Appendix A – Grade-Level Content Emphases

The tables on the following pages summarize the cluster-level emphases (major, additional, and supporting) for grades 3-8 and Grade 11.

Grade 3 Cluster-Level Emphases

m = major clusters; a = additional clusters; s = supporting clusters

Operations and Algebraic Thinking

[m]: Represent and solve problems involving multiplication and division.

[m]: Understand properties of multiplication and the relationship between multiplication and division.

[m]: Multiply and divide within 100.

[m]: Solve problems involving the four operations, and identify and explain patterns in arithmetic.

Number and Operations in Base Ten

[a]: Use place value understanding and properties of arithmetic to perform multi-digit arithmetic. (DOK 1)

Number and Operations—Fractions

[m]: Develop understanding of fractions as numbers. (DOK 1, 2)

Measurement and Data

[m]: Solve problems involving measurement and estimation of intervals of time, liquid volumes, and masses of objects. (DOK 1, 2)

[s]: Represent and interpret data. (DOK 2, 3)

[m]: Geometric measurement: understand concepts of area and relate area to multiplication and to addition. (DOK 1, 2)

[a]: Geometric measurement: recognize perimeter as an attribute of plane figures and distinguish between linear and area measures. (DOK 1)

Geometry

[s]: Reason with shapes and their attributes. (DOK 1, 2)

Mathematical Practices summary

1. Make sense of problems and persevere in solving them.
2. Reason abstractly and quantitatively.
3. Construct viable arguments and critique the reasoning of others.
4. Model with mathematics.
5. Use appropriate tools strategically.
6. Attend to precision.
7. Look for and make use of structure.
8. Look for and express regularity in repeated reasoning.

Grade 4 Cluster-Level Emphases

m = major clusters; a = additional clusters; s = supporting clusters

Operations and Algebraic Thinking

[m] Use the four operations with whole numbers to solve problems.

[s] Gain familiarity with factors and multiples.

[a] Generate and analyze patterns.

Number and Operations in Base Ten

[m] Generalize place value understanding for multi-digit whole numbers.

[m] Use place value understanding and properties of operations to perform multi-digit arithmetic.

Number and Operations—Fractions

[m] Extend understanding of fraction equivalence and ordering.

[m] Build fractions from unit fractions by applying and extending previous understandings of operations on whole numbers.

[m] Understand decimal notation for fractions, and compare decimal fractions.

Measurement and Data

[s] Solve problems involving measurement and conversion of measurements from a larger unit to a smaller unit.

[s] Represent and interpret data.

[a] Geometric measurement: understand concepts of angle and measure angles.

Geometry

[a] Draw and identify lines and angles, and classify shapes by properties of their lines and angles.

Mathematical Practices summary

1. Make sense of problems and persevere in solving them.
2. Reason abstractly and quantitatively.
3. Construct viable arguments and critique the reasoning of others.
4. Model with mathematics.
5. Use appropriate tools strategically.
6. Attend to precision.
7. Look for and make use of structure.
8. Look for and express regularity in repeated reasoning.

Grade 5 Cluster-Level Emphases

m = major clusters; a = additional clusters; s = supporting clusters

Operations and Algebraic Thinking

[a] Write and interpret numerical expressions.

[a] Analyze patterns and relationships.

Number and Operations in Base Ten

[m] Understand the place value system.

[m] Perform operations with multi-digit whole numbers and with decimals to hundredths.

Number and Operations— Fractions

[m] Use equivalent fractions as a strategy to add and subtract fractions.

[m] Apply and extend previous understandings of multiplication and division to multiply and divide fractions.

Measurement and Data

[s] Convert like measurement units within a given measurement system.

[s] Represent and interpret data.

[m] Geometric measurement: understand concepts of volume and relate volume to multiplication and to addition.

Geometry

[a] Graph points on the coordinate plane to solve real-world and mathematical problems.

[a]Classify two-dimensional figures into categories based on their properties.

Mathematical Practices summary

1. Make sense of problems and persevere in solving them.
2. Reason abstractly and quantitatively.
3. Construct viable arguments and critique the reasoning of others.
4. Model with mathematics.
5. Use appropriate tools strategically.
6. Attend to precision.
7. Look for and make use of structure.
8. Look for and express regularity in repeated reasoning.

Grade 6 Cluster-Level Emphases

m = major clusters; a = additional clusters; s = supporting clusters

Ratios and Proportional relationships

[m] Understand ratio concepts and use ratio reasoning to solve problems.

The Number System

[m] Apply and extend previous understandings of multiplication and division to divide fractions by fractions.
[a] Compute fluently with multi-digit numbers and find common factors and multiples.
[m] Apply and extend previous understandings of numbers to the system of rational numbers.

Expressions and Equations

[m] Apply and extend previous understandings of arithmetic to algebraic expressions.
[m] Reason about and solve one-variable equations and inequalities.
[m] Represent and analyze quantitative relationships between dependent and independent variables

Geometry

[s] Solve real-world and mathematical problems involving area, surface area, and volume.

