* a reform program. It provides a clear set of performance goals and a powerful focus and stimulus for professional development work. This proves a powerful stimulus and guide to teachers in the challenging process of absorbing new curricula and classroom practices. MARS offers support in this area, too.

Q. What support materials are available?

A. There is a range of materials, notably:

- Balanced Assessment packages (Dale Seymour, Pearson Learning)
- Practice tests, and the associated Scoring Guide (CTB)
- Professional development materials (MARS – 517-432-0815) and, of course, the curriculum materials developed by the twelve standards-based NSF-funded curriculum projects, for which MARS was funded to provide aligned assessment.

Q. What professional development is needed?

A. Hard working students in any school that is implementing a modern standards-based curriculum should do well on these tests. It will help to give them some experience with:

- Balanced Assessment tasks in class
- Working and scoring the practice tests for their grade.

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For those using more traditional curriculum, MARS will be happy to provide advice and support through the development process.

However, all teachers and their students benefit greatly from a sensible ongoing program of professional development. It is well recognized that performance assessment provides an effective focal element in any such program—one that motivates all teachers. The core of such professional development is looking in some depth at carefully selected examples of student work on rich and interesting tasks. This activity brings out, in a down-to-earth and explicit form, the central issues of curriculum and instruction. Scoring Training provides a motivating taste of this experience.

MARS offers workshops at which **professional development** leaders learn to lead similar workshops within their own system, initially built around carefully developed materials from MARS. To learn more about these services, contact MARS http://www.educ.msu.edu/mars .

Q. How do I learn more about Balanced Assessment in Mathematics?

A. To learn more, you may look at
http://ctb.com/products_services/balanced_math/index.shtml

then Email or call Alan Sheinker at asheinker@ctb.com; phone: 831-393-7691.

To learn more about the design of the tests, support materials, or MARS related work, look at **http://www.educ.msu.edu/mars** — then Email or call Sandra Wilcox at wilcoxs@pilot.msu.edu; phone: 517-432-0815.

Or, you may contact Hugh Burkhardt at Hugh.Burkhardt@nottingham.ac.uk

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Glossary

Academic Aptitude Test
An aptitude test that predicts achievement in academic pursuits. Ideally, in constructing this type of test the developer tries to minimize the effect of exposure to specific materials or courses of study on the examinee's score.

Achievement Test
An assessment that measures a student's current acquired knowledge and skills in one or more of the content areas common to most school curricula (for example, reading, language arts, mathematics, science, and social studies).

Adult Accountability Test
An assessment intended primarily for individuals 18 years old or older who are no longer attending elementary or secondary school.

Alternative Assessment
An assessment that differs from traditional achievement tests—for example, one that requires a student to generate or produce responses or products rather than answer only selected-response items. This type of assessment may include essays, constructed-response activities, portfolios, interviews, teacher observations, work samples, or group projects. See *Authentic Assessment*, *Multiple Measures*, and *Performance Assessment*.

Analytic Scoring
A scoring procedure in which a student's work is evaluated for selected characteristics, with each characteristic receiving a separate score. See *Holistic Scoring*.

Aptitude Test
An assessment designed to predict a student's expected or potential acquisition of knowledge or skills. This type of test usually consists of items selected and standardized to predict future performance on tasks not evidently similar to those in the test. Aptitude tests may or may not differ in content from achievement tests, but they do differ in purpose. Aptitude test items predict future learning or performance; achievement test items sample the adequacy of past learning.

Assessment Accommodation
A change made to the test administration procedure to provide equal access for students with disabilities to demonstrate their knowledge and skills.

Authentic Assessment
An assessment that measures a student's performance in tasks and situations that occur in real life. This type of assessment is closely aligned with and models what students do in a classroom.

Bias
The effect of a test when it systematically measures differently for different ethnic, cultural, regional, or gender groups. To ensure validity and reliability that strengthen tests, publishers should take all necessary steps to avoid bias.

Ceiling
The upper limit of performance that can be measured effectively by a test. Individuals are said to be at the ceiling of a test when they perform at the top of the range in which the test can make reliable discrimination. If an individual or group scores at the ceiling of a test, the test is too easy for them, and the next higher level of the test, if available, should be administered. See *Floor*.

Checklist
An assessment based on the examiner observing an individual or group and indicating whether or not the assessed behavior is demonstrated.

Composite Score
A single score used to express the combination, by averaging or summation, of the scores on several different tests.

Constructed-Response Item
An assessment unit with directions and a question or a problem that elicits a written, pictorial, or graphic response. Sometimes called an "open-ended" item.

Content Standard
A statement or description of the knowledge and skill in a content area (for example, language arts, mathematics, science, or social studies) that should be taught in school and assessed in a test. National content standards are published by groups such as the National Council of Teachers of Mathematics and the International Reading Association/National Council of Teachers of English. Local content standards are produced by states and/or school districts.

Content Validity
The extent to which the content of a test sample the subject matter or situation about which conclusions are to be drawn. Methods used in determining content validity are textbook analysis, description of the universe of items, adequacy of the sample, representativeness of the test content, inter-correlations of test scores, and opinions of a jury of experts.

Criterion
A standard or judgment used as a basis for quantitative and qualitative comparison; that variable to which a test is compared to constitute a measure of the tests validity. For example, grade-point average and attainment of curricular objectives are often used as criteria for judging the validity of an academic aptitude test.

Criterion-Referenced Test (CRT)
An assessment that measures a student's performance according to specified standards or criteria rather than in comparison to the performances of other test-takers. Each CRT test item is directly identified with an explicitly stated educational behavioral objective. The type of test is designed to determine which objectives have been mastered by each examinee.

