

A photograph of a classroom with two wooden desks. Each desk has a black top and a white sheet of paper. A pencil lies on each desk. In the background, there is a whiteboard and a wooden cabinet with various supplies. A red chair is visible in the foreground.

Pennsylvania Academic  
Standards for Mathematics  
Correlation to *Eureka Math*

Grade 5  
June 2017  
Draft

**EUREKA  
MATH™**

FROM THE NONPROFIT GREAT MINDS

# Grade 5 Mathematics

The majority of the Grade 5 Pennsylvania Academic Standards for Mathematics are fully covered by the Grade 5 *Eureka Math*<sup>™</sup> curriculum. The areas where the Grade 5 Pennsylvania Academic Standards for Mathematics and Grade 5 *Eureka Math* do not align will require the use of *Eureka Math* content from other grade levels. A detailed analysis of alignment is provided in the table below.

## Indicators



Green indicates that the Pennsylvania standard is fully addressed in *Eureka Math*.



Yellow indicates that the Pennsylvania standard may not be completely addressed in *Eureka Math*.



Red indicates that the Pennsylvania standard is not addressed in *Eureka Math*.



Blue indicates there is a discrepancy between the grade level at which this standard is addressed in the Pennsylvania standards and in *Eureka Math*.

## Standards for Mathematical Practice

### **1: Make sense of problems and persevere in solving them.**

Mathematically proficient students start by explaining to themselves the meaning of a problem and looking for entry points to its solution. They analyze givens, constraints, relationships, and goals. They make conjectures about the form and meaning of the solution and plan a solution pathway rather than simply jumping into a solution attempt. They consider analogous problems, and try special cases and simpler forms of the original problem in order to gain insight into its solution. They monitor and evaluate their progress and change course if necessary. Older students might, depending on the context of the problem, transform algebraic expressions or change the viewing window on their graphing calculator to get the information they need. Mathematically proficient students can explain correspondences between equations, verbal descriptions, tables, and graphs or draw diagrams of important features and relationships, graph data, and search for regularity or trends. Younger students might rely on using concrete objects or pictures to help conceptualize and solve a problem. Mathematically proficient students check their answers to problems using a different method, and they continually ask themselves, "Does this make sense?" They can understand the approaches of others to solving complex problems and identify correspondences between different approaches.

## Aligned Components of *Eureka Math*

Lessons in every module engage students in making sense of problems and persevering in solving them as required by this standard. This practice standard is analogous to the CCSSM Standards for Mathematical Practice 1, which is specifically addressed in the following modules:

G5 M2: Multi-Digit Whole Number and Decimal Fraction Operations

G5 M3: Addition and Subtraction of Fractions

G5 M5: Addition and Multiplication with Volume and Area

G5 M6: Problem Solving with the Coordinate Plane

## Standards for Mathematical Practice

### **2: Reason abstractly and quantitatively.**

Mathematically proficient students make sense of quantities and their relationships in problem situations. They bring two complementary abilities to bear on problems involving quantitative relationships: the ability to *decontextualize*—to abstract a given situation and represent it symbolically and manipulate the representing symbols as if they have a life of their own, without necessarily attending to their referents—and the ability to *contextualize*, to pause as needed during the manipulation process in order to probe into the referents for the symbols involved. Quantitative reasoning entails habits of creating a coherent representation of the problem at hand; considering the units involved; attending to the meaning of quantities, not just how to compute them; and knowing and flexibly using different properties of operations and objects.

## Aligned Components of *Eureka Math*

Lessons in every module engage students in reasoning abstractly and quantitatively as required by this standard. This practice standard is analogous to the CCSSM Standards for Mathematical Practice 2, which is specifically addressed in the following modules:

G5 M2: Multi-Digit Whole Number and Decimal Fraction Operations

G5 M4: Multiplication and Division of Fractions and Decimal Fractions

G5 M5: Addition and Multiplication with Volume and Area

G5 M6: Problem Solving with the Coordinate Plane

## Standards for Mathematical Practice

### **3: Construct viable arguments and critique the reasoning of others.**

Mathematically proficient students understand and use stated assumptions, definitions, and previously established results in constructing arguments. They make conjectures and build a logical progression of statements to explore the truth of their conjectures. They are able to analyze situations by breaking them into cases, and can recognize and use counterexamples. They justify their conclusions, communicate them to others, and respond to the arguments of others. They reason inductively about data, making plausible arguments that take into account the context from which the data arose. Mathematically proficient students are also able to compare the effectiveness of two plausible arguments, distinguish correct logic or reasoning from that which is flawed, and—if there is a flaw in an argument—explain what it is. Elementary students can construct arguments using concrete referents such as objects, drawings, diagrams, and actions. Such arguments can make sense and be correct, even though they are not generalized or made formal until later grades. Later, students learn to determine domains to which an argument applies. Students at all grades can listen or read the arguments of others, decide whether they make sense, and ask useful questions to clarify or improve the arguments.

## Aligned Components of *Eureka Math*

Lessons in every module engage students in constructing viable arguments and critiquing the reasoning of others as required by this standard. This practice standard is analogous to the CCSSM Standards for Mathematical Practice 3, which is specifically addressed in the following modules:

G5 M3: Addition and Subtraction of Fractions

G5 M4: Multiplication and Division of Fractions and Decimal Fractions

G5 M5: Addition and Multiplication with Volume and Area

G5 M6: Problem Solving with the Coordinate Plane

## Standards for Mathematical Practice

### **4: Model with mathematics.**

Mathematically proficient students can apply the mathematics they know to solve problems arising in everyday life, society, and the workplace. In early grades, this might be as simple as writing an addition equation to describe a situation. In middle grades, a student might apply proportional reasoning to plan a school event or analyze a problem in the community. By high school, a student might use geometry to solve a design problem or use a function to describe how one quantity of interest depends on another. Mathematically proficient students who can apply what they know are comfortable making assumptions and approximations to simplify a complicated situation, realizing that these may need revision later. They are able to identify important quantities in a practical situation and map their relationships using such tools as diagrams, two-way tables, graphs, flowcharts and formulas. They can analyze those relationships mathematically to draw conclusions. They routinely interpret their mathematical results in the context of the situation and reflect on whether the results make sense, possibly improving the model if it has not served its purpose.

## Aligned Components of *Eureka Math*

Lessons in every module engage students in modeling with mathematics as required by this standard. This practice standard is analogous to the CCSSM Standards for Mathematical Practice 4, which is specifically addressed in the following modules:

G5 M4: Multiplication and Division of Fractions and Decimal Fractions

G5 M5: Addition and Multiplication with Volume and Area

## Standards for Mathematical Practice

### **5: Use appropriate tools strategically.**

Mathematically proficient students consider the available tools when solving a mathematical problem. These tools might include pencil and paper, concrete models, a ruler, a protractor, a calculator, a spreadsheet, a computer algebra system, a statistical package, or dynamic geometry software. Proficient students are sufficiently familiar with tools appropriate for their grade or course to make sound decisions about when each of these tools might be helpful, recognizing both the insight to be gained and their limitations. For example, mathematically proficient high school students analyze graphs of functions and solutions generated using a graphing calculator. They detect possible errors by strategically using estimation and other mathematical knowledge. When making mathematical models, they know that technology can enable them to visualize the results of varying assumptions, explore consequences, and compare predictions with data. Mathematically proficient students at various grade levels are able to identify relevant external mathematical resources, such as digital content located on a website, and use them to pose or solve problems. They are able to use technological tools to explore and deepen their understanding of concepts.

## Aligned Components of *Eureka Math*

Lessons in every module engage students in using appropriate tools strategically as required by this standard. This practice standard is analogous to the CCSSM Standards for Mathematical Practice 5, which is specifically addressed in the following modules:

G5 M3: Addition and Subtraction of Fractions

G5 M4: Multiplication and Division of Fractions and Decimal Fractions

## Standards for Mathematical Practice

## Aligned Components of *Eureka Math*

### **6: Attend to precision.**

Mathematically proficient students try to communicate precisely to others. They try to use clear definitions in discussion with others and in their own reasoning. They state the meaning of the symbols they choose, including using the equal sign consistently and appropriately. They are careful about specifying units of measure, and labeling axes to clarify the correspondence with quantities in a problem. They calculate accurately and efficiently, express numerical answers with a degree of precision appropriate for the problem context. In the elementary grades, students give carefully formulated explanations to each other. By the time they reach high school they have learned to examine claims and make explicit use of definitions.

