# Mathletics

## Pennsylvania Core Standards

Activities (Courses) and Skill Quests


**Grades 7-8**

August, 2025

Mathletics

# Mathletics

## Pennsylvania Core Standards

Activities (Courses) & Skill Quests

August, 2025

**Grade 7** ..... **3**
**2.1.7 Numbers and Operations** ..... **3**
D. Ratios and Proportional Relationships ..... 3
E. The Number System ..... 3
**2.2.7 Algebraic Concepts** ..... **4**
B. Expressions and Equations ..... 4
**2.3.7 Geometry** ..... **5**
A. Geometry ..... 5
**2.4.7 Measurement, Data, and Probability B. Statistics and Probability** ..... **6**
**Grade 8** ..... **8**
**2.1.8 Numbers and Operations** ..... **8**
E. The Number System ..... 8
**2.2.8 Algebraic Concepts** ..... **8**
B. Expressions and Equations ..... 8
C. Functions ..... 10
**2.3.8 Geometry** ..... **11**
A. Geometry ..... 11
**2.4.8 Measurement, Data, and Probability** ..... **12**
B. Statistics and Probability ..... 12

# Grade 7

## 2.1.7 Numbers and Operations

### D. Ratios and Proportional Relationships

| CC.2.1.7.D.1<br>Analyze proportional relationships and use them to model and solve real-world and mathematical problems. | |
|---|---|
| **Course Topics** | **Activities** |
| Ratios & Proportional Relationships | Proportional Relationships |
| | Rate Word Problems |
| | Rates |
| | Average Speed |
| | Time Taken |
| | y=ax |
| | Conversion Graphs |
| | Best Buy |
| | Commission |
| | Percent Increase and Decrease |
| | Percentage Error |
| | Successive Discounts |
| | Profit and Loss |
| | Simple Interest |
| | Percentage Word Problems |
| **Topics** | **Skill Quests** |
| Proportional relationships | Solving unit rate problems involving fractions |
| | Identifying proportional relationships |
| | Identifying the constant of proportionality |
| | Representing proportional relationships: equations |
| | Interpreting graphs of proportional relationships |
| | Solving multi-step ratio & percent problems |

### E. The Number System

| CC.2.1.7.E.1<br>Apply and extend previous understandings of operations with fractions to operations with rational numbers. | |
|---|---|
| **Course Topics** | **Activities** |
| The Number System | Add Integers |
| | Adding Integers: Positive, Negative or Zero |
| | Subtract Integers |
| | Integers: Add and Subtract |
| | Negative or Positive? |
| | More with Integers |
| | Add Mixed Numbers: Signs Can Differ |
| | Subtract Mixed Numbers: Signs Differ |
| | Subtract Negative Mixed Numbers |
| | Multiplying and Dividing Integers |

| | |
|---|---|
| | Integers: Multiplication and Division |
| | Multiply Two Fractions 2 |
| | Divide Fractions by Fractions 2 |
| | Divide Mixed Numbers with Signs |
| | Fractions to Decimals 2 |
| | More Fraction Problems |
| | Integers: Order of Operations (PEDMAS) |
| | Integers: Operations Order |
| **Topics** | **Skill Quests** |
| Rational numbers | Describing situations involving opposites |
| | Opposites & absolute value |
| | Adding rational numbers |
| | Adding positive & negative fractions |
| | Adding positive & negative decimals |
| | Adding integers |
| | Subtracting rational numbers: adding the inverse |
| | Subtracting positive & negative fractions |
| | Subtracting positive & negative decimals |
| | Subtracting integers |
| | Subtracting rational numbers: absolute value |
| | Adding & subtracting rational numbers: properties |
| | Multiplying rational numbers |
| | Multiplying positive & negative fractions |
| | Multiplying positive & negative decimals |
| | Multiplying integers |
| | Products of rational numbers: real-world contexts |
| | Dividing integers |
| | Quotients of rational numbers: real-world contexts |
| | Multiply & divide rational numbers: properties |
| | Use long division to convert rationals to decimals |
| | Rational numbers problems: 4 operations |