Culture-Fair Test
A test devised to exclude specific cultural stimuli so persons from a particular culture will not be penalized or rewarded on the basis of differential familiarity with the stimuli.

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Curriculum-Referenced Test
An assessment that measures what a student knows or can do in relation to specific, commonly taught curriculum objectives.

Derived Score
Any score that is based on (derived from) a Scale Score. Examples are National Percentile scores, Normal Curve Equivalent scores, and Grade Equivalent scores.

Diagnostic Test
A test intended to locate difficulties or patterns of error. Such tests yield measures of specific knowledge, skills, or abilities underlying achievement within a broad subject. Thus, they provide a basis for remedial instruction.

Distractor
An incorrect answer choice in a selected-response or matching test item. Sometimes called a "foil."

Early Childhood Test
An assessment intended for students in Pre-K, Kindergarten, and Grades 1–3.

Educational (Instructional) Objective
An educational (instructional) objective defines an intended outcome of instruction. It describes what a successful learner should be able to do at the end of the lesson or course, defines the conditions under which the behavior is to occur, and often specifies the criterion or standard of acceptable performance.

Equated Score
A score from one test that is equivalent to a score from another test. Equated scores are usually obtained by administering the two tests of interest to a representative sample of students. Scores from one test are then aligned with scores on the other test using equating analysis.

Face Validity
The quality of a test that leads to judgments, based on inspection only, that it measures a certain variable.

Floor
The opposite of ceiling, the floor is the lower limit of performance that can be measured effectively by a test. Individuals are said to be at the floor of a test when they perform at the bottom of the range in which the test can make reliable discrimination. If an individual or group scores at the floor of a test, the test is too difficult for them, and the next lower level of the test, if available, should be administered. See *Ceiling*.

Frequency Distribution
An ordered tabulation of individual scores (or groups of scores) that shows the number of persons who obtained each score or placed within each group of scores.

Functional Range
The functional range of a test is the range of grades for which the test can be administered in order to obtain accurate norm-referenced data. For most tests, this range is two grades above or below the grade for which the test was intended.

Grade Equivalent (GE)
A score on a scale developed to indicate the school grade (usually measured in tenths of a year) that corresponds to an average test score. A grade equivalent of 6.4 is interpreted as a score that is average for a group that has completed the fourth month of Grade 6. Grade equivalents do not compose a scale of equal intervals and are not usable in drawing profiles.

Grade Norm
The average test score obtained by students classified at a given grade placement.

Holistic Scoring
A scoring procedure yielding a single score based on overall student performance rather than an accumulation of points. Holistic scoring uses rubrics. See *Analytic Scoring*.

Instructional Improvement Assessment
A test that provides specific information to assist teachers and administrators develop strategies to improve learning, e.g., a test that provides objective-level data.

Intelligence Test
A test that measures a person's higher intellectual capacities, such as the ability to perceive and understand relationships and the ability to recall associated meaning—the ability to learn.

Item
One of the assessment units, usually a problem or a question, that is included on a test.

Item Bias
The effect of an item when it systematically measures differently for different ethnic, cultural, regional, or gender groups.

K–12 Assessment
An assessment intended primarily for students in elementary and secondary school. CTB/McGraw-Hill assessments may assess students in the entire K–12 range or just in selected grades, e.g., Grades 2–12.

Local Norms
Norms that have been obtained from data collected in a limited locale, such as a school system, county, or state. They may be used instead of national norms to evaluate student performance.

Mean
A measure of central tendency. An average calculated by adding a set of scores and dividing by the number of scores in the set. Mathematicians call it "arithmetic mean."

Median
A measure of central tendency. The middle score in a set of ranked scores. Equal numbers of ranked scores lie above and below the median. It corresponds to the 50th percentile and the 5th decile.

Mode
A measure of central tendency. The score or value that occurs most frequently in a distribution.

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Multiple-Choice Item
See *Selected-Response Item.*

Multiple Measures
Assessments that measure student performance in a variety of ways. Multiple measures may include standardized tests, teacher observations, classroom performance assessments, and portfolios.

Normal Distribution Curve
A bell-shaped curve representing a theoretical distribution of measurements, often approximated by a wide variety of actual data. It is often assumed as a basis for scaling and statistical hypothesis testing and estimation in psychology and education because of its repeated occurrence in the frequency distributions of sets of measurements of human characteristics.

Norm-Referenced Test (NRT)
A standardized assessment—that is, an assessment in which all students perform under the same conditions—that compares a student or group of students with a specified reference group, usually others of the same grade or age.

Normal Curve Equivalent (NCE)
NCEs have many characteristics of percentile ranks but have the additional advantage of being based on an equal-interval scale. That is, the difference between two successive scores on the scale has the same meaning throughout the scale. The use of NCEs allows meaningful comparisons between different achievement test batteries and between different tests within the same test battery. See also *Percentile.*

Norms
The average or typical scores on a test performance for members of a specified group. Norms are usually presented in tabular form for a series of different homogeneous groups, for example, students at a certain age or in a certain grade.

Number-Correct or "Raw" Score
The Number of Correct Responses (NCR) is the number of items answered correctly by a student on any given test section.

Objective Test
A test for which a list of correct answers, one for each test item, can be provided so that subjective opinion or judgment is eliminated from the scoring procedure. Selected-response, true-false, and matching item tests are purely objective, while constructed-response, short answer, and completion-item tests are less so.

Objective Performance Index (OPI)
The OPI is an estimate of the number of items a student would be expected to answer correctly if there had been 100 similar items for that objective. For example, an OPI of 65 on an objective means that if the student were given 100 similar items, the student would be expected to answer 65 of them correctly.

