Product Name: Middle School Math (Mid Math)

Product Description
Originally measures were developed for the 2% population (i.e., students performing well below grade-level expectations) and aligned to the NCTM Focal Point Standard. New Middle School Math items (2,700) have been developed for 6th-8th grade students (performing at or slightly below grade-level expectations) and aligned to the Common Core State Standards.

List of Essential Features
• Universal design for assessment
• Considers all characteristics of test-takers.
• Precisely defined constructs.
• Accessible, non-biased items.
• Items amendable to accommodations.
• Simple, clear, and intuitive instructions and procedures.
• Maximum readability and comprehensibility.
• Maximum legibility of text, tables, figures, and illustrations

Audience
Middle School Math is intended for teachers, schools, or districts as a tool to monitor 6th - 8th grade students' progress in math proficiency.
Middle School Math

Test form creation
- 20 alternate test forms planned for benchmark and progress-monitoring
- All forms of equivalent difficulty
- All forms of comparable content
- All test items aligned with the Common Core Standards

Standards
RP: Ratios and Proportional Relationships (G6 – 3 sub-standards, G7 – 3 sub-standards)
NS: The Number System (G6 – 8 sub-standards, G7 – 3 sub-standards, G8 – 2 sub-standards)
EE: Expressions and Equations (G6 – 9 sub-standards, G7 – 4 sub-standards, G8 – 8 sub-standards)
G: Geometry (G6 – 4 sub-standards, G7 – 6 sub-standards, G8 – 9 sub-standards)
SP: Statistics and Probability (G6 – 5 sub-standards, G7 – 8 sub-standards, G8 – 4 sub-standards)
F: Functions (G8 – 5 sub-standards)

Items Developed
<table>
<thead>
<tr>
<th>Grade</th>
<th>RP</th>
<th>NS</th>
<th>EE</th>
<th>G</th>
<th>SP</th>
<th>F</th>
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<tbody>
<tr>
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<td>180</td>
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</table>

What coordinates will complete the rectangle?

Options:
- (-5, 2)
- (2, -5)
- (-5, -2)
- I don't know
Alignment

- 15 teachers from across the United States each rate 300 items.
- Approximately half of all items, randomly sampled, will be judged for alignment.
- Each item judged for alignment will be rated by at least 3 teachers, establishing a consensus or unanimous rating for each item (aligned/not aligned).
- Alignment process will include questions more directly relevant to formative assessments, rather than the more typical process used for summative assessments.
Middle School Mathematics Items

Development and Future Research Plans

Project overview

• Develop 2,700 new math items for easyCBM in grades 6-8; 900 items per grade
  – Aligned with the common core standards
  – Piloted to examine their technical adequacy
  – Plan: 20 alternate test forms for benchmark and progress-monitoring of comparable difficulty
Existing items vs. New Items

Existing Items
• Originally developed for the 2% population (i.e., students performing well below grade-level expectations)
• Aligned to the NCTM Focal Point Standards

New Middle School Math Items
• Should be developed for students performing at or slightly below grade-level expectations.
• Aligned to the Common Core State Standards

Outline of items written

<table>
<thead>
<tr>
<th>Number of Items to Write</th>
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</thead>
<tbody>
<tr>
<td>Grade</td>
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<tr>
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</table>

• RP - Ratios and Proportional Relationships
• NS - Number System
• EE - Expressions and Equations
• G - Geometry
• SP - Statistics and Probability
• F - Functions
Universal Design

How should we design a building so the widest range of populations possible can access it?

Universal Design for Assessment

- Considers all characteristics of test-takers.
- Precisely defined constructs.
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Thompson, Johnstone, and Thurlow (2002)
New Middle School Math Items

• Common Core Standards
  – 5 standards per grade
  – New items in grades 6, 7, 8

6th Grade Standard: Expressions and Equations (4)
Identify when two expressions are equivalent (i.e., when the two expressions name the same number regardless of which value is substituted into them). For example, the expressions $y + y + y$ and $3y$ are equivalent because they name the same number regardless of which number $y$ stands for.
7th Grade Standard: Geometry (6)

Solve real-world and mathematical problems involving area, volume and surface area of two- and three-dimensional objects composed of triangles, quadrilaterals, polygons, cubes, and right prisms.

8th Grade Standard: Number Systems (1)

Know that numbers that are not rational are called irrational. Understand informally that every number has a decimal expansion; for rational numbers show that the decimal expansion repeats eventually, and convert a decimal expansion which repeats eventually into a rational number.
Alignment

• Planned study
  – 15 teachers
  – Each reviews 300 items
  – Approximately half of all items will be reviewed

• Teach Qualifications
  – All have classroom experience
    • Many are Math coaches for District
  – All are familiar with Common Core
    • Many have helped implement Common Core in some way

Note. Eighth grade not pictured due to space, but is included in the plan
## Item Sampling Plan

<table>
<thead>
<tr>
<th>Item Set 1</th>
<th>Item Set 2</th>
<th>Item Set 3</th>
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### Questions?

http://www.brtprojects.org/

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**Behavioral Research and Teaching**

The projects at BRT concentrate on access to learning so that appropriate and accurate information can be collected from all students to improve decision-making. We focus on developing information systems with three primary goals:
- Improve basic skills assessments so that all students can read, write, and compute.
- Enhance learning of middle and secondary content subject matter so that all students have the opportunity to develop a broad knowledge base.
- Provide accessibility to large-scale testing so that all students can demonstrate their proficiencies on state and local achievement standards.

**Current Research**

1. Diagnostic Reading Progress Monitoring (DRPM) Scoring
2. RTI Progress Monitoring Case Study
3. Reading Measures Structure Analysis
4. Spanish Reading Tests: Review and Pilot
5. easyCBM Reading Construct Validity
6. Middle School Math Item Scaling
7a. easyCBM Beginning Reading Measures Alignment: Teachers
7b. easyCBM Reading Comprehension