

# PreAlgebra Syllabus

This course covers the Common Core grade-8 math standards and about half of the grade-7 standards. The previous course (Grade 6 Math) covers the other half of the grade-7 standards and all of the grade-6 standards.

The course is broken up into 9 units. Most units have a Quiz and an End Assessment.

Unit 1: Rigid Transformations and Congruence

Unit 2: Scale Drawings, Dilations, and Similarity

Unit 3: Writing and Solving Equations and Inequalities

Unit 4: Linear Relationships and Systems of Equations

Unit 5: Functions

Unit 6: Associations in Data

Unit 7: Volume and Surface Area

Unit 8: Exponents and Scientific Notation

Unit 9: Pythagorean Theorem and Irrational Numbers

# Unit 1: Rigid Transformations and Congruence

## Section 1: Transformations (6 Lessons + Quiz)

- Describe and perform translations, rotations, and reflections on a grid.

## Section 2: Defining Congruence (2 Lessons)

- Determine whether two figures are congruent using rigid transformations.

## Section 3: Angle Relationships (2 Lessons)

- Determine unknown angle measures using facts about complementary, supplementary, and vertical angles.
- Write and solve equations for unknown angles in a diagram.

## Section 4: Applying Congruence (3 Lessons)

- Use transformations to determine missing angle measurements and discover new angle relationships.

## Section 5: Drawing Triangles (4 Lessons + End Assessment)

- Draw triangles given three measures of side lengths or angles.
- Determine whether it is possible to draw a unique triangle, more than one triangle, or no triangle given a set of measurements.

## Materials

- blank paper, tracing paper, graph paper, colored pencils, scissors, a ruler, a protractor, and an index card. Masking tape or blue painters tape, thick markers in a variety of colors

## Common Core State Standards

- 8.G.A
- 8.G.A.1, 8.G.A.1.A, 8.G.A.1.B, 8.G.A.1.C,
- 8.G.A.2,
- 8.G.A.3,
- 8.G.A.5,
- 7.EE.A.2,
- 7.EE.B.4,
- 7.G.A.2, 7.G.A.3,
- 7.G.B.5
- 7.G.B.6

## Vocabulary

Reflection rotation, translation, clockwise, counterclockwise, image, sequence of transformations, transformation, corresponding, congruent, rigid transformation, transversal, vertical angles, right angle, straight angle, adjacent angles, complementary angles, supplementary angles, vertical angles, identical copy, cross section, base, prism, pyramid, volume, surface area

## Unit 2: Scale Drawings, Dilations, and Similarity

### Section 1: Scaled Copies (2 Lesson)

- Describe how scaling affects lengths, angles, and areas in scaled copies.
- Use scale factors to create and compare scaled copies.

### Section 2: Scale Drawings (3 Lessons + Quiz)

- Represent distances in the real world using scales and scale drawings.

### Section 3: Dilations (4 Lessons)

- Describe dilations precisely in terms of their center of dilation and scale factor.
- Apply dilations to figures on and off of a coordinate grid.

### Section 4: Similarity (4 Lessons)

- Identify similar figures and properties of similar figures using transformations.

### Section 5: Slope (1 Lesson + End Assessment)

- Explain slope in terms of similar triangles on the same line and determine the slopes of lines.

### Materials

blank paper, tracing paper, graph paper, colored pencils, scissors, a ruler, a protractor, and an index card

### Common Core State Standards

- 7.G.A.1
- 7.G.B.6
- 8.EE.B.6
- 8.G.A
- 8.G.A.3
- 8.G.A.4
- 8.G.A.5

### Vocabulary

- scaled copy
- scale factor
- scale
- scale drawing
- dilation
- center of a dilation
- scale factor
- similar
- slope

## Unit 3: Writing and Solving Equations and Inequalities

### Section 1: Equations and Tape Diagrams (4 Lessons)

- Use tape diagrams to represent equations and situations in context and to determine unknown values.

### Section 2: Solving Equations (8 Lessons + Quiz)

- Solve equations of the form  $px+q=r$  and  $p(x+q)=r$  in real-world and mathematical problems.
- Write equivalent expressions by adding, subtracting, expanding, and factoring.

### Section 3: Solving Linear Equations (6 Lessons + Quiz)

- Write and solve equations with multiple occurrences of one variable.

### Section 4: Inequalities (3 Lessons)

- Represent inequalities using symbols, words, and graphs.
- Identify solutions to inequalities.

### Section 5: Inequalities (4 Lessons + End Assessment)

- Solve inequalities of the form  $px+q>r$  and  $px+q<r$  that represent real-world and mathematical problems.
- Create graphs that represent solutions to inequalities, including those with  $\leq$  or  $\geq$ .

### Materials

- blank paper, graph paper, straightedge, tools for creating a visual display

### Common Core State Standards

- 8.EE.C
- 8.EE.C.7, 8.EE.C.7.A, 8.EE.C.7.B
- 8.EE.C.8, 8.EE.C.8.A, 8.EE.C.8.B, 8.EE.C.8.C

### Vocabulary

- tape diagram
- solution to an equation
- expand
- factor
- equivalent expression
- term
- solutions to an inequality
- constant term
- system of equations

# Unit 4: Linear Relationships and Systems of Equations

## Section 1: Proportionality Revisited (3 Lessons)

- Compare proportional relationships using their equations, tables, and graphs.