Open-Ended Item
See *Constructed-Response Item.*

Pattern Scoring
Pattern scoring, based on item response theory (IRT), takes into account which items a student answered correctly and produces better test information, less measurement error, and greater reliability than number-correct (NCR) scoring. Pattern scoring produces more accurate scores for individual students.

Percentile
One of the 99 point scores that divide a ranked distribution into groups, each of which contains 1/100 of the scores. It is a point (score) in a distribution below which falls the percentage of cases indicated by the given percentile. Thus, the 73rd percentile denotes the score or point below which 73% of the scores fall in this particular distribution of scores. Percentile scores do not compose a scale of equal intervals and thus cannot be averaged.

Percentile Rank
The percentage of scores for a particular group that fall below a given student's score. For example, a score with a percentile rank of 90 indicates that 90 percent of the scores for that particular group are below that student's score. Percentile ranks cannot be averaged.

Performance Assessment
An assessment activity that requires students to construct a response, create a product, or perform a demonstration. Usually there are multiple ways to approach a performance assessment, and more than one correct answer.

Performance Standard
A level of performance on a test established by education experts as a goal of student attainment.

Portfolio Assessment
An assessment based on a collection of evidence highlighting a student's performance, often over a period of time. A portfolio assessment can contain a wide variety of information, including norm-referenced test scores, awards, drawings, audio or video tapes, and writings. Sometimes these are best examples, sometimes they are a representative sample, exhibiting a record of changes in performance.

Power Test
A test that samples the range of an examinee's capacity in particular skills or abilities and that places minimal emphasis on time limits. A "pure" power test may be defined as one in which every examinee has sufficient time to complete the test.

Primary Trait Scoring
A scoring procedure in which a student's work is evaluated for one or more specific traits or dimensions; other traits or dimensions are not scored. For example, a student's writing may be scored on organization, but not on grammar or spelling.

Prompt
An assessment topic, situation, or statement to which students are expected to respond. See also *Stimulus.*

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Raw Score
The first score obtained in scoring a test, which is often the number of correct answers. Sometimes it is the number right minus a fraction of the number wrong, the time required to complete the test, the number of errors, or some other number obtained directly from the test administration.

Readiness Test
A test of ability to engage in a new type of specific learning. Level of maturity, previous experience, and emotional and mental set are important factors in readiness.

Reliability
The degree to which an assessment yields consistent results over repeated uses.

Rubric
A scoring tool, or set of criteria, used to evaluate a student's test or performance.

Scale
An organized set of measurements, all of which measure one property or characteristic. Different types of test-score scales use different units (for example, Number Correct, Percentile, IRT Scale Scores).

Selected-Response Item
A question or incomplete statement that is followed by answer choices, one of which is the correct or best answer. Also referred to as a "multiple-choice" item.

Special Admissions Test
A test of a student's ability to participate in special programs or advanced learning situations. For example, an honors-level class or a magnet school may require the attainment of high scores on an assessment for admission.

Speed Test
A test in which one aspect of performance is measured by the number of tasks performed in a given time. A "pure" speed test is one in which examinees make no error and that cannot be completed by any examinee in the allotted time.

Standard Deviation
A statistic that defines a range of scores around the mean within which 68 percent of the cases in a normal distribution of test scores are found. About 95 percent of the cases are found within two standard deviations of the mean.

Standard Error of Measurement (SEM)
A statistic that defines a range within which a student's "true score" would fall had that student taken the test numerous times. It is important to understand that all tests have inherent measurement error because they are a sample of student performance at one particular time.

Standard Score
A derived score scaled to produce an arbitrarily assigned mean and standard deviation—for example, deviation IQs are standard scores with a mean of 100 and, usually, a standard deviation of 16.

Standardization Sample
That part of the population that is used in the norming of a test—the reference population. The sample should represent the population in essential characteristics, some of which are geographic location, size of school, socio-economic status, age, grade, and ability.

Standardized Test
An assessment with directions, time limits, materials, and scoring procedures designed to remain constant each time the test is given, to ensure comparability of scores. Many standardized tests have norms. All norm-referenced tests are standardized.

Stanines
A unit of a standard score scale that divides the norm population into nine groups. Except for the first and ninth stanines, the groups are spaced in half sigma units, with the mean at stanine 5. The word "stanine" draws its name from the fact that it is a STAndard score on a scale of NINE units.

Stem
The part of an item that asks a question, provides directions, or presents a statement to be completed.

Stimulus
A passage or graphic display about which questions are asked.

Test
A device or procedure designed to elicit responses that permit an inference about what the test-taker knows or can do.

Test Battery
A set of several tests designed to be given as a unit.

Test Developer
One who prepares and develops tests.

Test Objective
A targeted goal that can be measured by an assessment.

Test-taker
One who takes a test whether by choice, direction, or necessity.

Test User
One who uses test results for some decision-making purpose.

Validity
The degree to which a test measures what it is intended to measure.