Lessons in every module engage students in attending to precision as required by this standard. This practice standard is analogous to the CCSSM Standards for Mathematical Practice 6, which is specifically addressed in the following modules:

G5 M1: Place Value and Decimal Fractions

G5 M5: Addition and Multiplication with Volume and Area

G5 M6: Problem Solving with the Coordinate Plane

### **7: Look for and make use of structure.**

Mathematically proficient students look closely to discern a pattern or structure. Young students, for example, might notice that three and seven more is the same amount as seven and three more, or they may sort a collection of shapes according to how many sides the shapes have. Later, students will see  $7 \times 8$  equals the well remembered  $7 \times 5 + 7 \times 3$ , in preparation for learning about the distributive property. In the expression  $x^2 + 9x + 14$ , older students can see the 14 as  $2 \times 7$  and the 9 as  $2 + 7$ . They recognize the significance of an existing line in a geometric figure and can use the strategy of drawing an auxiliary line for solving problems. They also can step back for an overview and shift perspective. They can see complicated things, such as some algebraic expressions, as single objects or as being composed of several objects. For example, they can see  $5 - 3(x - y)^2$  as 5 minus a positive number times a square and use that to realize that its value cannot be more than 5 for any real numbers  $x$  and  $y$ .

Lessons in every module engage students in looking for and making use of structure as required by this standard. This practice standard is analogous to the CCSSM Standards for Mathematical Practice 7, which is specifically addressed in the following modules:

G5 M1: Place Value and Decimal Fractions

G5 M2: Multi-Digit Whole Number and Decimal Fraction Operations

G5 M3: Addition and Subtraction of Fractions

G5 M4: Multiplication and Division of Fractions and Decimal Fractions

G5 M5: Addition and Multiplication with Volume and Area

G5 M6: Problem Solving with the Coordinate Plane

## Standards for Mathematical Practice

### **8: Look for and express regularity in repeated reasoning.**

Mathematically proficient students notice if calculations are repeated, and look both for general methods and for shortcuts. Upper elementary students might notice when dividing 25 by 11 that they are repeating the same calculations over and over again, and conclude they have a repeating decimal. By paying attention to the calculation of slope as they repeatedly check whether points are on the line through (1, 2) with slope 3, middle school students might abstract the equation  $(y - 2)/(x - 1) = 3$ . Noticing the regularity in the way terms cancel when expanding  $(x - 1)(x + 1)$ ,  $(x - 1)(x^2 + x + 1)$ , and  $(x - 1)(x^3 + x^2 + x + 1)$  might lead them to the general formula for the sum of a geometric series. As they work to solve a problem, mathematically proficient students maintain oversight of the process, while attending to the details. They continually evaluate the reasonableness of their intermediate results.

## Aligned Components of *Eureka Math*

Lessons in every module engage students in looking for and expressing regularity in repeated reasoning as required by this standard. This practice standard is analogous to the CCSSM Standards for Mathematical Practice 8, which is specifically addressed in the following modules:

G5 M1: Place Value and Decimal Fractions

G5 M2: Multi-Digit Whole Number and Decimal Fraction Operations

G5 M3: Addition and Subtraction of Fractions

Domain	Standards for Mathematical Content	Aligned Components of <i>Eureka Math</i>
<b>Number &amp; Operations in Base Ten</b>	<b>CC.2.1.5.B.1</b> Apply place-value concepts to show an understanding of operations and rounding as they pertain to whole numbers and decimals.	G5 M1: Place Value and Decimal Fractions G5 M2: Multi-Digit Whole Number and Decimal Fraction Operations G5 M4 Lessons 17–18: Relate decimal and fraction multiplication. G5 M4 Lesson 29: Connect division by a unit fraction to division by 1 tenth and 1 hundredth. G5 M4 Lessons 30–31: Divide decimal dividends by non-unit decimal divisors.
	<b>CC.2.1.5.B.2</b> Extend an understanding of operations with whole numbers to perform operations including decimals.	G5 M1: Place Value and Decimal Fractions G5 M2: Multi-Digit Whole Number and Decimal Fraction Operations G5 M4 Lessons 17–18: Relate decimal and fraction multiplication. G5 M4 Lesson 29: Connect division by a unit fraction to division by 1 tenth and 1 hundredth. G5 M4 Lessons 30–31: Divide decimal dividends by non-unit decimal divisors.

