



THE QUANTILE[®] FRAMEWORK[®] MAP FOR MATHEMATICS

Linking assessment with mathematics instruction



Imagine empowering and accelerating students' learning in mathematics by better differentiating instruction and monitoring growth in student ability. With the Quantile Framework, educators can help achieve this goal by identifying level-appropriate mathematical tasks for students and track their progress!

HOW IT WORKS

The Quantile Framework for Mathematics is a unique measurement system that uses a common scale and metric to assess a student's mathematical achievement level and the difficulty of specific skills and concepts. The Quantile Framework describes a student's ability to solve mathematical problems and the demand of the skills and concepts typically taught in kindergarten mathematics through Algebra II, Geometry, Trigonometry and Precalculus. The Quantile Map provides educators with a sampling of primary mathematical skills and concepts from over 500 Quantile Skills and Concepts (QSCs) throughout the Quantile scale. This sampling of QSCs ranges from EM (Emerging Mathematician) for early, foundational mathematical skills and concepts to 1500Q for more advanced skills and concepts. As the difficulty, or demand of the skill increases, so does the Quantile[®] measure.

HOW TO USE IT

With the Quantile Framework, educators can explore the interconnectedness of mathematical skills and concepts and identify those elements that are critical for progressing student learning. Educators are better able to inform their instruction on how to best teach a skill or concept by pinpointing which skills build upon each other. The skill mapping of mathematical concepts enables educators to build an

instructional path that best fits their students' unique abilities. Both students and QSCs receive a Quantile measure. Numerous tests report Quantile student measures including many state end-of-year assessments, national norm-referenced assessments and math programs. On the QSC side, more than 580 textbooks, 64,000 lessons and 3,100 downloadable resources have received Quantile measures.

Quantile measures provide educators with the information they need to identify gaps in mathematical knowledge, as well as serve as a guide for progressing to more advanced topics. Every QSC is part of a knowledge cluster that shows relationships and connections between mathematical skills and offers their relative difficulty among different skills. Both the prerequisite and impending skills are elements of knowledge clusters and serve as building blocks that support students' success. Educators can advance student learning by using prerequisite and impending skills to build mathematical knowledge and understanding. Prerequisite skills help educators see the pieces of the puzzle that make up a skill or concept, showing what needs to be understood first. Impending skills are skills and concepts that build upon a focus skill and allow educators to see a trajectory of knowledge across grades and content strands.



James: 1190Q



Sophia: 770Q



Donald: 450Q



Aliyah: EM100Q





High School Example James

Heritage High School | Geometry Course

Quantile Measure: 1190Q



James is exploring theorems about lines and angles in his Geometry class. In his current learning path, the focus skill being taught is *use properties, definitions, and theorems of angles and lines to solve problems related to adjacent, vertical, complementary, supplementary, and linear pairs of angles*. This focus skill is part of a knowledge cluster that contains prerequisite and impending skills. Working with prerequisite skills can help students struggling to learn and impending skills can help students progress to the next level of learning.

Since James' Quantile measure is within the range of the focus skill being taught (his Quantile measure $\pm 50Q$), James will be ready for this type of instruction. With his mathematical ability being at the same level as the focus skill, learning will be optimal. Once James is performing well with the focus skill, he will be better prepared to learn the impending skills connected with this focus skill.

1250Q

IMPENDING SKILL

Use definitions and theorems of angles formed when a transversal intersects parallel lines.

1220Q

IMPENDING SKILL

Use properties, definitions, and theorems of polygons to solve problems related to the interior and exterior angles of a convex polygon.

1160Q

FOCUS SKILL

Use properties, definitions, and theorems of angles and lines to solve problems related to adjacent, vertical, complementary, supplementary, and linear pairs of angles.

CCSS G.CO.9

1010Q

PREREQUISITE SKILL

Define and identify alternate interior, alternate exterior, corresponding, adjacent and vertical angles.

1020Q

PREREQUISITE SKILL

Define and identify complementary and supplementary angles.