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Acronyms

AAG	Assessment Accommodations Guide
Adult LAS	Adult Language Assessment Scales
CAT/5	California Achievement Tests, Fifth Edition
CDI	Customer Data Input
CDMT	California Diagnostic Mathematics Test
CDRT	California Diagnostic Reading Test
CRST	Customized Reporting from a Standardized Test
CRST | 2	Customized Reporting from a Standardized Test, Second Edition
CTBS/4	Comprehensive Tests of Basic Skills, Fourth Edition
DRS	Diagnostic Reading Scales
DSC	Developing Skills Checklist
ESA	Early School Assessment
La Lista	*Lista de Destrezas en Desarrollo*
LAS	Language Assessment Scales
LAS-O	Language Assessment Scales–Oral
LAS R/W	Language Assessments Scales Reading/Writing
MIDEBANK	Minnesota Department of Education Bank
NEDT	National Educational Development Test
PTCS	Primary Test of Cognitive Skills
SABE/2	Spanish Assessment of Basic Education, Second Edition
SNAP	School Needs Assessment Profile
TABE 5&6	Tests of Adult Basic Education, Forms 5&6
TABE 7&8	Tests of Adult Basic Education, Forms 7&8
TABE-PS	TABE Work-Related Problem-Solving
TABE-WF	TABE Work-Related Foundation Skills
TCS/2	Test of Cognitive Skills, Second Edition
TOBE/2	Tests of Basic Experiences, Second Edition
VoCATS	Vocational Competency Achievement Tracking System

Score Abbreviations

Following are score abbreviations commonly used in descriptions of test data or on test reports.

AAGE	Anticipated Achievement Grade Equivalent
AANCE	Anticipated Achievement Normal Curve Equivalent
AANP	Anticipated Achievement National Percentile
AASS	Anticipated Achievement Scale Score
CSI	Cognitive Skills Index
CSS	Cognitive Skills Summary
DIFF	Difference (Anticipated vs. Obtained)
GE	Grade Equivalent
GME	Grade Mean Equivalent
IR/ML	Instructional Reading and Math Levels
LP	Local Percentile
MDNP	Median National Percentile
MNCE	Mean Normal Curve Equivalent
MNS	Mean National Stanine
MSS	Mean Scale Score
NCE	Normal Curve Equivalent
NP	National Percentile
NPG	National Percentile by Grade
NS	National Stanine
OMS	Objectives Mastery Summary
OPI	Objective Performance Index
RP	Reference Percentile
SS	Scale Score
TSS	Thinking Skills Score

Organizations

AERA	American Educational Research Association
APA	American Psychological Association
IRA	International Reading Association
NAEP	National Assessment of Educational Progress
NCME	National Council on Measurement in Education
NCTE	National Council of Teachers of English
NCTM	National Council of Teachers of Mathematics
NEA	National Education Association
NRA	National Reading Association

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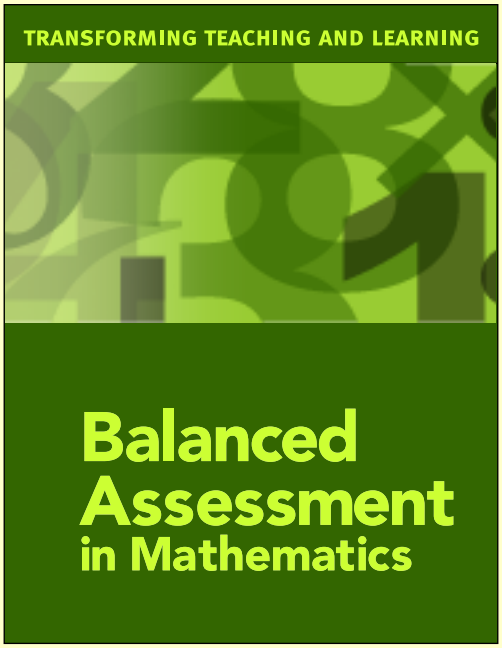

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Materials and services will be invoiced separately (by shipment) and are payable within 30 days of each invoice date. Late requests for additional scoring reports can be accommodated but will result in a set-up surcharge of $85.00.

Any discrepancies or errors in shipments or invoices for materials or scoring results must be reported within 60 days of invoice date or no adjustment or credit is possible.

Special packaging can be accommodated at additional cost if arrangements are made prior to testing.

Foreign shipments are payable in advance in U.S. funds or by International Money Orders. Prices are subject to change without notice.

For information on Braille and large-print editions of CTB materials please contact:

American Printing House for the Blind, Inc.
P.O. Box 6085
Louisville, KY 40206-0085
Tel: 502/895-2405

Right Not to Sell

If CTB determines in its sole discretion that sales of a test instrument to a purchaser would not be or is no longer in the best interest of CTB or the test, CTB reserves the right not to sell the test.

Where to Order Materials

All orders should be sent to the Monterey Order Services Center:

CTB/McGraw-Hill
Attn.: Customer Services
P.O. Box 150
Monterey, California 93942-0150
Tel: 831/393-0700 or
Toll-free: 800/538-9547
Fax: 800/282-0266

Minimum Orders

The minimum order for scoring services is $125.00 for each test plus transportation charges. Orders for test materials less than $10.00 must be accompanied by remittance, or a $10.00 minimum charge will be made (plus shipping and handling charges).

Quantity Discounts

Discounts apply only to materials ordered at the same time (on one purchase order) and which are invoiced to a single address.

Discounts, except for quantity discounts listed below, are not allowed for materials purchased for resale.

Test books and answer sheets are discounted, miscellaneous accessories are not.

Test books of the same test, title, level, and form (i.e., code number):

1–49 packages	No discount
50–299 packages	10% discount
300 or more packages	15% discount

Answer sheets of the same answer sheet number (i.e., code number) are sold in units of 25 or 50.

1–49 units	No discount
50–299 units	10% discount
300 or more units	15% discount

Scoring services for each test:

Minimum scoring charge plus shipping/handling	$125.00 (no discount)

20,000 or more cases; Prices will be quoted upon request prior to scoring.

Materials Return Policy

Return materials to:
CTB/McGraw-Hill
Returns Department
2460 Kerper Boulevard
Dubuque, Iowa 52001-2224

Materials returned to any other location will not be credited.