## 2.2.7 Algebraic Concepts

### B. Expressions and Equations

| **CC.2.2.7.B.1**<br>Apply properties of operations to generate equivalent expressions. | |
|---|---|
| **Course Topics** | **Activities** |
| Expressions & Equations | Using the Distributive Property |
| | Factoring |
| | Addition Properties |
| | Multiplication Properties |
| **Topics** | **Skill Quests** |
| Equivalent expressions | Simplifying algebraic expressions: add & subtract |
| | Distributive property: algebraic expressions |
| | Factoring algebraic expressions |
| | Rearranging expressions to interpret quantities |

| CC.2.2.7.B.3<br>Model and solve real-world and mathematical problems by using and connecting numerical, algebraic, and/or graphical representations. | |
|---|---|
| **Course Topics** | **Activities** |
| Expressions & Equations | Write an Equation: Word Problems |
| | Writing Equations |
| | Solve Equations: Add, Subtract 1 |
| | Solve Equations: Add, Subtract 2 |
| | Solve Equations: Multiply, Divide 1 |
| | Solve Equations: Multiply, Divide 2 |
| | Solve Two-Step Equations |
| | Solving Simple Equations |
| | Inequalities on a Number Line: Basics |
| | Inequalities on a Number Line: Mixed Basics |
| | Graphing Inequalities 2 |
| | Graphing Inequalities on Number Line |
| | Solve One-Step Inequalities 1 |
| | Solve One-Step Inequalities 2 |
| **Topics** | **Skill Quests** |
| Expressions, equations & inequalities | Solving problems with rational numbers |
| | Converting terminating decimals |
| | Solving 2-step equations: word problems |
| | 2-step equations, positive integer coefficients |
| | 2-step equations, integer coefficients |
| | 2-step equations, positive rational coefficients |
| | 2-step equations, rational coefficients |
| | 2-step equations, distributive property |
| | Creating & solving 2-step inequalities |
| | Representing inequalities |
| | Graphing the solution of an inequality |
| | Solving 2-step inequalities |

## 2.3.7 Geometry

### A. Geometry

| CC.2.3.7.A.1<br>Solve real-world and mathematical problems involving angle measure, area, surface area, circumference, and volume. | |
|---|---|
| **Course Topics** | **Activities** |
| Geometry 1 (angles) | Equal, Complement, or Supplement? |
| | Vertically Opposite: Value of x |
| | Introduction to Angles on Parallel Lines 1 |
| | Parallel Lines |
| | Angles and Parallel Lines |
| | Angles on Parallel Lines |
| | Angle Measures in a Triangle |
| | Exterior Angles of a Triangle |
| | Angle Sum of a Triangle |

| | |
|---|---|
| Geometry 1 (area, circumference, volume) | Calculate Circumference of Circles |
| | Area: Circles 1 |
| | Area: Circles 2 |
| | Area: Annulus |
| | Area of Triangles |
| | Area of Squares and Rectangles |
| | Area: Parallelograms |
| | Area of Quadrilaterals |
| | Area: Compound Figures |
| | Area: Composite Shapes |
| | Nets |
| | Surface Area: Rectangular Prisms |
| | Surface Area: Triangular Prisms 1 |
| | Volume of Rectangular Prisms 1 |
| | Volume of Triangular Prisms |
| | Volume: Prisms |
| **Topics** | **Skill Quests** |
| Geometry | Finding the area of a circle |
| | Introducing the parts of a circle |
| | Finding the circumference of a circle |
| | Supplementary angles |
| | Complementary angles |
| | Adjacent angles |
| | Vertical angles |
| | Area: polygons |
| | Solving real-life problems: area of polygons |
| | Volume: right prisms |
| | Surface area: rectangular & triangular prisms |