Statistics and Probability

[a] Develop understanding of statistical variability.

[a] Summarize and describe distributions.

Mathematical Practices summary

1. Make sense of problems and persevere in solving them.
2. Reason abstractly and quantitatively.
3. Construct viable arguments and critique the reasoning of others.
4. Model with mathematics.
5. Use appropriate tools strategically.
6. Attend to precision.
7. Look for and make use of structure.
8. Look for and express regularity in repeated reasoning.

Grade 7 Cluster-Level Emphases

m = major clusters; a = additional clusters; s = supporting clusters

Ratios and Proportional relationships

[m] Analyze proportional relationships and use them to solve real-world and mathematical problems.

The Number System

[m] Apply and extend previous understandings of operations with fractions to add, subtract, multiply, and divide rational numbers.

Expressions and Equations

[m] Use properties of operations to generate equivalent expressions.

[m] Solve real-life and mathematical problems using numerical and algebraic expressions and equations.

Geometry

[a] Draw, construct and describe geometrical figures and describe the relationships between them.

[a] Solve real-life and mathematical problems involving angle measure, area, surface area, and volume.

Statistics and Probability

[s] Use random sampling to draw inferences about a population.

[a] Draw informal comparative inferences about two populations.

[s] Investigate chance processes and develop, use, and evaluate probability models.

Mathematical Practices summary

1. Make sense of problems and persevere in solving them.
2. Reason abstractly and quantitatively.
3. Construct viable arguments and critique the reasoning of others.
4. Model with mathematics.
5. Use appropriate tools strategically.
6. Attend to precision.
7. Look for and make use of structure.
8. Look for and express regularity in repeated reasoning.

Grade 8 Cluster-Level Emphases

m = major clusters; a = additional clusters; s = supporting clusters

The Number System

[s] Know that there are numbers that are not rational, and approximate them by rational numbers.

Expressions and equations

[m] Work with radicals and integer exponents.

[m] Understand the connections between proportional relationships, lines, and linear equations.

[m] Analyze and solve linear equations and pairs of simultaneous linear equations.

Functions

[m] Define, evaluate, and compare functions.

[s] Use functions to model relationships between quantities.

Geometry

[m] Understand congruence and similarity using physical models, transparencies, or geometry software.

[m] Understand and apply the Pythagorean theorem.

[a] Solve real-world and mathematical problems involving volume of cylinders, cones and spheres.

Statistics and Probability

[s] Investigate patterns of association in bivariate data.

Mathematical Practices summary

1. Make sense of problems and persevere in solving them.
2. Reason abstractly and quantitatively.
3. Construct viable arguments and critique the reasoning of others.
4. Model with mathematics.
5. Use appropriate tools strategically.
6. Attend to precision.
7. Look for and make use of structure.
8. Look for and express regularity in repeated reasoning.

Grade 11 Emphases

The following aspects of the standards play an especially prominent role in college and career readiness:

- The Standards for Mathematical Practice, viewed in connection with mathematical content. Postsecondary instructors value expertise in fundamentals over broad topic coverage (ACT 2006, 2009).

- Modeling and rich applications (see pages 72 and 73 in the standards), which can be integrated into curriculum, instruction and assessment.
  - Note the star symbols («) in the high school Standards for Mathematical Content, which identify natural opportunities to connect the modeling practice to content.
  - Many modeling tasks in high school will require application of content knowledge first gained in grades 6–8 to solve complex problems. (See p. 84 of the standards.)

The following clusters of high school standards have wide relevance as prerequisites for a range of postsecondary college and career pathways:

Number and Quantity: Quantities

Reason quantitatively and use units to solve problems.

Number and Quantity: The Real Number System

Extend the properties of exponents to rational exponents.

Use properties of rational and irrational numbers.

Algebra: Seeing Structure in Expressions

Interpret the structure of expressions.

Write expressions in equivalent forms to solve problems.

Algebra: Arithmetic with Polynomials and Rational Expressions

Perform arithmetic operations on polynomials.

Algebra: Creating Equations

Create equations that describe numbers or relationships.

Algebra: Reasoning with Equations and Inequalities

Understand solving equations as a process of reasoning and explain the reasoning.

Solve equations and inequalities in one variable.

Represent and solve equations and inequalities graphically.

Functions: Interpreting Functions

Understand the concept of a function and use function notation.

Analyze functions using different representations.

Interpret functions that arise in applications in terms of a context.

Functions: Building Functions

Build a function that models a relationship between two quantities.

Geometry: Congruence

Prove geometric theorems.

Statistics and Probability: Interpreting Categorical and Quantitative Data

Summarize, represent and interpret data on a single count or measurement variable.

Mathematical Practices summary

1. Make sense of problems and persevere in solving them.
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4. Model with mathematics.
5. Use appropriate tools strategically.
6. Attend to precision.
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