Light Lunch and Learn: Mathematics and Closing the Achievement Gap
Region 4 Education Service Center
May 27, 2014

Session Objectives

• Explore curriculum, instructional, and assessment considerations for strong tier 1 mathematics instruction
• Explore strategies to close the achievement gap
Texas Essential Knowledge and Skills

• Knowledge and Skill Statement
  4(4) **Number, operation, and quantitative reasoning.** The student multiplies and divides to solve meaningful problems involving whole numbers.

• Student Expectation
  (E) The student is expected to use division to solve problems (no more than one-digit divisors and three-digit dividends without technology).
Tier 1 Instruction

TEKS

Curriculum

Instruction

Assessment

Start with TAKS

- Where do we see evidence of the Knowledge and Skill?
- Where do we see evidence of the student expectation?

**33** During math class, 4 students used 60 tiles to play a math game. Each student received the same number of tiles at the start of the game. How many tiles did each student receive?

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>12</td>
<td>6%</td>
</tr>
<tr>
<td>B</td>
<td>64</td>
<td>9%</td>
</tr>
<tr>
<td>C</td>
<td>56</td>
<td>3%</td>
</tr>
<tr>
<td>D</td>
<td>15</td>
<td>*85%</td>
</tr>
</tbody>
</table>
State of Texas Assessments of Academic Readiness

STAAR will

– Be a more clearly articulated assessment program

– Focus on fewer skills

– Address skills in deeper manner

Addressing Skills in a Deeper Way: Increasing the Rigor

• Look at the 3 STAAR® items from 2013.
• How are the items aligned with the knowledge and skills statement? The student expectation?
• Which item is the least rigorous? The most?
• What makes the problem more rigorous?
4th Grade Mathematics STAAR Assessment-2013

41. Oscar used a total of 315 blocks to make 5 towers. He used an equal number of blocks to make each tower. How many blocks did Oscar use to make each tower?

<table>
<thead>
<tr>
<th>Option</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>A 65</td>
<td>10%</td>
</tr>
<tr>
<td>B 63</td>
<td>*75%</td>
</tr>
<tr>
<td>C 61</td>
<td>8%</td>
</tr>
<tr>
<td>D 79</td>
<td>6%</td>
</tr>
</tbody>
</table>

4th Grade Mathematics STAAR Assessment-2013

9. Terrell spent $306 on a television and 3 video games. He spent $243 on the television. Each video game was the same price. How much did Terrell spend on each video game?

<table>
<thead>
<tr>
<th>Option</th>
<th>Solution</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>A $21, because 306 − 243 = 63 and 63 ÷ 3 = 21</td>
<td>*73%</td>
<td></td>
</tr>
<tr>
<td>B $1,647, because 306 + 243 = 549 and 549 ÷ 3 = 1,647</td>
<td>7%</td>
<td></td>
</tr>
<tr>
<td>C $183, because 306 ÷ 243 = 549 and 549 ÷ 3 = 183</td>
<td>9%</td>
<td></td>
</tr>
<tr>
<td>D $189, because 306 − 243 = 63 and 63 × 3 = 189</td>
<td>10%</td>
<td></td>
</tr>
</tbody>
</table>
4th Grade Mathematics STAAR Assessment-2013

24. The picture below shows the number of prizes that were in 5 treasure chests.

54 prizes 31 prizes 47 prizes 64 prizes 56 prizes

Mr. Washington opened the chests and put all the prizes into 7 equal groups. How many prizes did Mr. Washington put into each group?

F 34 13%
G 1,764 4%
H 36 *54%
J 252 28%

What Makes These Items More Rigorous?

- More cognitively complex questions
- More questions that have multiple steps
- More questions that have application context
- More questions that are open-ended (griddable)
- Questions that are asked in a reverse manner
- Questions that could be answered with “not here”, “none of the above”, or “all of the above”
- Questions that assess content and incorporate process skills

TEA Update on STAAR Mathematics-Texas Assessment Conference November 2012
What Makes These Items More Rigorous?

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TEA Update on STAAR Mathematics-Texas Assessment Conference November 2012

What Does “Cognitively Complex” Mean in Mathematics?

