

# Pocantico Hills School District

## Grade 8 Math Curriculum Draft

### Algebra

(Pre-March)

#### Content Strands: Performance Indicators

- 8.N.2 Evaluate expressions with integral exponents
- 8.N.1 Develop and apply the laws of exponents for multiplication and division
- 8.A.2 Write verbal expressions that match given mathematical expressions
- 8.A.1 Translate verbal sentences into algebraic inequalities
- 8.A.15 Understand that numerical information can be represented in multiple ways: arithmetically, algebraically, and graphically
- 8.A.5 Use physical models to perform operations with polynomials
- 8.A.7 Add and subtract polynomials (integer coefficients)
- 8.A.6 Multiply and divide monomials
- 8.A.8 Multiply a binomial by a monomial or a binomial (integer coefficients)
- 8.A.9 Divide a polynomial by a monomial (integer coefficients) *Note: The degree of the denominator is less than or equal to the degree of the numerator for all variables*
- 8.A.10 Factor algebraic expressions using the GCF
- 8.A.11 Factor a trinomial in the form  $ax^2 + bx + c$ ;  $a=1$  and  $c$  having no more than three sets of factors
- 8.A.3 Describe a situation involving relationships that matches a given graph
- 8.A.4 Create a graph given a description or an expression for a situation involving a linear or nonlinear relationship
- 8.A.16 Find a set of ordered pairs to satisfy a given linear numerical pattern (expressed algebraically); then plot the ordered pairs and draw the line

#### Process Strands: Performance Indicators

- 8.PS.5 Make conjectures from generalizations
- 8.PS.6 Represent problem situations verbally, numerically, algebraically, and graphically
- 8.PS.7 Understand that there is no one right way to solve mathematical problems but that different methods have advantages and disadvantages
- 8.PS.3 Understand and demonstrate how written symbols represent mathematical ideas
- 8.PS.15 Choose methods for obtaining required information
- 8.RP.1 Recognize that mathematical ideas can be supported by a variety of strategies
- 8.RP.2 Use mathematical strategies to reach a conclusion
- 8.RP.4 Provide supportive arguments for conjectures
- 8.RP.7 Devise ways to verify results or use counterexamples to refute incorrect statements
- 8.CM.1 Provide a correct, complete, coherent, and clear rationale for thought process used in problem solving
- 8.CM.6 Analyze mathematical solutions shared by others
- 8.CM.7 Compare strategies used and solutions found by others in relation to their own work
- 8.PS.9 Work backwards from a solution
- 8.CM.10 Use appropriate language, representations, and terminology when describing objects, relationships, mathematical solutions, and rationale
- 8.CM.11 Draw conclusions about mathematical ideas through decoding, comprehension and interpretation of mathematical visuals, symbols and technical writing

- 8.CN.2 Recognize connections between subsets of mathematical ideas**
- 8.CN.3 Connect and apply a variety of strategies to solve problems**
- 8.CN.7 Apply mathematical ideas to problem situations that develop outside of mathematics**
- 8.R.6 Use representations to explore problem situations**
- 8.R.2 Explain, describe, and defend mathematical ideas using representations**
- 8.R.4 Explain how different representations express the same relationship**

### Vocabulary

<i>algebraic</i>	<i>algebraic expression</i>
<i>algebraically</i>	<i>arithmetically</i>
<i>binomial</i>	<i>combine like terms</i>
<i>degree of a polynomial</i>	<i>domain</i>
<i>factor</i>	<i>graphically</i>
<i>integral exponent</i>	<i>law of exponents for multiplication and division</i>
<i>line</i>	<i>linear equation</i>
<i>monomial</i>	<i>nonlinear equation or inequality</i>
<i>numerically</i>	<i>operations</i>
<i>ordered pair</i>	<i>polynomial</i>
<i>quadratic equation</i>	<i>range of a function</i>
<i>relation</i>	<i>simplify expressions</i>
<i>solution set</i>	<i>trinomial</i>
<i>verbal expression</i>	<i>verbal form</i>
<i>written symbol</i>	

