Mathematics Standards

National Council of Teachers of Mathematics
http://standards.nctm.org/

New Standards
http://www.ncee.org/store/products/index.jsp

Pennsylvania Academic Standards
http://www.pde.state.pa.us/

GRADE 3, 5, 8, & 11 STANDARDS AND ELIGIBLE CONTENT (PSSA 2004)
http://www.pde.state.pa.us/

Assessment Anchors (PSSA 2005)[Coming Soon!]
Math

- **Math Assessment Handbook** (3.24 MB - 121 pages)
- **Released Mathematics Items from the 2000 and 2001 Assessments** (5.1 pages)
- **Grade 3 Math Assessment Handbook** (1.92 MB - 72 pages)
- **Getting Ready! Mathematics Assessment Handbook Supplement 2004 P...**
National Assessment of Educational Progress
2003 NAEP Emphasis by Grade Level

- Numbers
- Algebra
- Geometry
- Measurement
- Data
Assessments

• The International Mathematics and Science Study
  • http://timss.bc.edu/TIMSS1/Items.html
• National Assessment of Educational Progress
  • http://nces.ed.gov/nationsreportcard/
• Council of Chief State School Officers
  • http://www.ccsso.org/chief_state_school_officers/state_education_agencies/
• Pennsylvania System of School Assessment
  • http://www.pde.state.pa.us/
• Local Assessment
  Your web site.
PSSA Sample Tests

- BB Sample PSSA Tests 5,8,11\A.
  5thPssaTest\5th Grade PSSA Sample Test.HTM
No Child Left Behind
WHAT ARE THE INDICATORS?

- Student Achievement
- Participation Rate in Assessments
- Attendance – K-8
- 4-year Graduation Rate – Secondary
## SUMMARY OF NCLB RESULTS

<table>
<thead>
<tr>
<th>School</th>
<th>Math AYP &gt; 35% N &gt; 39</th>
<th>Rdg AYP &gt; 45% N &gt; 39</th>
<th>Attend. /Grad. &gt;94.5%</th>
<th>Partic. Rate &gt;94.5%</th>
<th>TOTAL Y OR N</th>
</tr>
</thead>
<tbody>
<tr>
<td>All</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>White</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Black</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hispanic</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Asian</td>
<td></td>
<td></td>
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<td></td>
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</tr>
<tr>
<td>IEP</td>
<td></td>
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</tr>
<tr>
<td>LEP</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Econ.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
5th Grade MATHEMATICS
Performance Level by %

- ADVANCED: 29.9%
- PROFICIENT: 33.1%
- BASIC: 23.6%
- BELOW BASIC: 13.4%
Grade 5 Average Percent Correct by Math Standard

<table>
<thead>
<tr>
<th>Standard</th>
<th>BLDG AVG %</th>
<th>STATE AVG %</th>
<th>PERFECT %</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.1Number</td>
<td>16.5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.2Comp.</td>
<td>17.6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.3Meas.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.4Reas.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.6Stat.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.7Probab.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.8AlgFun</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.9Geom</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.10Trig</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.11Calc</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
# Math Performance Levels

<table>
<thead>
<tr>
<th></th>
<th>Grade 5</th>
<th>Grade 8</th>
<th>Grade 11</th>
</tr>
</thead>
<tbody>
<tr>
<td>Advanced</td>
<td>1460 and higher</td>
<td>1510 and higher</td>
<td>1490 and higher</td>
</tr>
<tr>
<td>Proficient</td>
<td>1300 - 1459</td>
<td>1300 - 1509</td>
<td>1310 - 1489</td>
</tr>
<tr>
<td>Basic</td>
<td>1170 - 1299</td>
<td>1180 - 1299</td>
<td>1180 - 1309</td>
</tr>
<tr>
<td>Below Basic</td>
<td>1169 and lower</td>
<td>1179 and lower</td>
<td>1179 and lower</td>
</tr>
</tbody>
</table>
5th Grade Advanced Student Math Scores

