Quantiles:

Powerful New Way to Track Student Progress

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“Algebra class will be important to you later in life because there’s going to be a test six weeks from now.”
The importance of algebra . . .

How important is algebra to a student’s chance of attending college?

Students who take a year of algebra and follow with a year of geometry nearly DOUBLE their chances of going to college -- by doing that alone!

Students who complete Algebra II are more than twice as likely to GRADUATE from college.

Challenges you face . . .

College Board and the National Math Panel
Which skill is the most difficult for students?

• Create equivalent amounts with different coins and bills 460Q

• Analyze patterns and translate the patterns into another pattern (e.g. from letters to numbers) 460Q

• Divide using single-digit divisors with and without remainders 460Q

The Quantile Framework™ of Mathematics

Developed by MetaMetrics®, Inc.

Measures Student Achievement

Measures Math Concepts
What is a Quantile Measure

Measures Student Achievement
A student’s overall level of mathematical understanding

Measures Math Concepts
The “solvability” or difficulty level of math skills and concepts

Results
Effectively link assessment with instruction
Match learners to materials they’re ready to learn

The Quantile Framework is NOT:

• An indicator of mastery of specific skills
• A list of mathematical skills
• A curriculum for mathematics
• A mathematics program
• A grade equivalent
• A measurement for a worksheet or a test
Quantiles: A New Way to Connect Assessment and Instruction

Quantiles make test scores “actionable”

- identify how well students will likely be able to solve problems and apply mathematics
- identify which skills and concepts students are ready to learn

- Facilitates differentiated instruction
- Enables benchmarking
Defining Key Terms

Quantile Measure
When applied to Students = *readiness for instruction*
When applied to Skills & Concepts = *solvability level*

QTaxon
A skill or concept included in the Quantile Framework taxonomy

Quantile Scale
- Use systems of linear equations in two or more variables to solve problems.
- Determine the absolute value of a number
- Calculate unit rates to make comparisons

Student Readiness
Skill Difficulty
Using Quantile Ranges

Student’s Instructional Quantile Range
Learning Frontier

+ 50Q
Student’s Quantile measure
- 50Q

Grade Average Annual Increase for On-level Students

<table>
<thead>
<tr>
<th>Grade</th>
<th>Annual Increase</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>150Q</td>
</tr>
<tr>
<td>3</td>
<td>205Q</td>
</tr>
<tr>
<td>4</td>
<td>110Q</td>
</tr>
<tr>
<td>5</td>
<td>85Q</td>
</tr>
<tr>
<td>6</td>
<td>85Q</td>
</tr>
<tr>
<td>7</td>
<td>40Q</td>
</tr>
<tr>
<td>8</td>
<td>65Q</td>
</tr>
</tbody>
</table>
Why Quantiles?
More specific information about individual students
Teachers, parents, & even students

Why Quantiles?
Links assessment to instructions
Curriculum, textbooks, & other resources

Information Related to the Attached Activity
QTaxon(s): QT-N-413 QT-G-460 QT-A-603
Quantile® measure: HMC
Quantiles:
Developmental within a strand

- **40Q**: Combine simple figures to create a given shape.
- **200Q**: Identify and name: hexagon, trapezoid, parallelogram.
- **680Q**: Classify plane figures according to type of symmetry (line, rotational).
- **1340Q**: Describe the transformations of solid figures in space.

Quantiles:
Developmental across the strands

- **70Q**: Determine the value of sets of coins.
- **600Q**: Estimate products and quotients of decimals or of mixed numbers.
- **1340Q**: Rename logarithmic expressions using properties of logarithms.
Quantiles: Developmental across the strands

650Q
Use one-step equations and inequalities to model and solve problems.