Materials returned for credit will be accepted, provided the edition is current and invoiced within the prior 12 months. Returned materials must be received by CTB within 12 months of invoice date.

All materials must be in original unbroken packages or unopened one-unit cartons. Loose copies and opened one-unit cartons will not be credited. Test results are not returnable for credit. Specimen sets, multi-level examination kits, stencils, manuals, scoring keys, and other miscellaneous accessories not sold in packages are not returnable.

Be sure to pack materials carefully for return. In order to properly credit your account, we require that you enclose a copy of your original packing list or a copy of the original CTB invoice listing the items you are returning. If all cartons are returned unopened, please affix invoice or packing list to the outside of one carton. Returns not accompanied by an invoice or packing list will incur a 25% restocking charge. For your own protection, insure all packages you are returning.

Software Return Policy

The quality of its products enables CTB to maintain an exceptionally generous policy on the return of software. All software may be returned for full credit for up to 30 days after the original shipment. The credit does not extend to training which has already been scheduled or carried out. Software support fees which have been paid in advance will be credited at the rate of 11/12ths of the total.

Except as stated above, no returns or credits are provided or available, except with respect to defective merchandise under a CTB license or agreement signed or otherwise accepted by purchaser. The appropriate CTB license(s)/agreement(s) are included with shipments of the software products.

All transportation charges associated with returns must be prepaid and are at the customer's expense.

Returns and the required information must be sent to the appropriate address:

Software only:

CTB/McGraw-Hill
Customer Services
20 Ryan Ranch Road
Monterey, CA 93940-5703

All other materials:

CTB/McGraw-Hill
Returns Department
2460 Kerper Boulevard
Dubuque, IA 52001-2224

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Who May Order Test Materials

The *Standards for Educational and Psychological Testing* (the "*Standards*") describe the serious responsibilities of test users in applying standards in test situations.[1] The *Standards* publication is a guide for evaluating the technical quality of testing practices as they affect test developers, test users, test-takers, test sponsors, test administrators, and test reviewers. CTB fully subscribes to the position of the American Educational Research Association, the American Psychological Association, and the National Council on Measurement in Education, and expects that the test purchaser and user shall rigorously observe the required user qualifications set out for each test. CTB recommends that test purchasers and users become familiar with the contents of the *Standards*. Note specifically that: "In selecting a test and interpreting a test score, the test user is expected to have a clear understanding of the purposes of the testing and its probable consequences. The knowledgeable user has definite ideas on how to achieve these purposes and how to avoid bias, unfairness, and undesirable consequences. In subscribing to these *Standards*, test publishers and agencies mandating test use agree to provide information on the strengths and weaknesses of their instruments. They accept the responsibility to warn against likely misinterpretations by unsophisticated interpreters of individual scores or aggregated data. However, the ultimate responsibility for appropriate test use and interpretation lies predominantly with the test user. In assuming this responsibility, the user must become knowledgeable about a test's appropriate uses and the populations for which it is suitable. The user must also become adept, particularly in statewide and community-wide assessment programs, in communicating the implications of test results to those entitled to receive them." (The *Standards*, 1999, p. 112)

Also, to be noted is *Standard* 11.3: "Responsibility for test use should be assumed by or delegated only to those individuals who have the training, professional credentials, and experience necessary to handle this responsibility. Any special qualifications for test administration or interpretation specified in the test manual should be met." (The *Standards*, 1999, p. 114)

In accordance with these principles, CTB has adopted the following policies. By purchasing CTB test materials the purchaser agrees to conform to these policies and to the requirements stated below.

Policy 1—Prequalified Purchasers

Orders that can be filled without requiring a Purchaser's Qualification Statement (PQS) are listed as follows:

1(a) Orders from state-approved or accredited schools or colleges and from government agencies on, or accompanied by, an official purchase order or on official letterhead with purchase order number.

1(b) Orders from teachers in institutions or agencies with signed approval on the CTB order form of their administrator and accompanied by remittance.

1(c) Orders from graduate students on academic letterhead with signed approval of their department head and accompanied by remittance.

1(d) Orders from members of qualified professional organizations need only report their current membership status on the order form. The organizations are the American Educational Research Association; the American Psychological Association; the American Speech, Language, and Hearing Association; the National Association of School Psychologists; and the National Council on Measurement in Education.

1(e) Home schools may not order individually. Orders from agencies serving home schools must be accompanied by signed approval of local or state school officials on the CTB order form (page 222 or 224) and by remittance. For security and embargo reasons, home school agencies may not purchase or use *TerraNova* test materials. Home schools are encouraged to have their students tested in public or private schools or in an approved testing center.

In all cases, individuals giving official approval to these orders are assuming responsibility for proper test use and interpretation as indicated on the order form.

Policy 2—Purchasers Needing Qualification

Orders from persons or institutions not covered by Policy 1 will be filled only when CTB receives with the order or has in its files assurance of the purchaser's qualification to use and interpret the test(s) being ordered.

First-time purchasers should complete, sign, and enclose with their orders a copy of the Purchaser's Qualification Statement. Purchasers who have a Purchaser's Qualification Summary or a Purchaser's Qualification Statement on file with CTB may continue to purchase test materials by indicating on their purchase orders that such a document is on file, a fact that is subject to verification by CTB.