<table>
<thead>
<tr>
<th>Memorization</th>
<th>500 ÷ 5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Procedures Without Connections</td>
<td>5\underline{252}</td>
</tr>
<tr>
<td>Procedures With Connections</td>
<td>252 ÷ 5</td>
</tr>
<tr>
<td>Doing Mathematics</td>
<td>Think of a real-life situation that describes the following problem. 252 ÷ 5 Write the problem and then solve it.</td>
</tr>
</tbody>
</table>

-Smith and Stein, 1998
Are you seeing cognitive complexity in classroom walkthroughs?

<table>
<thead>
<tr>
<th>Memorization</th>
<th>• Identify types of lines and angles</th>
</tr>
</thead>
</table>
| Procedures Without Connections | • Name decimals and fractions using models  
|                        | • Find the missing value in a table of related data  
|                        | • Perform simple conversions in the customary system  
|                        | • Identify equivalent forms of decimals and fractions that name tenths and hundredths using models  
|                        | • Use essential attributes to define two- and three-dimensional geometric figures  
|                        | • Locate and name points on number line  |
| Procedures With Connections | • Solve application problems involving whole number operations  
|                        | • Describe the relationship between two sets of related data  
|                        | • Interpret bar graphs  |
| Doing Mathematics     | • Evaluate the reasonableness of solutions to application problems  
|                        | • Extend and apply geometry and measurement concepts to solve problems  
|                        | • Evaluate the reasonableness of solutions to application problems involving measurement |
Performance Level Descriptions

State of Texas Assessments of Academic Readiness (STAAR™) Performance Level Descriptors Grade 4 Mathematics

Performance Level Descriptions

Mathematical process skills are not assessed in isolation but are incorporated into questions that assess grade 4 content. These process skills focus on applying mathematics to solve problems, communicating about mathematics, and using logical reasoning.

Students achieving Level III: Advanced Academic Performance can
- Evaluate the reasonableness of solutions to application problems involving addition, subtraction, multiplication, and division of whole numbers
- Extend and apply geometry and measurement concepts to solve application problems including length and perimeter
- Evaluate the reasonableness of solutions to application problems involving measurement

Students achieving Level II: Satisfactory Academic Performance can
- Identify equivalent forms of decimals and fractions that name tenths and hundredths using models
- Solve application problems involving addition, subtraction, multiplication, and division of whole numbers
- Determine the relationship between two sets of related data
- Use essential attributes to define two- and three-dimensional geometric figures
- Locate and name points on a number line using whole numbers, fractions, and decimals
- Solve application problems involving length, perimeter, area, capacity, volume, weight, mass, time, and temperature
- Interpret bar graphs

Students achieving Level I: Unsatisfactory Academic Performance can
- Name decimals and fractions using models
- Find the missing value in a table of related data
- Identify types of lines and angles
- Perform simple conversions in the customary system

Are you seeing cognitive complexity in classroom walkthroughs?

Memorization
- Identify types of lines and angles

Procedures Without Connections
- Name decimals and fractions using models
- Find the missing value in a table of related data
- Perform simple conversions in the customary system
- Identify equivalent forms of decimals and fractions that name tenths and hundredths using models
- Use essential attributes to define two- and three-dimensional geometric figures
- Locate and name points on number line

Procedures With Connections
- Solve application problems involving whole number operations
- Describe the relationship between two sets of related data
- Interpret bar graphs

Doing Mathematics
- Evaluate the reasonableness of solutions to application problems
- Extend and apply geometry and measurement concepts to solve problems
- Evaluate the reasonableness of solutions to application problems involving measurement

How are these assessed on STAAR?
Using the Process Standards to Make Connections

“Mathematical process skills are not assessed in isolation but are incorporated into questions that assess grade 4 content. These process skills focus on applying mathematics to solve problems, communicating about mathematics, and using logical reasoning.”

• 4(7)(A) **Patterns, relationships, and algebraic thinking.** *The student uses organizational structures to analyze and describe patterns and relationships.*
  The student is expected to describe the relationship between two sets of related data such as ordered pairs in a table.