800Q

PREREQUISITE SKILL

Write a linear equation or inequality to represent a given number or word problem; solve.



Middle School Example Sophia

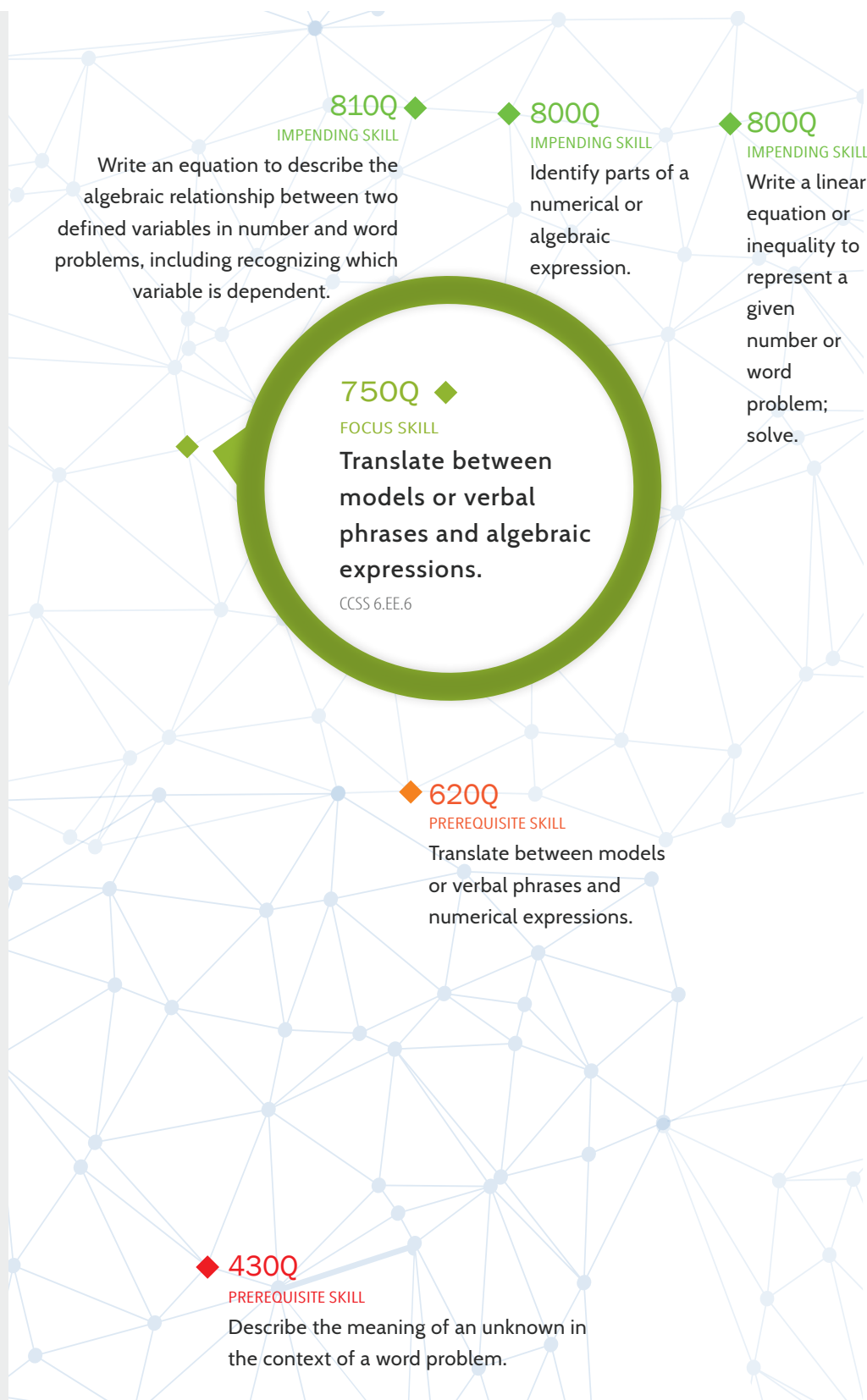
Heritage Middle School | Grade 6

Quantile Measure: 770Q



Sophia is using variables to represent mathematical expressions in her math class. In her current learning path, the focus skill being taught is *translate between models or verbal phrases and algebraic expressions*. This focus skill is part of a knowledge cluster that contains prerequisite and impending skills. Working with prerequisite skills can help students struggling to learn and impending skills can help students progress to the next level of learning.

