PARCC Model Content Frameworks

Mathematics

Grade 5

Version 3.0

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Partnership for Assessment of Readiness for College and Careers

Examples of Key Advances from Grade 4 to Grade 5

- In grade 5, students will integrate decimal fractions more fully into the place value system (5.NBT.1–4). By thinking about decimals as sums of multiples of base-ten units, students begin to extend algorithms for multidigit operations to decimals (5.NBT.7).
- Students use their understanding of fraction equivalence and their skill in generating equivalent fractions as a strategy to add and subtract fractions, including fractions with unlike denominators.
- Students apply and extend their previous understanding of multiplication to multiply a fraction or whole number by a fraction (5.NF.4). They also learn the relationship between fractions and division, allowing them to divide any whole number by any nonzero whole number and express the answer in the form of a fraction or mixed number (5.NF.3). And they apply and extend their previous understanding of multiplication and division to divide a unit fraction by a whole number or a whole number by a unit fraction.[1]
- Students extend their grade 4 work in finding whole-number quotients and remainders to the case of two-digit divisors (5.NBT.6).
- Students continue their work in geometric measurement by working with volume as an attribute of solid figures and as a measurement quantity (5.MD.3–5).
- Students build on their previous work with number lines to use two perpendicular number lines to define a coordinate system (5.G.1–2).

Fluency Expectations or Examples of Culminating Standards

5.NBT.5 Students fluently multiply multidigit whole numbers using the standard algorithm.

Examples of Major Within-Grade Dependencies

- Understanding that in a multidigit number, a digit in one place represents $1/10$ of what it represents in the place to its left (5.NBT.1) is an example of multiplying a quantity by a fraction (5.NF.4).

[1] Students able to multiply fractions in general can develop strategies to divide fractions in general by reasoning about the relationship between multiplication and division. But the division of a fraction by a fraction is not a requirement in this grade.

Examples of Opportunities for Connections among Standards, Clusters or Domains

- The work that students do in multiplying fractions extends their understanding of the operation of multiplication. For example, to multiply $a/b \times q$ (where q is a whole number or a fraction), students can interpret $a/b \times q$ as meaning a parts of a partition of q into b equal parts (5.NF.4a). This interpretation of the product leads to a product that is less than, equal to or greater than q depending on whether $a/b < 1$, $a/b = 1$ or $a/b > 1$, respectively (5.NF.5).

- Conversions within the metric system represent an important practical application of the place value system. Students' work with these units (5.MD.1) can be connected to their work with place value (5.NBT.1).

Examples of Opportunities for In-Depth Focus

5.NBT.1 The extension of the place value system from whole numbers to decimals is a major intellectual accomplishment involving understanding and skill with base-ten units and fractions.

5.NBT.6 The extension from one-digit divisors to two-digit divisors requires care. This is a major milestone along the way to reaching fluency with the standard algorithm in grade 6 (6.NS.2).

5.NF.2 When students meet this standard, they bring together the threads of fraction equivalence (grades 3–5) and addition and subtraction (grades K–4) to fully extend addition and subtraction to fractions.

5.NF.4 When students meet this standard, they fully extend multiplication to fractions, making division of fractions in grade 6 (6.NS.1) a near target.

5.MD.5 Students work with volume as an attribute of a solid figure and as a measurement quantity. Students also relate volume to multiplication and addition. This work begins a progression leading to valuable skills in geometric measurement in middle school.

Examples of Opportunities for Connecting Mathematical Content and Mathematical Practices

Mathematical practices should be evident *throughout* mathematics instruction and connected to all of the content areas highlighted above, as well as all other content areas addressed at this grade level. Mathematical tasks (short, long, scaffolded, and unscaffolded) are an important opportunity to connect content and practices. Some brief examples of how the content of this grade might be connected to the practices follow.

- When students break divisors and dividends into sums of multiples of base-ten units (5.NBT.6), they are seeing and making use of structure (MP.7) and attending to precision (MP.6). Initially for most students, multidigit division problems take time and effort, so they also require perseverance (MP.1) and looking for and expressing regularity in repeated reasoning (MP.8).

- When students explain patterns in the number of zeros of the product when multiplying a number by powers of 10 (5.NBT.2), they have an opportunity to look for and express regularity in repeated reasoning (MP.8). When they use these patterns in division, they are making sense of problems (MP.1) and reasoning abstractly and quantitatively (MP.2).

- When students show that the volume of a right rectangular prism is the same as would be found by multiplying the side lengths (5.MD.5), they also have an opportunity to look for and express regularity in repeated reasoning (MP.8). They attend to precision (MP.6) as they use correct length or volume units, and they use appropriate tools strategically (MP.5) as they understand or make drawings to show these units.

Content Emphases by Cluster

Not all of the content in a given grade is emphasized equally in the standards. Some clusters require greater emphasis than the others based on the depth of the ideas, the time that they take to master, and/or their importance to future mathematics or the demands of college and career readiness. In addition, an intense focus on the most critical material at each grade allows depth in learning, which is carried out through the Standards for Mathematical Practice.

To say that some things have greater emphasis is not to say that anything in the standards can safely be neglected in instruction. Neglecting material will leave gaps in student skill and understanding and may leave students unprepared for the challenges of a later grade. All standards figure in a mathematical education and will therefore be eligible for inclusion on the PARCC assessment. However, the assessments will strongly focus where the standards strongly focus.

In addition to identifying the Major, Additional, and Supporting Clusters for each grade, suggestions are given following the table on the next page for ways to connect the Supporting to the Major Clusters of the grade. Thus, rather than suggesting even inadvertently that some material not be taught, there is direct advice for teaching it, in ways that foster greater focus and coherence.

Key: ■ Major Clusters; ■ Supporting Clusters; ○ Additional Clusters

Operations and Algebraic Thinking
○ Write and interpret numerical expressions.
○ Analyze patterns and relationships.
Number and Operations in Base Ten
■ Understand the place value system.
■ Perform operations with multi-digit whole numbers and with decimals to hundredths.
Number and Operations — Fractions
■ Use equivalent fractions as a strategy to add and subtract fractions
■ Apply and extend previous understandings of multiplication and division to multiply and divide fractions.
Measurement and Data
■ Convert like measurement units within a given measurement system.
■ Represent and interpret data.
■ Geometric measurement: understand concepts of volume and relate volume to multiplication and to addition.
Geometry

- Graph points on the coordinate plane to solve real-world and mathematical problems.
- Classify two-dimensional figures into categories based on their properties.

Examples of Linking Supporting Clusters to the Major Work of the Grade

- Convert like measurement units within a given measurement system: Work in these standards supports computation with decimals. For example, converting 5 cm to 0.05 m involves computation with decimals to hundredths.

- Represent and interpret data: The standard in this cluster provides an opportunity for solving real-world problems with operations on fractions, connecting directly to both Number and Operations — Fractions clusters.