| **CC.2.3.7.A.2**<br>Visualize and represent geometric figures and describe the relationships between them. | |
|---|---|
| **Course Topics** | **Activities** |
| Geometry 2 | Scale Factor |
| | Scale Measurement |
| | Floor Plans |
| | Perimeter, Area, Dimension Change |
| | Triangle - Tasters |
| | Triangle Tasters |
| | Triangles: Acute, Right, Obtuse |
| **Topics** | **Skill Quests** |
| Visualize & represent geometric figures | Scale drawings |
| | Triangle inequality theorem |
| | Constructing triangles with given conditions |
| | Describing cross sections of 3-D figures |

## 2.4.7 Measurement, Data, and Probability

### B. Statistics and Probability

| CC.2.4.7.B.1<br>Draw inferences about populations based on random sampling concepts. | |
|---|---|
| **Course Topics** | **Activities** |
| Teacher directed | |
| **Topics** | **Skill Quests** |
| Draw inferences about populations | Understanding sampling |
| | Drawing inferences from samples |

| CC.2.4.7.B.2<br>Draw informal comparative inferences about two populations. | |
|---|---|
| **Course Topics** | **Activities** |
| Statistics and Probability | Mean |
| | Median |
| | Mode |
| | Data Extremes and Range |
| **Topics** | **Skill Quests** |
| Draw informal comparative inferences | Comparing data distributions |
| | Drawing comparative inferences |

| CC.2.4.7.B.3<br>Investigate chance processes and develop, use, and evaluate probability models. | |
|---|---|
| **Course Topics** | **Activities** |
| Statistics and Probability | Chance Dial |
| | Probability Scale |
| | Find the Probability |
| | Simple Probability |
| | Introductory Probability |
| | Probability Tables |
| | Probability - Replacement |
| | Probability - No Replacement |
| | Counting Principle |
| | Counting Techniques 1 |
| | Dice and Coins |
| **Topics** | **Skill Quests** |
| Probability | Introducing probability |
| | Probability of chance events: relative frequency |
| | Theoretical probability |
| | Predicting outcomes of chance experiments |
| | Finding the complement of an event |
| | Finding the approximate probability |
| | Comparing observed frequency & expected frequency |
| | Investigating mutually exclusive events |
| | Calculating probabilities of compound events |
| | Representing sample spaces & identifying outcomes |
| | Independent & dependent compound events |

# Grade 8

## 2.1.8 Numbers and Operations

### E. The Number System

| CC.2.1.8.E.1<br>Distinguish between rational and irrational numbers using their properties. | |
|---|---|
| **Course Topics** | **Activities** |
| The Number System | Irrational Numbers |
| | Fraction to Terminating Decimal |
| | Recurring Decimals |
| **Topics** | **Skill Quests** |
| Rational & irrational numbers | Describing properties of irrational numbers |
| | Classifying real numbers |
| | Converting repeating decimals to rational numbers |
| | Repeating & terminating decimals as fractions |

| CC.2.1.8.E.4<br>Estimate irrational numbers by comparing them to rational numbers. | |
|---|---|
| **Course Topics** | **Activities** |
| The Number System | Estimating Square Roots |
| **Topics** | **Skill Quests** |
| Approximate irrational numbers | Comparing irrational numbers |
| | Locating irrational numbers on a number line |
| | Approximating the value of an irrational number |
| | Finding square roots of non-perfect squares |