Since Sophia's Quantile measure is within the range of the focus skill being taught (her Quantile measure +/- 50Q), Sophia will be ready for this type of instruction. With her mathematical ability being at the same level as the focus skill, learning will be optimal. Once Sophia is performing well with the focus skill, she will be better prepared to learn the impending skills connected with this focus skill.





Late Elementary Example Donald

Heritage Elementary School | Grade 4

Quantile Measure: 450Q



Donald is learning about line graphs with very large data values. In his current learning path, the focus skill being taught is *organize, display, and interpret information in graphs containing scales that represent multiple units*. This focus skill is part of a knowledge cluster that contains prerequisite and impending skills. Working with prerequisite skills can help students struggling to learn and impending skills can help students progress to the next level of learning.

Since Donald's Quantile measure is within the range of the focus skill being taught (his Quantile measure $\pm 50Q$), Donald will be ready for this type of instruction. With his mathematical ability being at the same level as the focus skill, learning will be optimal. Once Donald is performing well with the focus skill, he will be better prepared to learn the impending skills connected with this focus skill.

800Q ▲

IMPENDING SKILL

Identify and use appropriate scales and intervals in graphs and data displays.

480Q ▲

IMPENDING SKILL

Organize, display, and interpret information in bar graphs.

470Q ▲

IMPENDING SKILL

Organize, display, and interpret information in line graphs.

480Q ▲

FOCUS SKILL

Organize, display, and interpret information in graphs containing scales that represent multiple units.

CCSS 3.MD.3

200Q ▲

PREREQUISITE SKILL

Organize, display, and interpret information in line plots and tally charts.

★ 90Q

PREREQUISITE SKILL

Skip count by 3s, 4s, 6s, 7s, 8s, and 9s.

★ 110Q

PREREQUISITE SKILL

Skip count by 2s, 5s and 10s beginning at any number.

EM10Q ▲

PREREQUISITE SKILL

Organize, display, and interpret information in picture graphs and bar graphs using grids.



Early Elementary Example Aliyah

Heritage Elementary School | Kindergarten

Quantile Measure: EM100Q



Aliyah is exploring unknown-addend problems in her class. In her current learning path, the focus skill being taught is *know and use related addition and subtraction facts*. This focus skill is part of a knowledge cluster that contains prerequisite and impending skills. Working with prerequisite skills can help students struggling to learn and impending skills can help students progress to the next level of learning.

Since Aliyah's Quantile measure is within the range of the focus skill being taught (her Quantile measure +/- 50Q), Aliyah will be ready for this type of instruction. With her mathematical ability being at the same level as the focus skill, learning will be optimal. Once Aliyah is performing well with the focus skill, she will be better prepared to learn the impending skills connected with this focus skill.

EM80Q ■ FOCUS SKILL

**Know and use
related addition
and subtraction facts.**

CCSS 1.OA.4

■ EM25Q

IMPENDING SKILL

**Model the concept of
subtraction using numbers
less than or equal to 10.**

EM110Q ◆

PREREQUISITE SKILL

**Identify missing addends for
addition facts.**

■ EM260Q

PREREQUISITE SKILL

**Model the concept of
addition for sums to 10.**

GLOSSARY

Emerging Mathematician (EM) A code that comes before a Quantile measure of below zero for material and student measures at early levels.

Quantile Skill and Concept (QSC)
The description of a skill and its Quantile measure.



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OPERATIONS

●
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GEOMETRY

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