Policy 3—Security

3(a) Users are to keep all testing materials secure, releasing them only for appropriate use and returning components to a secure area. The *Standards* state in 5.7 that: "Test users have the responsibility of protecting the security of test materials at all times." (The *Standards*, 1999, p. 64)

3(b) Test users are expected to protect the privacy of testing information. The *Standards* provide in 5.10 that: "When test score information is released to students, parents, legal representatives, teachers, clients, or the media, those responsible for testing programs should provide appropriate interpretations. The interpretations should describe in simple language what the test covers, what scores mean, the precision of the scores, common misinterpretations of test scores, and how scores will be used." (The *Standards*, 1999, p. 65)

3(c) CTB reserves the right not to sell its secure tests to any purchaser that does not meet CTB's requirements for maintenance of security of its test materials or that cannot demonstrate to CTB's satisfaction that an appropriate level of test security will be maintained, or to meet the obligations contemplated in any request for proposal or of any contract with a state or local public school system or district, or if CTB determines in its sole discretion that sales of the test instrument to a purchaser would not be or is no longer in the best interest of CTB or the test. CTB, as a condition of sale or further sale of test materials, may require the purchaser to sign a separate understanding concerning the security of CTB's test materials and/or that the purchaser will follow the requirements/principles stated in this catalog.

Policy 4—Protecting the Rights of Test-Takers

"Test data maintained in data files should be adequately protected from improper disclosure. Use of facsimile transmission, computer networks, data banks, and other electronic data processing or transmittal systems should be restricted to situations in which confidentiality can be reasonably assured." (The *Standards*, 1999, p. 88)

Limitation of Liability

CTB shall not be responsible or liable for the use or misuse of the materials or services offered in this catalog. The purchaser/user assumes all responsibility for determining before ordering if the CTB materials or services meet their needs for the selection, use, or misuse of the same. Unless expressly agreed to in writing by CTB, ALL MATERIALS AND SERVICES ARE SOLD WITHOUT WARRANTY, EXPRESS OR IMPLIED, INCLUDING THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. Return or replacement of materials as described herein and/or refund of purchase price or credit toward future purchases, at CTB's sole option, is THE PURCHASER/USER'S SOLE AND EXCLUSIVE REMEDY. THIS REMEDY IS IN LIEU OF ACTUAL, CONSEQUENTIAL, OR INCIDENTAL DAMAGES IN CONNECTION WITH THE USE OR MISUSE OF CTB MATERIALS AND SERVICES. IN NO EVENT SHALL CTB LIABILITY EXCEED THE PURCHASE PRICE OF SAID MATERIALS AND SERVICES. The provisions of this Catalog apply to all orders accepted by CTB and may not be modified by a purchaser's form unless expressly agreed to in writing by CTB. Notwithstanding the above, CTB reserves the right at any time to refuse to sell any or all products and/or services.

[1] For a full reference and information on obtaining a copy, Section 5, page 203.

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Purchaser's Qualification Statement

For additional blank forms, please make photocopies from this form.

CTB/McGraw-Hill
Attn: Customer Services
P.O. Box 150
Monterey, CA 93942-0150

Name *(please print)* Tel ( )

Position Type of Organization

Employer

Employer's Address

City/State/Zip

Professional duties involving use of educational/psychological tests

Membership in Professional Organizations ○ ACA ○ AERA ○ APA ○ ASLHA ○ NASP ○ Other

CTB/McGraw-Hill subscribes to the general principles of test use as set forth in the *Standards for Educational and Psychological Testing* (1999) by the American Educational Research Association (The *Standards*). In particular, attention is drawn to the following applicable statements with which purchaser agrees to comply:

"In selecting a test and interpreting a test score, the test user is expected to have a clear understanding of the purposes of the testing and its probable consequences. The knowledgeable user has definite ideas on how to achieve these purposes and how to avoid bias, unfairness, and undesirable consequences. In subscribing to these *Standards*, test publishers and agencies mandating test use agree to provide information on the strengths and weaknesses of their insturments. They accept the resposibility to warn against likely misinterpretations by unsophisticated interpreters of individual scores or aggregated data. However, the ultimate responsibility for appropriate test use and interpretation lies predominantly with the test user. In assuming this responsibility, the user must become knowledgeable about a test's appropriate uses and the populations for which it is suitable. The user must also become adept, particularly in statewide and community-wide assessment programs, in communicating the implications of test results to those entitled to receive them." (The *Standards*, 1999, p. 112)

"5.7 Test users have the responsibility of protecting the security of test materials at all times." (The *Standards*, 1999, p. 64)

"5.10 When test score information is released to students, parents, legal representatives, teachers, clients, or the media, those responsible for testing programs should provide appropriate interpretations. The interpretations should describe in simple language what the test covers, what scores mean, the precision of the scores, common misinterpretations of test scores, and how scores will be used." (The *Standards*, 1999, p. 65)

"8.6 Test data maintained in data files should be adequately protected from improper disclosure. Use of facsimile transmission, computer networks, data banks, and other electronic data processing or transmittal systems should be restricted to situations in which confidentiality can be reasonably assured." (The *Standards*, 1999, p. 88)

"11.1 Prior to the adoption and use of a published test, the test user should study and evaluate the materials provided by the test developer. Of particular importance are those that summarize the test's purposes, specify the procedures for test administration, define the intended populations of test takers, and discuss the score interpretations for which validity and reliability data are available." (The *Standards*, 1999, p. 113)

"11.2 When a test is to be used for a purpose for which little or no documentation is available, the user is responsible for obtaining evidence of the test's validity and reliability for this purpose." (The *Standards*, 1999, p. 113)

"11.3 Responsibility for test use should be assumed by or delegated only to those individuals who have the training, professional credentials, and experience necessary to handle this responsibility. Any special qualifications for test administration or interpretation specified in the test manual should be met." (The *Standards*, 1999, p. 114)

"11.15 Test users should be alert to potential misinterpretations of test scores and to possible unintended consequences of test use; users should take steps to minimize or avoid foreseeable misinterpretations and unintended negative consequences." (The *Standards*, 1999, p. 116)

Signature Date

Purchaser certifies that purchaser and/or other persons who may use the test materials being purchased have a general knowledge of measurement principles and of the limitation of test interpretations and that purchaser/they are qualified to use and interpret the results of the tests being purchased as recommended in the *Standards for Educational and Psychological Testing*.