## 2.2.8 Algebraic Concepts

### B. Expressions and Equations

| CC.2.2.8.B.1<br>Apply concepts of radicals and integer exponents to generate equivalent expressions. | |
|---|---|
| **Course Topics** | **Activities** |
| Expressions & Equations 1 | Exponent Notation |
| | Exponent Notation and Algebra |
| | Properties of Exponents |
| | Exponent Laws with Brackets |
| | The Zero Exponent |
| | Negative Exponents |
| | Integer Exponents |
| | Multiplication with Exponents |
| | Simplifying with Exponent Laws 1 |
| | Exponent Laws and Algebra |

| | |
|---|---|
| | Exponent Form to Numbers |
| | Square Roots |
| | Square Roots 1 |
| | Square and Cube Roots |
| | Scientific Notation |
| | Scientific Notation 1 |
| | Scientific Notation 2 |
| | Scientific notation to decimal |
| | Ordering Scientific Notation |
| **Topics** | **Skill Quests** |
| Radicals and integer exponents | Using exponent notation |
| | Product of powers, numerical base |
| | Product of powers, algebraic base |
| | Quotient of powers, numerical base |
| | Quotient of powers, algebraic base |
| | Power of a power, numerical base |
| | Power of a power, algebraic base |
| | Zero exponents, numerical base |
| | Zero exponents, algebraic base |
| | Negative exponents, numerical base |
| | Negative exponents, algebraic base |
| | Simplifying expressions, numerical base |
| | Simplifying expressions, algebraic base |
| | Investigating square roots & cube roots |
| | Squares & square roots |
| | Evaluating expressions with square & cube roots |
| | Square roots of fractions & decimals |
| | Cubes & cube roots |
| | Introducing scientific notation |
| | Converting scientific notation to standard form |
| | Converting standard form to scientific notation |

| **CC.2.2.8.B.2**<br>Understand the connections between proportional relationships, lines, and linear equations. | |
|---|---|
| **Course Topics** | **Activities** |
| Expressions & Equations 2 | y=ax |
| | Determining a Rule for a Line |
| | Slope |
| | Slope of a Line |
| | Equation of a Line 1 |
| | Which Straight Line? |
| | Equation from Point and Slope |
| | Modeling Linear Relationships |
| **Topics** | **Skill Quests** |
| Proportional relationships | Calculations in scientific notation |
| | Graphing proportional relationships |
| | Comparing proportional relationships |
| | Using similar triangles to understand slope |

| | |
|---|---|
| | Writing equations of proportional relationships |
| | Writing equations of nonproportional relationships |
| | Identifying the slope in an equation or graph |
| | Identifying the y-intercept on a graph |
| | Graphing equations in slope-intercept form |
| | Graphing equations not in slope-intercept form |
| | Finding the y-intercept algebraically |

| **CC.2.2.8.B.3**<br>Analyze and solve linear equations and pairs of simultaneous linear equations. | |
|---|---|
| **Course Topics** | **Activities** |
| Expressions & Equations 3 | Equations with Grouping Symbols |
| | Equations with Fractions |
| | Equations with Decimals |
| | Equations to Solve Problems |
| | Equations: Variables, Both Sides |
| | Solving More Equations |
| | Solve Systems by Graphing |
| | Linear Modelling |
| | Simultaneous Equations 1 |
| | Simultaneous Equations 2 |
| | Simultaneous Linear Equations |
| **Topics** | **Skill Quests** |
| Linear equations | Solution types of linear equations |
| | Solving 3-step linear equations |
| | Solving linear equations, variables on both sides |
| | Solving linear equations, distributive property |
| | Using substitution to check solutions |
| | Identifying solutions, systems of equations |
| | Solving systems of equations graphically |
| | Solving systems of equations using elimination |
| | Solving systems of equations using substitution |
| | Checking the solution of a system of equations |
| | Writing & solving systems of equations |

## C. Functions

| **CC.2.2.8.C.1**<br>Define, evaluate, and compare functions. | |
|---|---|
| **Course Topics** | **Activities** |
| Functions | Function Rules and Tables |
| | Vertical Line Test |
| | Find the Function Rule |
| **Topics** | **Skill Quests** |
| Functions | Identifying functions |
| | Comparing functions represented in different ways |
| | Represent linear relationships in different forms |
| | Equations of linear & non-linear relationships |

| CC.2.2.8.C.2<br>Use concepts of functions to model relationships between quantities. | |
|---|---|
| **Course Topics** | **Activities** |
| Functions | Travel Graphs |
| | Line Graphs: Interpretation |
| **Topics** | **Skill Quests** |
| Use functions as models | Rate of change & initial value |
| | Distance-time graphs |