14 Students
Vocational Raw Scores for Math

Vocational

20 Students

Individual Student Report
State 5th Grade Distribution of Demographic Groups

- Title 1
- LEP
- Migrant
- Non-IEP
- IEP

Categories:
- Advanced
- Proficient
- Basic
- Below Basic
5th Grade Point Distribution
By Math Standard Area

- 2.1 Numbers
- 2.2 Computation
- 2.3 Measurement
- 2.4 Reasoning
- 2.6 Statistics
- 2.7 Prob & Data Anal
- 2.8 Alg & Funct
- 2.9 Geometry
- 2.10 Trig
- 2.11 Calculus
Sample Guiding Questions!

- Define or describe the highest level of mathematics that you offer to **all** students?
- How have you integrated mathematics across all disciplines and vice versa?
- Does the level of math offerings accessible to **all** off your students **match** or exceed the standards and/or assessments required by the Pennsylvania Department of Education and No Child Left Behind for **all** students?
- Is your mathematics curriculum **sequenced** in the same order as the state standards and in the same order that they are assessed?
- Which sub populations are not performing well?
- Do you include a unit in every math course focusing on communications skills that are particularly related to mathematics and how often is it reviewed? Briefly describe the objectives of the unit.
- How much time is allocated for the teaching of mathematics to **all** students at each grade level?
TIME
IS
OF
THE
ESSENCE
All Curricula

All Curricula Containing Math Assessment Anchors

All Math courses + Math Tutoring

All Math Courses

All Math Courses Containing only Assessment Anchors

Interdisciplinary Infusion Team

One period = 2/3 hr.                                               One day = 6 hours
1 course = (2/3 x 180)/ 6 = 20 days       25% REDUCTION FACTOR = 20 – 5 = 15 DAYS
RESEARCH

Standards Based Curricula

- CoMap  
  The Consortium for Mathematics and its Applications

- ShowmeCenter  
  Middle School

- COMPASS  
  Curricular Options in Mathematics Programs for All Secondary Students
Research on Mathematics Education

Grover J. (Russ) Whitehurst, Ph.D.
Director
Institute of Education Sciences
United States Department of Education
Achievement Tracking and Grouping Assessment for Instruction Structured Peer Feedback Conceptual Understanding Curriculum Implementation Teachers Alignment
### The Math Wars

<table>
<thead>
<tr>
<th>Constructivist Approaches</th>
<th>Skills-based Approaches</th>
</tr>
</thead>
<tbody>
<tr>
<td>Knowledge is constructed</td>
<td>Knowledge is imparted</td>
</tr>
<tr>
<td>Children should develop their own understanding</td>
<td>Children should master standard facts &amp; concepts</td>
</tr>
<tr>
<td>Authentic problems</td>
<td>Skill-relevant problems</td>
</tr>
<tr>
<td>Intrinsically motivated</td>
<td>Extrinsically motivated</td>
</tr>
</tbody>
</table>
Checks on Constructivism

- Many routes to understanding
- Limits on working memory
- Inefficiency of discovery
- Role of work in learning
Elements of State Math Reforms

• State-wide standards
• Linked state-wide assessments
• Accountability for results
Students can do no better than the assignments they are given
Getting Ready!
The 2004 PSSA
Assessment and Accountability
January 2004
Purpose and Goals

- Clarify what is expected on PSSA
- Provide an update on assessment system
Assessment Update

- 2003-2004
  - Similar to past tests
- 2004-2005
  - PSSA using the Assessment Anchors
- 2005-2006
  - PSSA Grades 4, 6, and 7
- 2007-2008
  - PSSA Science Grades 4, 7, and 10
What You Need to Know
Tools You Have

• Test Design/Format
• Test Blueprint
• Standards/Eligible Content
• Released Items/Rubrics
• Accommodations Policy
Test Design and Format
Test Design