• 4(15)(A) **Underlying processes and mathematical tools.** *The student communicates about Grade 4 mathematics using informal language.*
  The student is expected to explain and record observations using objects, words, pictures, numbers, and technology.
4th Grade Mathematics STAAR Assessment-2013

20 The table below shows the amount of money Hector earned and spent during each of four months.

<table>
<thead>
<tr>
<th>Month</th>
<th>Amount Earned</th>
<th>Amount Spent</th>
</tr>
</thead>
<tbody>
<tr>
<td>May</td>
<td>$27</td>
<td>$12</td>
</tr>
<tr>
<td>June</td>
<td>$39</td>
<td>$24</td>
</tr>
<tr>
<td>July</td>
<td>$46</td>
<td>$31</td>
</tr>
<tr>
<td>August</td>
<td>$43</td>
<td>$28</td>
</tr>
</tbody>
</table>

Which of the following describes the relationship in the table?

- F Amount spent + 12 = amount earned
- G Amount spent × 2 = amount earned
- H Amount spent + 15 = amount earned
- J Amount spent − 15 = amount earned

4th Grade Mathematics STAAR Assessment-2013

- Look back at questions 9, 24, and 41.
- Did the question incorporate
  - Applying mathematics to solve a problem,
  - Communicating, or
  - Using logical reasoning?
Tier 1 Instruction

Curriculum

TEKS

Instruction

Assessment

Closing the Achievement Gap

• Follow an acceleration model instead of a remediation model
• Focus on high-priority gaps
• Focus on vocabulary development

*Learning in the Fast Lane: 8 Ways to Put ALL Students on the Road to Academic Success* (2014)- Suzy Pepper Rollins
Remediation or Acceleration?

**Remediation**
- Mastering concepts that students have not previously mastered
- Done in isolation from the new content
- Focuses on knowledge and skills from the past

**Acceleration**
- Strategically putting prior knowledge into place so that students can master new content
- Laser-focused on the new content
- Introduces new concepts just prior to primary instruction

Adapted from *Learning in the Fast Lane: 8 Ways to Put ALL Students on the Road to Academic Success* (2014) - Suzy Pepper Rollins

High-Priority Gaps

My students have quite a few gaps. What should the acceleration focus on?

Students could master this student expectation if they just knew . . .

Adapted from *Learning in the Fast Lane: 8 Ways to Put ALL Students on the Road to Academic Success* (2014) - Suzy Pepper Rollins
Vocabulary Development

• All students need vocabulary development.
• Targeted students may need the vocabulary introduced in advance of the lesson in Tier 1 instruction.
• Vocabulary development should be done strategically utilizing vocabulary acquisition strategies that are interactive.

Adapted from Learning in the Fast Lane: 8 Ways to Put ALL Students on the Road to Academic Success (2014) - Suzy Pepper Rollins
2014-2015: A New Speedway

Looking to 2014-2015

Curriculum

Revised Mathematics
TEKS (2012)

Instruction

Assessment
Texas Essential Knowledge and Skills

Knowledge and Skills
4(4) Number, operation, and quantitative reasoning. The student multiplies and divides to solve meaningful problems involving whole numbers.

Student Expectation
(E) The student is expected to use division to solve problems (no more than one-digit divisors and three-digit dividends without technology).

Knowledge and Skills
4(4) Number and operation. The student applies mathematical process standards to develop and use strategies and methods for whole number computations and decimal sums and differences in order to solve problems with efficiency and accuracy.

Student Expectations
(F) The student is expected to use strategies and algorithms, including the standard algorithm, to divide up to a four-digit dividend by a one-digit divisor.

Texas Essential Knowledge and Skills

• What information does the Knowledge and Skill statement provide?
• What evidence of the student expectation would we expect to see?
Revised Mathematics TEKS: Side-by-Side TEKS Comparison

Tasks for a Variety of Cognitive Complexities

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Closing the Achievement Gap

Resources

**Documents**
- Side-by-Side TEKS Comparison
- Vertical Alignment Charts
- Texas Response to the Curriculum Focal Points
- NEW STAAR Assessed Curriculum Documents
- NEW STAAR Blueprints

**Trainings**
- Revised Mathematics TEKS Summer Offerings
- Project Share Revised Mathematics TEKS Online Courses
- Region 4 Mathematics Academies: Revised TEKS
- Region 4 Mathematics Summer Professional Development
THANK YOU!

Contact Region 4 Math at:
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