### Geometry

#### Content Strands: Performance Indicators:

- 8.G.1 Identify pairs of vertical angles as congruent**
- 8.G.2 Identify pairs of supplementary and complementary angles**
- 8.G.3 Calculate the missing angle in a supplementary or complementary pair**
- 8.G.6 Calculate the missing angle measurements when given two intersecting lines and an angle**
- 8.G.4 Determine angle pair relationships when given two parallel lines cut by a transversal**
- 8.G.5 Calculate the missing angle measurements when given two parallel lines cut by a transversal**
- 8.A.12 Apply algebra to determine the measure of angles formed by or contained in parallel lines cut by a transversal and by intersecting lines**
- 8.G.7 Describe and identify transformations in the plane, using proper function notation (rotations, reflections, translations, and dilations)**
- 8.G.8 Draw the image of a figure under rotations of 90 and 180 degrees**
- 8.G.9 Draw the image of a figure under a reflection over a given line**
- 8.G.10 Draw the image of a figure under a translation**
- 8.G.11 Draw the image of a figure under a dilation**
- 8.G.12 Identify the properties preserved and not preserved under a reflection, rotation, translation, and dilation**

### **Process Strands: Performance Indicators**

**8.PS.14 Determine information required to solve the problem**

**8.PS.16 Justify solution methods through logical argument**

**8.PS.17 Evaluate the efficiency of different representations of a problem**

**8.RP.5 Develop, verify and explain an argument using appropriate mathematical ideas and language**

**8.RP.6 Support an argument by using a systematic approach to test more than one case**

**8.CM.3 Organize and accurately label work**

**8.CM.4 Share organized mathematical ideas through the manipulation of objects, numerical tables, drawings, pictures, charts, graphs, tables, diagrams, models and symbols in written and verbal form**

**8.CM.9 Increase use of mathematical vocabulary and language when communicating with others**

**8.CN.6 Recognize and provide examples of the presence of mathematics in their daily lives**

**8.R.1 Use physical objects, drawings, charts, tables, graphs, symbols, equations, and objects created using technology as representations**

### **Vocabulary:**

*alternate exterior angles*

*angle pairs*

*complementary angles*

*corresponding angles*

*equation*

*exterior angle of a polygon*

*formally*

*informally*

*line*

*parallel lines*

*pre-image*

*reflection*

*rotational symmetry*

*supplementary angles*

*system of equations*

*translation*

*vertical*

*vertical line test*

*alternate interior angles*

*bisector*

*congruent*

*dilation*

*equidistant*

*fixed distance*

*image*

*interior angle*

*line of symmetry*

*perpendicular bisector*

*preserved*

*rotation*

*spatial reasoning*

*symmetry*

*transformation*

*transversal*

*vertical angles*

*visual*

### **Proportional Reasoning**

#### **Content Strands: Performance Indicators**

**8.N.3 Read, write, and identify percents less than 1% and greater than 100%**

**8.N.4 Apply percents to: tax, percent increase/decrease, simple interest, sale price, commission, interest rates, and gratuities**

**8.M.1 Solve equations/proportions to convert to equivalent measurements within metric and customary measurement systems Note: Also allow Fahrenheit to Celsius and vice versa**