Purchaser further certifies and agrees that:

- Purchaser will follow the requirements/principles stated in the CTB catalog and those of the *Standards*.
- The security of CTB test materials will be maintained and CTB test materials will be kept in a secure place at all times, except as necessary and appropriate to administer or score a test. Purchaser will communicate the need for security to all appropriate persons within purchaser's organization.
- Tests will be administered only as directed in CTB's Examiner's Manual.
- The confidential nature of the tests and results of testing will be observed.
- Test materials will not be photocopied or otherwise reproduced without the permission of CTB, including by entry into any computer memory or other storage medium.
- Test-takers will not be left alone with any test materials.
- Purchaser will notify CTB of any suspected breach of any of these conditions of which purchaser becomes aware.

Occasionally, The McGraw-Hill Companies may use information you have provided to offer you products and services that may be of interest to you. If you have questions about our privacy practices or wish to confirm the accuracy of the information you've provided, please contact us at 831/393–7434 or refer to the McGraw-Hill Website. *http://www.mcgraw-hill.com/privacy.html*

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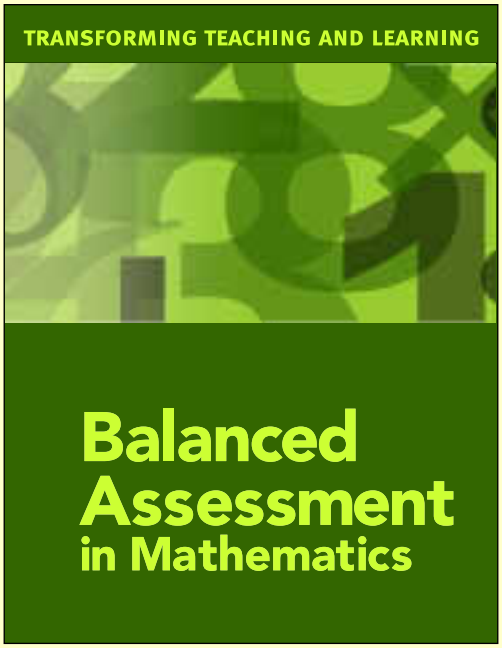

> Testimonials

CTB
McGraw-Hill

Balanced Assessment– Arkansas User Testimonials

- The Balanced Assessment materials give teachers wonderful examples of open response items with student work that correlates with the testing taking place in Arkansas. I would recommend it to all teachers!

  Sandy Preston, Elementary Mathematics Specialist
  Southeast Arkansas Education Cooperative
  Monticello, Arkansas

- I have done workshops using balanced assessment tasks and used the tasks in numerous classrooms. Teachers love them! They want similar K-2 tasks in an interview format.

  Tonia McMillan, Elementary Mathematics Specialist
  Dawson Education Service Cooperative
  Arkadelphia, Arkansas

- The Balanced Assessment materials allow teachers to increase their own mathematical skills and increase strategies for using constructed response items in the classroom.

  Bill Mullins, Secondary Mathematics Specialist
  Center for Mathematics & Science
  Arkansas Tech University - Russellville, Arkansas

- I am using the Balanced Assessment tasks with my teachers. Teachers say they will continue using tasks like these. I go into many classrooms and observe teachers model lessons using the tasks. Great material that support our state standards!

  Brenda Costello, Elementary Mathematics Specialist
  Arkansas River Education Service Cooperative
  Pine Bluff, Arkansas

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- Balanced Assessment materials are used in individual classrooms and in school staff development. We discovered how quickly all students, including those in special education who were included in the regular classes, were able to access the tasks.

  Charlotte Ester, Secondary Mathematics Specialist
  Minority Center of Excellence in Mathematics & Science
  University of Arkansas at Pine Bluff – Pine Bluff, Arkansas

- I have used tasks from each of the four grade band books. The tasks integrate communication skills with applications of mathematics better than any other resource I have seen.

  Wallece Brewer, Secondary Mathematics Specialist
  Northeast Arkansas Rural Institute for Math & Science
  Arkansas State University – Jonesboro, Arkansas

- I have used Balanced Assessment tasks with teachers in workshops. They have always been well received. A number of teachers have purchased the books to use in their classroom. There is a great need for K-2 materials!

  Bonnie Robb, Elementary Mathematics Specialist
  Northeast Arkansas Education Service Cooperative
  Walnut Ridge, Arkansas

- I have used Balanced Assessment materials in several teacher workshops and with students in 2nd-6th grades. Students and teachers alike love the materials! The students enjoy the tasks and the teachers appreciate the high quality of the assessments. I have also used the Balanced Assessment workshop, "Developing a Holistic Rubric." This workshop has helped many teachers become confident in developing their own rubrics. Because of Balanced Assessment, many teachers in my area now view assessment differently. Instead of using assessment only to give grades, they now see that assessment helps them determine what the strengths and weaknesses are of their students, and what their next instructional move will be. We need tasks for K-2! Teachers are asking for them.

  Sherry Salmons, Elementary Mathematics Specialist
  Crowley's Ridge Education Service Cooperative
  Harrisburg, Arkansas

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- Balanced Assessment tasks provide high quality activities that help students and teachers focus on important mathematical concepts. The constructed response items closely resemble the types of questions used on our state Benchmark Exams.