- Common versus Matrix
- Weights
  - Items:
    - Multiple-choice Items ➔ 1 point
    - Reading Task ➔ 4 points
    - Math Task ➔ 5 points
  - Standards:
    - The more items per standard, the more heavily ‘weighted’ that standard
# Current Test Format

<table>
<thead>
<tr>
<th>Grade</th>
<th>Test Length (Not strictly timed)</th>
<th># of Multiple Choice Items</th>
<th># of Common Items</th>
<th># of Matrix Items</th>
<th># of Common Items</th>
<th># of Matrix Items</th>
<th># of Points</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Reading</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>1 _ hours 30-min. (3 sessions)</td>
<td>17 (10 Field Test)</td>
<td>25</td>
<td></td>
<td></td>
<td>1 Field Test</td>
<td>17+25+8=50</td>
</tr>
<tr>
<td>5, 8, 11</td>
<td>4 hours 80-min. (3 sessions)</td>
<td>52 72 80</td>
<td>26 36 40</td>
<td></td>
<td></td>
<td>2 1</td>
<td>52+8=60 72+8=80 80+8=88</td>
</tr>
<tr>
<td><strong>Math</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>2 hours 30-min. (4 sessions)</td>
<td>60</td>
<td>10</td>
<td></td>
<td></td>
<td>2 1</td>
<td>60+10=70</td>
</tr>
<tr>
<td>5, 8, 11</td>
<td>4 hours 60-min. (4 sessions)</td>
<td>70</td>
<td>15</td>
<td></td>
<td></td>
<td>3 1</td>
<td>70+15=85</td>
</tr>
</tbody>
</table>
Test Blueprints
## Sample Reading Test Blueprint

<table>
<thead>
<tr>
<th>Standards Category</th>
<th>*Gr. 3</th>
<th>Gr. 5</th>
<th>Gr. 8</th>
<th>Gr. 11</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.1 Learning to Read Independently</td>
<td>36 or 38</td>
<td>21.7</td>
<td>18.0</td>
<td>30.0</td>
</tr>
<tr>
<td>1.2 Reading Critically in All Content Areas</td>
<td>24 or 26</td>
<td>18.3</td>
<td>16.0</td>
<td>11.0</td>
</tr>
<tr>
<td>1.3 Reading, Analyzing and Interpreting Literature</td>
<td>36 or 38</td>
<td>33.3</td>
<td>36.0</td>
<td>24.0</td>
</tr>
<tr>
<td>1.7 Characteristics and Function of the English Language</td>
<td>**</td>
<td>13.3</td>
<td>15.0</td>
<td>16.0</td>
</tr>
<tr>
<td>1.8 Research</td>
<td>**</td>
<td>13.3</td>
<td>15.0</td>
<td>19.0</td>
</tr>
</tbody>
</table>

### Percent

<table>
<thead>
<tr>
<th>Percent</th>
<th>100</th>
<th>100</th>
<th>100</th>
<th>100</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of Points</td>
<td>50</td>
<td>60</td>
<td>80</td>
<td>88</td>
</tr>
</tbody>
</table>

*The number of points per standards category varies depending on which matrix form a student takes.
For all students the total number of points was 50.