**8.N.5 Estimate a percent of quantity, given an application**

**8.N.6 Justify the reasonableness of answers using estimation**

### Process Strands: Performance Indicators

- 8.PS.8 Understand how to break a complex problem into simpler parts or use a similar problem type to solve a problem
- 8.PS.10 Use proportionality to model problems
- 8.PS.11 Work in collaboration with others to solve problems
- 8.PS.12 Interpret solutions within the given constraints of a problem
- 8.PS.13 Set expectations and limits for possible solutions
- 8.RP.2 Use mathematical strategies to reach a conclusion
- 8.RP.3 Evaluate conjectures by distinguishing relevant from irrelevant information to reach a conclusion or make appropriate estimates
- 8.CM.2 Provide an organized argument which explains rationale for strategy selection
- 8.CM.5 Answer clarifying questions from others
- 8.CN.9 Recognize and apply mathematics to other disciplines, areas of interest, and societal issues
- 8.CN.8 Investigate the presence of mathematics in careers and areas of interest
- 8.R.5 Use standard and non-standard representations with accuracy and detail
- 8.CN.5 Understand how concepts, procedures and mathematical results in one area of mathematics can be used to solve problems in other areas of mathematics
- 8.R.8 Use representation as a tool for exploring and understanding mathematical ideas
- 8.R.9 Use mathematics to show and understand physical phenomena (i.e., make and interpret scale drawings of figures or scale models of objects)
- 8.R.10 Use mathematics to show and understand social phenomena (i.e., determine profit from sale of yearbooks)

### Vocabulary:

<i>Celsius</i>	<i>commission</i>
<i>convert</i>	<i>evaluate</i>
<i>Fahrenheit</i>	<i>gratuity</i>
<i>greatest common factor</i>	<i>income</i>
<i>interest</i>	<i>interest rate</i>
<i>percent</i>	<i>percent decrease</i>
<i>percent increase</i>	<i>profit</i>
<i>proportion</i>	<i>sales price</i>
<i>simple interest</i>	<i>tax</i>

## Algebra & Geometry

(Post-March)

### Content Strands: Performance Indicators

- 8G.19 Graph the solution set of an inequality on a number line
- 8.A.13 Solve multi-step inequalities and graph the solution set on a number line
- 8.A.14 Solve linear inequalities by combining like terms, using the distributive property, or moving variables to one side of the inequality (include multiplication or division of inequalities by a negative number)
- 8.A.17 Define and use correct terminology when referring to function (domain and range)
- 8.A.18 Determine if a relation is a function
- 8.G.15 Graph a line using a table of values
- 8.A.19 Interpret multiple representations using equation, table of values, and graph

- 8.G.13 Determine the slope of a line from a graph and explain the meaning of slope as a constant rate of change**
- 8.G.14 Determine the y-intercept of a line from a graph and be able to explain the y- intercept**
- 8.G.16 Determine the equation of a line given the slope and the y-intercept**
- 8.G.17 Graph a line from an equation in slope-intercept form( $y = mx + b$  )**
- 8.G.18 Solve systems of equations graphically (only linear, integral solutions,  $y=mx + b$  format, (no vertical/horizontal lines)**
- 8.G.20 Distinguish between linear and nonlinear equations  $ax^2+ bx + c$ ;  $a=1$  (only graphically)**
- 8.G.21 Recognize the characteristics of quadratics in tables, graphs, equations, and situations**
- 8.G.0 Construct the following using a straight edge and compass: segment congruent to a segment, angle congruent to an angle, perpendicular bisector, angle bisector**

**Process Strands: Performance Indicators**

- 8.PS.1 Use a variety of strategies to understand new mathematical content and to develop more efficient methods**
- 8.PS.2 Construct appropriate extensions to problem situations**
- 8.PS.4 Observe patterns and formulate generalizations**
- 8.RP.8 Apply inductive reasoning in making and supporting mathematical conjectures**
- 8.CM.8 Formulate mathematical questions that elicit, extend, or challenge strategies, solutions, and/or conjectures of others**
- 8.CN.1 Understand and make connections among multiple representations of the same mathematical idea**
- 8.CN.4 Model situations mathematically using representations to draw conclusion and formulate new situations**
- 8.R.3 Recognize, compare, and use an array of representational forms**
- 8.R.7 Investigate relationships between different representations and their impact on a given problem**
- 8.R.11 Use mathematics to show and understand mathematical phenomena (i.e. use tables, graphs, and equations to show a pattern underlying a function)**

**Vocabulary:**

*angle bisector*

*construction*

*function notation*

*slope*

*straightedge*

*y-intercept*

*compass*

*function*

*rate of change*

*slope-intercept form*

*system of inequalities*