## Section 2: Slope-Intercept Form (6 Lessons + Quiz)

- Interpret the intercept and slope of a graph or an equation for a linear relationship.

## Section 3: Solutions and Standard Form (2 Lessons)

- Use the concept that a graph represents all solutions of an equation to solve problems.

## Section 4: Systems of Linear Equations (6 Lessons + End Assessment)

- Use graphs and algebraic methods to solve systems of linear equations with two variables.

## Materials

Blank paper, graph paper, straightedge, tools for creating a visual display

## Common Core State Standards

- 8.EE.B
- 8.EE.B.5
- 8.EE.B.6
- 8.EE.C
- 8.EE.C.7, 8.EE.C.7.A, 8.EE.C.7.B
- 8.EE.C.8, 8.EE.C.8.A, 8.EE.C.8.B, 8.EE.C.8.C

## Vocabulary

- rate of change
- linear relationship
- vertical intercept
- solution to an equation with two variables
- term
- constant term
- system of equations

## Unit 5: Functions

### Section 1: Introduction to Functions (4 Lessons + Quiz)

- Determine whether or not graphs, tables, or rules represent functions.

### Section 2: Representing and Interpreting Functions (4 Lessons + End Assessment)

- Create and interpret graphs of functions that represent stories.

### Common Core State Standards

- 8.F.A.1
- 8.F.A.2
- 8.F.A.3
- 8.F.B.4
- 8.F.B.5

### Vocabulary

- function
- dependent variable
- independent variable

# Unit 6: Associations in Data

## Section 1: Organizing Numerical Data (2 Lessons)

- Examine different ways to organize bivariate data, including scatter plots.

## Section 2: Analyzing Numerical Data (6 Lessons)

- Use scatter plots and fitted lines to analyze numerical data and identify associations.

## Section 3: Categorical Data (3 Lessons + End Assessment)

- Use two-way tables and bar graphs to identify associations in categorical data.

## Materials

- blank paper, graph paper, rulers, meter sticks or tape measures marked in centimeters, tools for creating a visual display

## Common Core State Standards

- 8.SP.A.1
- 8.SP.A.2
- 8.SP.A.3
- 8.SP.A.4

## Vocabulary

- scatter plot
- outlier
- positive association
- negative association
- two-way table
- segmented bar graph
- relative frequency

# Unit 7: Volume and Surface Area

## Section 1: Solid Geometry (5 Lessons)

- Describe, compare, and contrast cross sections of prisms and pyramids.
- Solve real-world and mathematical problems involving the volume and surface area of right prisms.

## Section 2: Volume (6 Lessons + End Assessment)

- Calculate and compare the volumes of cylinders, cones, and spheres.
- Use the relationships between height, radius, and volume to calculate missing dimensions.

## Materials

In all of the lessons in this unit, students should have access to their geometry toolkits, which should contain blank paper, tracing paper, graph paper, colored pencils, scissors, a ruler, a protractor, and an index card. Students may not need all (or even any) of these tools to solve a particular problem. However, to make strategic choices about when to use which tools ([MP5](#)), students need to have opportunities to make those choices.

## Common Core State Standards

- 7.EE.A.2
- 7.EE.B.4
- 7.G.A.2
- 7.G.A.3
- 7.G.B.5
- 7.G.B.6
- 8.G.C.9

## Vocabulary

- right angle, straight angle, adjacent angles, complementary angles, supplementary angles, vertical angles, identical copy, cross section, base, prism, pyramid, volume, surface area, cone, cylinder, radius, sphere, volume,



# Unit 8: Exponents and Scientific Notation

## Section 1: Exponent Properties (6 Lessons + Quiz)

- Identify and create equivalent expressions involving positive, negative, and zero exponents.

## Section 2: Scientific Notation (7 Lessons + End Assessment)

- Express and perform operations with very large or very small quantities using powers of 10 and scientific notation.

## Materials

- blank paper, tools for creating a visual display

## Common Core State Standards

- 8.EE.A.1
- 8.EE.A.3
- 8.EE.A.4

## Vocabulary

- exponent
- base (of an exponent)
- power of ten
- scientific notation

# Unit 9: Pythagorean Theorem and Irrational Numbers

## Section 1: Square Roots and Cube Roots (4 Lessons + Quiz)

- Understand that square roots and cube roots represent the edge length of squares and cubes, and approximate their values.

## Section 2: The Pythagorean Theorem (7 Lessons)

- Use the Pythagorean theorem and its converse to reason about right triangles and find unknown measurements.

## Section 3: Rational and Irrational Numbers (2 Lessons + End Assessment)

- Determine fractions and decimal approximations for rational and irrational numbers.

## Materials

- Blank paper

## Common Core State Standards

- 8.NS.A
- 8.NS.A.1
- 8.NS.A.2
- 8.EE.A.2
- 8.G.B
- 8.G.B.6
- 8.G.B.7
- 8.G.B.8

## Vocabulary

- cube root
- hypotenuse
- irrational number
- legs
- pythagorean theorem
- rational number
- square root