**Standards categories 1.7 and 1.8 are not assessed at Grade 3
### Sample Mathematics Test Blueprint

<table>
<thead>
<tr>
<th>Standards Category</th>
<th>Grade 3</th>
<th>Grade 5</th>
<th>Grade 8</th>
<th>Grade 11</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.1 Numbers, Number Systems and Number Relationships</td>
<td>14.3</td>
<td>17.6</td>
<td>11.8</td>
<td>5.9</td>
</tr>
<tr>
<td>2.2 Computation and Estimation</td>
<td>14.3</td>
<td>17.6</td>
<td>11.8</td>
<td>11.8</td>
</tr>
<tr>
<td>2.3 Measurement and Estimation</td>
<td>11.4</td>
<td>11.8</td>
<td>11.8</td>
<td>11.8</td>
</tr>
<tr>
<td>2.4 Mathematical Reasoning and Connections</td>
<td>7.1</td>
<td>5.9</td>
<td>5.9</td>
<td>5.9</td>
</tr>
<tr>
<td>2.6 Statistics and Data Analysis</td>
<td>10.0</td>
<td>9.4</td>
<td>11.8</td>
<td>11.8</td>
</tr>
<tr>
<td>2.7 Probability and Predictions</td>
<td>7.1</td>
<td>5.9</td>
<td>5.9</td>
<td>5.9</td>
</tr>
<tr>
<td>2.8 Algebra and Functions</td>
<td>10.0</td>
<td>8.2</td>
<td>17.6</td>
<td>22.4</td>
</tr>
<tr>
<td>2.9 Geometry</td>
<td>11.4</td>
<td>11.8</td>
<td>11.8</td>
<td>12.9</td>
</tr>
<tr>
<td>2.10 Trigonometry</td>
<td>7.1</td>
<td>5.9</td>
<td>5.9</td>
<td>5.9</td>
</tr>
<tr>
<td>2.11 Concepts of Calculus</td>
<td>7.1</td>
<td>5.9</td>
<td>5.9</td>
<td>5.9</td>
</tr>
</tbody>
</table>

| Percent Number of points | 100 | 100 | 100 | 100 |

Standard 2.5 is included in the above standards and is not a stand alone.
Standards and Eligible Content
2.2 Computation and Estimation

<table>
<thead>
<tr>
<th>Standard Statement</th>
<th>Eligible Content</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. Create and solve word problems involving addition, subtraction, division and multiplication of whole numbers.</td>
<td>Up to 4 operations. Include division up to four digits.</td>
</tr>
</tbody>
</table>
### Sample Grade 3 Reading Eligible Content

#### 1.1.3 Learning to Read Independently

<table>
<thead>
<tr>
<th>Standard Statement</th>
<th>Eligible Content</th>
</tr>
</thead>
</table>
| A. Identify the purposes and types of text (e.g., literature, information) before reading | Items may ask students to identify text type at a broad level, such as
• Fiction: story, poem, play
• Nonfiction: biography, autobiography, article, interview
Third-grade students will not be expected to make fine distinctions among genre, such as folk tale, fairy tale, or fable.
Items that address a purpose for reading will assess a general purpose, such as enjoyment, for learning information, to learn how to do something, etc. |
So what?

• How could the Eligible Content help teachers organize their curriculum?

• How would you use the Eligible Content to inform instructional practice?
Released Items and Rubrics
What’s out there now?

- See Assessment Handbook
- 2003 Items on the website
- Rubrics are only for this year’s test
Administration Highlights

- Who takes the test?
- When?
- How?
  - Allowable resources
  - Accommodations
- Which test:
  PSSA or PASA
Who takes the test?

- All students must take test including IEP and ELL.
- “Non-Assessed” students:
  - Parental request
  - Alternate assessment
  - Extended absence
  - Student refusal
How?

- Allowable Materials
  - The Rubrics
  - Calculators when specified
  - Formula Sheets

- Non-Allowable Materials
  - Calculators for non-calculator use items
  - Dictionaries
  - Textbooks
Accommodations

- Revised Accommodations Policy on Website for ELL, 504 and IEP
- New for ELL
  - Use of an interpreter
  - Use of bilingual dictionaries
Taking the PASA

- Six criteria
- The number of proficient and advanced scores for AYP cannot exceed 1% of the total population assessed in the district.
- Contact Lynda Lupp in the Bureau of Special Education for more information

(717) 783-2311
Where we’re headed

- Maintain rigor and alignment
- Take mystery out of test
- Provide access to test
- Give teachers information they can use
- Provide more resources and tools
- Focus on development of local assessments
THE END