Domain	Standards for Mathematical Content	Aligned Components of <i>Eureka Math</i>
<b>Number &amp; Operations - Fractions</b>	<b>CC.2.1.5.C.1</b> Use the understanding of equivalency to add and subtract fractions.	G5 M3: Addition and Subtraction of Fractions
	<b>CC.2.1.5.C.2</b> Apply and extend previous understandings of multiplication and division to multiply and divide fractions.	G5 M4: Multiplication and Division of Fractions and Decimal Fractions  G5 M5 Topic C: Area of Rectangular Figures with Fractional Side Lengths  G6 M2 Topic A: Dividing Fractions by Fractions
<b>Operations and Algebraic Thinking</b>	<b>CC.2.2.5.A.1</b> Interpret and evaluate numerical expressions using order of operations.	G5 M2 Lesson 3: Write and interpret numerical expressions, and compare expressions using a visual model.  G5 M2 Lesson 4: Convert numerical expressions into unit form as a mental strategy for multi-digit multiplication.  G5 M4 Lesson 10: Compare and evaluate expressions with parentheses.  G5 M4 Topic H: Interpretation of Numerical Expressions  G6 M4 Topic B: Special Notations of Operations
	<b>CC.2.2.5.A.4</b> Analyze patterns and relationships using two rules.	G5 M6 Topic B: Patterns in the Coordinate Plane and Graphing Number Patterns from Rules  G5 M6 Lesson 18: Draw symmetric figures on the coordinate plane.

Domain	Standards for Mathematical Content	Aligned Components of <i>Eureka Math</i>
Geometry	<p><b>CC.2.3.5.A.1</b> Graph points in the first quadrant on the coordinate plane and interpret these points when solving real world and mathematical problems.</p>	<p>G5 M6 Topic A: Coordinate Systems</p> <p>G5 M6 Lesson 7: Plot points, use them to draw lines in the plane, and describe patterns within the coordinate pairs.</p> <p>G5 M6 Lesson 14: Construct parallel line segments, and analyze relationships of the coordinate pairs.</p> <p>G5 M6 Lesson 16: Construct perpendicular line segments, and analyze relationships of the coordinate pairs.</p> <p>G5 M6 Topic D: Problem Solving in the Coordinate Plane</p>
	<p><b>CC.2.3.5.A.2</b> Classify two-dimensional figures into categories based on an understanding of their properties.</p>	<p>G5 M5 Topic D: Drawing, Analysis, and Classification of Two-Dimensional Shapes</p>
Measurement and Data	<p><b>CC.2.4.5.A.1</b> Solve problems using conversions within a given measurement system.</p>	<p>G5 M1 Lesson 4: Use exponents to denote powers of 10 with application to metric conversions.</p> <p>G5 M2 Topic D: Decimal Multi-Digit Multiplication</p> <p>G5 M4 Topic C: Multiplication of a Whole Number by a Fraction</p> <p>G5 M4 Lesson 19: Convert measures involving whole numbers, and solve multi-step word problems.</p> <p>G5 M4 Lesson 20: Convert mixed unit measurements, and solve multi-step word problems.</p>

Domain	Standards for Mathematical Content	Aligned Components of <i>Eureka Math</i>
	<b>CC.2.4.5.A.2</b> Represent and interpret data using appropriate scale.	G5 M4 Topic A: Line Plots of Fraction Measurements
	<b>CC.2.4.5.A.4</b> Solve problems involving computation of fractions using information provided in a line plot.	G5 M4 Topic A: Line Plots of Fraction Measurements
	<b>CC.2.4.5.A.5</b> Apply concepts of volume to solve problems and relate volume to multiplication and to addition.	G5 M5: Addition and Multiplication with Volume and Area