## 2.3.8 Geometry

### A. Geometry

| CC.2.3.8.A.1<br>Apply the concepts of volume of cylinders, cones, and spheres to solve real-world and mathematical problems. | |
|---|---|
| **Course Topics** | **Activities** |
| Geometry | Volume: Cylinders |
| | Volume: Cones |
| | Volume: Spheres |
| **Topics** | **Skill Quests** |
| Volume: cones, cylinders & spheres | Volume: cones |
| | Volume: cylinders |
| | Volume: spheres |

| CC.2.3.8.A.2<br>Understand and apply congruence, similarity, and geometric transformations using various tools. | |
|---|---|
| **Course Topics** | **Activities** |
| Geometry | Flip, Slide, Turn |
| | Transformations |
| | Transformations: Coordinate Plane |
| | Rotations: Coordinate Plane |
| | Congruent Figures (Dot Grid) |
| | Congruent Figures (Grid) |
| | Scale Factor |
| | Similar Figures 1 |
| **Topics** | **Skill Quests** |
| Congruence, similarity, transformations | Translating points on the coordinate plane |
| | Reflecting points across the x- or y-axis |
| | Rotating points about the origin |
| | Preserved properties: length |
| | Preserved properties: angles |
| | Preserved properties: parallel lines |
| | Congruency: rigid transformations |
| | Dilations, coordinates |
| | Translations, coordinates |
| | Rotations, coordinates |

| | |
|---|---|
| | Reflections, coordinates |
| | Sequences of transformations |
| | Introducing similarity |
| | Similarity: transformations |
| | Angle sum theorem |
| | Exterior angle theorem |
| | Angle relationships: parallel lines, transversal |
| | Using scale to analyze similar triangles |
| | Identifying similar triangles |

| **CC.2.3.8.A.3**<br>Understand and apply the Pythagorean Theorem to solve problems. | |
|---|---|
| **Course Topics** | **Activities** |
| Geometry | Pythagorean Triads |
| | Pythagorean Theorem |
| | Pythagorean: Find a Short Side (integers only) |
| | Pythagorean: Find a Short Side (decimal values) |
| | Pythagorean: Find a Short Side (rounding needed) |
| | Pythagorean' Theorem |
| | Find Slant Height |
| | Distance Between Two Points |
| **Topics** | **Skill Quests** |
| The Pythagorean Theorem & its converse | Identifying the hypotenuse, right triangles |
| | Identifying right triangles, Pythagorean Theorem |
| | Pythagorean triples |
| | Pythagorean Theorem: missing short side |
| | Pythagorean Theorem: missing hypotenuse |
| | Pythagorean Theorem: missing side |
| | Pythagorean Theorem in 2-D & 3-D |
| | Finding the distance between two points |

## 2.4.8 Measurement, Data, and Probability

### B. Statistics and Probability

| **CC.2.4.8.B.1**<br>Analyze and/or interpret bivariate data displayed in multiple representations. | |
|---|---|
| **Course Topics** | **Activities** |
| Statistics & Probability | Data Analysis: Scatter Plots |
| | Scatter Plots |
| **Topics** | **Skill Quests** |
| Analyze bivariate data | Using & interpreting scatter plots |
| | Estimating the line of best fit |
| | Interpreting the line of best fit |

| CC.2.4.8.B.2<br>Understand that patterns of association can be seen in bivariate data utilizing frequencies. | |
|---|---|
| **Course Topics** | **Activities** |
| Teacher directed | |
| **Topics** | **Skill Quests** |
| Two-way tables | Constructing & interpreting two-way tables |


For more information about Mathletics,
contact our friendly team.

**www.mathletics.com/contact**