  Susie Ward, Elementary Mathematics Specialist
  Wilbur D. Mills Education Service Cooperative
  Beebe, Arkansas

- Balanced Assessment provides an eye-opening look at what students know and how they think about mathematics.

  Allen Henderson, Secondary Mathematics Specialist
  Center for Math & Science Education
  Harding University – Searcy, Arkansas

- Balanced Assessment has given my teachers a valuable tool to help them both evaluate their teaching and their students' learning.

  Kelly Dibrell, Elementary Mathematics Specialist
  Northcentral Arkansas Education Service Cooperative
  Melbourne, Arkansas

- I have yet to share the Balanced Assessment tasks with teachers who did not find them to be beneficial. The opportunity to examine and categorize student work on high quality tasks is especially meaningful.

  Tony Timms, Secondary Mathematics Specialist
  Arkansas Center for Mathematics Education
  University of Central Arkansas – Conway, Arkansas

- This summer's inservice that I provided at my co-op using Balanced Assessment materials was one of my most well received. I had teachers saying things such as. "I finally understand the "rubric" system of scoring!"

  Nancy Via, Elementary Mathematics Specialist
  Arch Ford Education Service Cooperative
  Plumerville, Arkansas

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- The Balanced Assessment materials have given me useful tasks to assist my teachers and their students in preparation for our state's criterion referenced test. Students are involved in the problems and teachers appreciate the rubrics that accompany the problems.

  Marcia Sanders, Elementary Mathematics Specialist
  Western Arkansas Education Service Cooperative
  Branch, Arkansas

- We were able to bring back materials and information from our BA training that we incorporate into our professional development with schools. For example, we use the BA protocol in training teachers to examine student work with our state's CRT released items and also for developing scoring rubrics.

  Lynne Roberts, Secondary Mathematics Specialist
  Center for Teaching Excellence in Mathematics & Science
  Southern Arkansas University – Magnolia, Arkansas

  Dr. Bill Nielsen, Program Support Manager
  Arkansas Department of Education – Little Rock, Arkansas

- I have shared Balanced Assessment materials with several districts and talked with them about using the assessment program at the district level. They are excited about this program because it is so similar to our state's assessment program.

  Connie Smith, Secondary Mathematics Specialist
  Northeast Arkansas Delta Institute for Math & Science
  Arkansas State University – Jonesboro, Arkansas

- Balanced Assessment tasks have proven to be a very valuable tool for teachers attending training in my area. It has given them much needed practice analyzing student work and provided an outstanding resource for worthwhile assessment tasks. Our teachers need this resource because it is so closely aligned with our state assessment!

  Cindy Roberts, Elementary Mathematics Specialist
  Great Rivers Education Service Cooperative
  West Helena, Arkansas

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- I have used the Balanced Assessment protocol in several staff development trainings. Documenting student understanding and using those results to plan instructional decisions has been powerful for the teachers in my area.

  Denise Merritt, Elementary Mathematics Specialist
  South Central Education Service Cooperative
  Camden, Arkansas

- Balanced Assessment ties in very well with our state assessment. My teachers appreciate more high quality open response items to use in their classroom. The student work included in excellent!

  Phoebe Bailey, Elementary Mathematics Specialist
  Southwest Arkansas Education Service Cooperative
  Hope, Arkansas

- I am impressed with Balanced Assessment for the following reasons:
  - The tasks are very flexible. A task can be used as an assessment for a unit or topic. It can also be used to introduce a topic.
  - The tasks span the five strands of mathematics.
  - The writing portions truly test the students' knowledge level and understanding of the concepts.

  Christie Alexander, Secondary Mathematics Specialist
  Arkansas Department of Education – Little Rock, Arkansas

- The Balanced Assessment program has been a valuable component of the training for Arkansas' state mathematics specialists. The program provides a high quality model for conducting presentations or workshops for other teachers and enables specialists, teachers, and administrators to acquire a deeper understanding of how well students are learning mathematics. The thoughtful combination of content and processes reflected in the tasks provide useful information for improving the curriculum, guiding instruction, and assessing learning.

  Judy Trowell, Coordinator, Mathematics Specialists' Training
  Arkansas Department of Education/Higher Education

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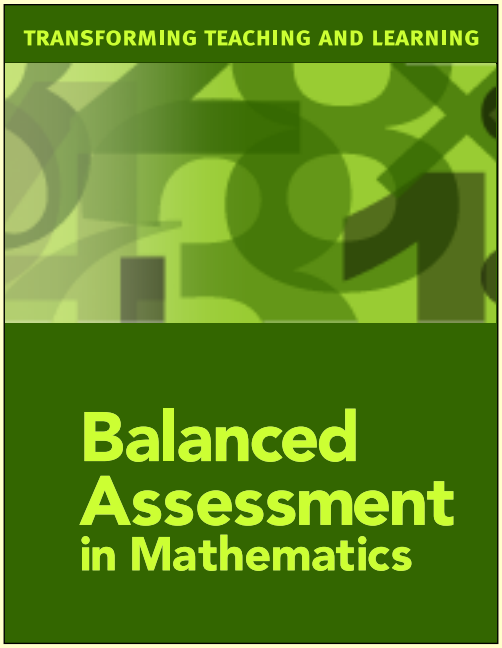

Concluding Remarks

Balanced Assessment in Mathematics is the only performance test that has as 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, and so are testing requirements and priorities. Balanced Assessment in Mathematics offers a complete solution that can help students meet new goals and help schools build effective mathematics programs—now and in the future.

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