

**Blind Brook School District
Grade 8 Pre-Algebra
Standards Curriculum Alignment
August 2006**

Pre-March Exam Scope and Sequence

Unit 1: Algebra

Unit Outline

Variables and Expressions

- Order of operations (PEDMAS)
- Laws of exponents
- Algebraic expressions
- Problem solving

Polynomials

- Multiplication and division of monomials
- Addition and subtraction of polynomials
- Multiplication of a binomial by a monomial or binomial
- Division of a polynomial by a monomial

Factoring

- Greatest common factor
- Quadratic trinomials

Content Strands

- 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.6 Multiply and divide monomials
- 8.A.5 Use physical models to perform operations with polynomials
- 8.A.7 Add and subtract polynomials with integer coefficients
- 8.A.8 Multiply a binomial by a monomial or a binomial with integer coefficients
- 8.A.9 Divide a polynomial by a monomial with 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), plot the ordered pairs and draw the line

Process Strands

- 8PS.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.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.PS.8 Understand how to break a complex problem into simpler parts or use a similar problem type to solve a problem
- 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

algebraic expressions
combine like terms
integer coefficients
laws of exponents
simplify expressions
variables
verbal form
written symbols

arithmetically
evaluate
integral exponents
numerically
solve algebraically
verbal expression
verbal sentence

Unit 2: Geometry

Unit Outline

Introduction to Functions

- Graphs of linear functions
- Linear vs. non-linear graphs
- Interpretation of a graph

Pairs of Angles

- Vertical angles
- Complementary and supplementary angles
- Parallel lines and their angles

Transformations

- Reflections over the axes and a given line
- Translations
- Rotations of 90° and 180° around the origin
- Dilations from the origin
- Symmetries: line and point
- Properties preserves/not preserved under transformations

Content Strands

- 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.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.G.6 Calculate the missing angle measurements when given two intersecting lines and an angle
- 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.A.16 Find a set of ordered pairs to satisfy a given linear numerical pattern (expressed algebraically), plot the ordered pairs and draw the line
- 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

- 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 their 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

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|---------------------------|---------------------------|
| alternate exterior angles | alternate interior angles |
| angle pairs | complementary angles |
| congruent | corresponding angles |
| exterior angles | interior angles |
| pairs of Angles | parallel lines |
| perpendicular lines | supplementary angles |
| transversal | vertical angles |
| vertical lines | |

Unit 3: Ratios and Proportions

Unit Outline

Percents and Proportions

- Conversions: fractions \leftrightarrow decimals \leftrightarrow percents
- Proportions involving metric and customary measurements
- Percents less than 1%, greater than 100%
- Estimation in a given application

Applications of percents

- Tax and tip
- Sale price
- Commission
- Interest
- Percent increase/decrease

Content Strands

- 8.N.3 Read, write, and identify percents less than 1% and greater than 100%
- 8N.4 Apply percents to: tax, tips, sales price, interest, commissions, percent increase/decrease
- 8.M.1 Solve equations/proportions converting 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

- 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 [e.g., determine profit from sale of yearbooks]

Vocabulary

Celsius	convert
commission	convert within a given system
discount	estimate
expenses	Fahrenheit
gratuity	income
interest rates	percent
percent increase	percent decrease
percent of quantity	profit
proportions	sales
sale Price	simple interest
tax	tip

Post-March Exam Scope and Sequence

Unit 4: Algebra/Geometry

Unit Outline

Inequalities

- Algebraic solution
- Graph of the solution set on the number line

Functions

- Definitions: relation, function, domain, range
- Function notation
- Graphs of linear functions
- Linear vs. non-linear graphs
- Characteristics of quadratics

Linear Equations

- Slope and y-intercept
- Equation of a line: $y = mx + b$
- System of 2 linear equations: graphic solution

Constructions with Compass and Straightedge

- Line segment congruent to a given line segment
- Angle congruent to a given angle
- Bisection of a given angle
- Construction of the perpendicular bisector of a given line

Content Strands

- 8.G.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, 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: copy a segment, copy an angle, bisect an angle, construct the perpendicular bisector

Process Strands

- 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.6 Support an argument by using a systematic approach to test more than one case
- 8.RP.8 Apply inductive reasoning in making and supporting mathematical conjectures
- 8.CM.11 Draw conclusions about mathematical ideas through decoding, comprehension and interpretation of mathematical visuals, symbols and technical writing
- 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]
- 8.PS.5 Make conjectures from generalizations
- 8.RP.4 Provide supportive arguments for conjectures

Vocabulary

Transformations

dilate	image
line symmetry	not preserved
point Symmetry	pre-image
preserved	reflect
rotate	translate
transformations	rotational symmetry
visualization	spatial reasoning
symmetry	

Polynomials

binomial	degree of polynomial
monomial	operation with polynomials
polynomial	trinomial

Factoring

Greatest Common Factor	factor
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Introduction to Functions

function rule	graphically
line	linear equation
linear relationship	non-linear relationship
ordered pair	

Inequalities

algebraic solution	linear equalities
solution set	

Functions

domain	function
function notation	non-linear equations
non-linear relationship	parabola
quadratic equations	quadratics
range	relations
vertical line test	

Linear Equations

equation of a line	graphically
rate of change	slope
slope-intercept form	solution set
systems of equation	y-intercept

Constructions

angle bisector	bisector
compass	congruent
construction	equidistant
fixed distant	line segment
perpendicular bisector	segment bisector
straight edge	

Additional Vocabulary

Problem Solving

adapt
collaboration
constraints
evaluate efficiency
generalizations
ideas
interpret
justify
logical argument
make conjectures
model problems
procedures
strategies
visualization

Reasoning and Proof

counterexamples
defend
evaluate conjectures
explain
indirect
inductive reasoning
informally
investigate conjectures
mathematical argument
refute
supportive arguments
verify results

Communication

accurately label work
clarifying questions
compare strategies
draw conclusions
formulate mathematical questions
mathematical language
organize work
rationale
results
solutions

strategy selection
supportive argument
symbols in verbal form
symbols in written form
technical writing

Connections

apply a variety of strategies
interconnect
model situations
recognize connections
results
social contexts

Representation

defend
mathematical ideas
mathematical phenomena
multiple representations
physical phenomena
social phenomena