A Research-based Taxonomy

The Quantile Framework

I am a 4th grader with a 500Q. I am on grade level and here are the things I’m ready to learn!
A Research-based Taxonomy

Quantiles.com

Math Skill Database
- QTaxon Search
  - Knowledge Clusters
  - Curriculum Alignment
  - Textbook Alignment
  - Instructional Resources

Math @ Home
Find your Math Textbook
Quantile Teaching Assistant
Quantiles: A New Way to Connect Assessment and Instruction

Quantiles are an “open standard”

Quantiles.com
Quantile Terminology

- **Emerging Mathematician (EM):**
  - has a Quantile measure of zero or below

- **Not Measurable in Quantiles (NMQ):**
  - is extensively diverse in QTaxons or strands

- **Higher Mathematical Content (HMC):**
  - is above the precalculus level

Quantiles.com
Knowledge Clusters

Quantiles.com: Math Terms

QT-N-117
Subtract 2- and 3-digit numbers with regrouping, 210Q

Supplemental Q’taxon

Prior Q’taxon

Man Skill Concept

Supplemental Q’taxon

Prior Q’taxon

Related Math Terms
- numerator
- mixed number
- denominator
- fraction

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### Quantiles.com: State Standards

**Goal** | **Description** | **Grade**
--- | --- | ---
4-NF3a | Understand addition and subtraction of fractions as joining and separating parts referring to the same whole | 4
4-NF3b | Decompose a fraction into a sum of fractions with the same denominator in more than one way, recording each decomposition by an equation. Justify decompositions, e.g., by using properties of operations and the relationship between addition and subtraction. | 4
4-NF3c | Add and subtract mixed numbers with like denominators, e.g., by replacing each mixed number with an equivalent fraction, and/or by using properties of operations and the relationship between addition and subtraction. | 4

### Quantiles.com: Resources

- **Harcourt Math 3 Florida Edition**
  - Harcourt
  - 5 - Add and Subtract Fractions
  - 6 - Subtract Fractions
- **Holt Mathematics Course 1**
  - Holt, Rinehart, Winston
  - 4 - Number Theory and Fractions
- **Holt McDougal Mathematics Course 4**
  - Holt McDougal
  - 4 - Number Theory and Fractions
- **Holt McDougal Mathematics Course 2**
  - Holt McDougal
  - 3 - Applying Rational Numbers
  - 7 - Adding and Subtracting Rational Numbers
  - 8 - Adding and Subtracting Mixed Numbers

## Resources

### Web Resources

<table>
<thead>
<tr>
<th>Web Resource</th>
<th>Link</th>
<th>Additional Resources</th>
</tr>
</thead>
<tbody>
<tr>
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Quantile Alignments

NCTM Focal Points Alignment with The Quantile Framework® for Mathematics®

NAEP Alignment with The Quantile Framework® for Mathematics®

National Mathematics Panel Report Alignment with The Quantile Framework® for Mathematics®

**COMMON CORE**
STATE STANDARDS INITIATIVE
PREPARING AMERICA’S STUDENTS FOR COLLEGE & CAREER

Norm- Referenced Assessments
Formative Assessments
State Assessments

WDE
Public Schools of North Carolina

Scholastic
Math Inventory

CTB McGraw-Hill

ERB
Educational Research Bureau

West Virginia Department of Education
Quantile Vocabulary Terms

<table>
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<tr>
<th>Feature</th>
<th>Definition</th>
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<tr>
<td>QTaxon</td>
<td>Mathematical skill/concept included in the Framework</td>
</tr>
<tr>
<td>Quantile measure</td>
<td>Measure on the Scale that delineates student achievement level and the difficulty level of skills &amp; concepts.</td>
</tr>
<tr>
<td>Knowledge Clusters</td>
<td>Related QTaxons</td>
</tr>
<tr>
<td>Impending QTaxons</td>
<td>Skills and Concepts that enrich the learning.</td>
</tr>
<tr>
<td>Supplemental QTaxons</td>
<td>Skills and Concepts that extend or build the learning.</td>
</tr>
<tr>
<td>Prerequisite QTaxon</td>
<td>Skills and concepts that are foundational to the learning.</td>
</tr>
<tr>
<td>Learning Frontier</td>
<td>The learning frontier-50Q above and below the student’s Quantile measure.</td>
</tr>
</tbody>
</table>

Things to think about . . .

Meeting Students’ Needs
- Instructional needs of students
- Lesson Planning with Knowledge Clusters
- Differentiated Lesson Plans
- Individual Education Plans (IEPs)
- Plan to chart student growth during a certain semester or year
Things to remember . . .

- Quantile Framework places the mathematics curriculum, the materials to teach, and the students ALL on the same scale
- Target Instruction
- Anticipate Understanding
- Inform Instruction
- Improve Achievement

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