

Introduction to Algebra and Geometry

The objective of this course is to strengthen the students' computational and problem-solving skills needed for Algebra 1 and Geometry and introduce data analysis to help build skills needed in science.

Content Strands :

Numbers and Operations
Geometry and Measurement
Functions and Algebra
Data, Statistics, and Probability

Process Strands :

Problem-solving, Reasoning , and Proof
Communications, Representations, and Connections

MAJOR STEMS:

Introduction
Fractions, Decimals, and Percents
Rates, Ratios, and Proportions
Simplifying Expressions and Solving Equations
Representation of Data
More Representation of Data
Angles and Lines
Operations with Negative Numbers
Simplifying Expressions and Solving Equations with Negatives
Word Problems
Polygons
Trigonometry
Inequalities
Graphing Linear Equations

Introduction to Algebra and Geometry COURSE COMPETENCIES

1. Demonstrates understanding of real numbers
2. Uses properties of angle relationships

3. Applies concepts of similarity
4. Applies concepts of congruence
5. Applies trigonometric formulas
6. Solves problems involving perimeter, circumference, or area
7. Solves problems on and off the coordinate plane
8. Identifies arithmetic and geometric sequences
9. Demonstrates conceptual understanding of algebraic expressions
10. Demonstrates conceptual understanding of equality
11. Interprets a given representation
12. Organizes and displays one and two variable data using a variety of representations

Introduction to Algebra and Geometry COURSE PROCESS SKILLS

1. Students will use problem-solving strategies to investigate and understand increasingly complex mathematical content.
2. Students will use mathematical reasoning and proof.
3. Students will communicate their understanding of mathematics.
4. Students will recognize, explore, and develop mathematical connections.

Numbers and Operations – Stem 1

Introduction

Topics	Patterns; order of operations; roots and powers
Competencies	1. Demonstrates understanding of real numbers 8. Identifies arithmetic and geometric sequences
	Recognize patterns in numerical problems and

Knowledge/Skills	<p>geometric diagrams</p> <p>Understand properties of exponents</p> <p>Apply order of operations to algebraic expressions</p> <p>Evaluate roots and powers using calculators</p>
Process Skills	<ol style="list-style-type: none"> 1. Students will use problem-solving strategies to investigate and understand increasingly complex mathematical content. 3. Students will communicate their understanding of mathematics. 4. Students will recognize, explore, and develop mathematical connections.

Numbers and Operations –Stem 2

Fractions, Decimals, and Percents

Topics	Simplify fractions; Operations with fractions and decimals; converting between fractions, decimals, and percents
Competencies	<ol style="list-style-type: none"> 1. Demonstrates understanding of real numbers 10. Demonstrates conceptual understanding of equality
Knowledge/Skills	<p>Simplify numerical and algebraic fractions</p> <p>Multiply, divide, add and subtract numerical and algebraic fractions</p> <p>Multiply, divide, add and subtract decimal values</p> <p>Convert between fractions, decimals and percents</p>
Process Skills	<ol style="list-style-type: none"> 1. Students will use problem-solving strategies to investigate and understand increasingly complex mathematical content. 3. Students will communicate their understanding of mathematics.

	4. Students will recognize, explore, and develop mathematical connections.

Geometry and Measurement - Stem 3	
Rates, Ratios, and Proportions	
Topics	Units of measure; rates and ratios; solving equations; proportions; similar triangles; Pythagorean Theorem; perimeter and area of triangles
Competencies	<ul style="list-style-type: none"> 1. Demonstrates understanding of real numbers 3. Applies concepts of similarity 6. Solves problems involving perimeter, circumference, or area 10. Demonstrates conceptual understanding of equality
Knowledge/Skills	<ul style="list-style-type: none"> Convert units of measure Simplify rates and ratios Test a replacement set for solutions to equations Solving equations using guess and check and the inverse methods Solve proportions and relate to similar triangles Use equations to solve percent problems Apply the Pythagorean Theorem to solve right triangle problems Determine the area and perimeter for right triangles Calculate percent increase and decrease
Process Skills	<ul style="list-style-type: none"> 1. Students will use problem-solving strategies to investigate and understand

	<p>increasingly complex mathematical content.</p> <ol style="list-style-type: none"> 2. Students will use mathematical reasoning and proof. 3. Students will communicate their understanding of mathematics. 4. Students will recognize, explore, and develop mathematical connections.
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Functions and Algebra - Stem 4

Simplifying Expressions and Solving Equations

Topics	Distributive Property; collecting like terms; solving equations; expression versus equation; simple inequalities
Competencies	<ol style="list-style-type: none"> 1. Demonstrates understanding of real numbers 9. Demonstrates conceptual understanding of algebraic expressions 10. Demonstrates conceptual understanding of equality
Knowledge/Skills	<p>Represent algebraic expressions with algebra tiles</p> <p>Apply the Distributive Property to evaluate expressions</p> <p>Simplify algebraic expressions</p> <p>Solve more complicated equations involving roots and powers</p> <p>Translate English phrases into algebraic expressions</p> <p>Recognize the difference between an expression and an equation</p> <p>Solve simple inequalities</p>

Process Skills	<ol style="list-style-type: none"> 1. Students will use problem-solving strategies to investigate and understand increasingly complex mathematical content. 2. Students will use mathematical reasoning and proof. 3. Students will communicate their understanding of mathematics. 4. Students will recognize, explore, and develop mathematical connections.
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Data, Statistics, and Probability - Stem 5	
Representation of Data	
Topics	Time lines; pictographs; bar graphs; histograms; line graphs; circle graphs; line plots; mode, median and mean
Competencies	<ol style="list-style-type: none"> 11. Interprets a given representation 12. Organizes and displays one and two variable data using a variety of representations
Knowledge/Skills	<p>Draw time lines and pictographs</p> <p>Create bar graphs, histograms and line plots</p> <p>Use a protractor to create circle graphs</p> <p>Calculate the mean, median and mode of a data set</p> <p>Use algebraic equations to solve problems about averages</p>
Process Skills	<ol style="list-style-type: none"> 1. Students will use problem-solving strategies to investigate and understand increasingly complex mathematical content. 2. Students will use mathematical reasoning and proof.

	<ol style="list-style-type: none"> 3. Students will communicate their understanding of mathematics. 4. Students will recognize, explore, and develop mathematical connections.
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Data, Statistics, and Probability - Stem 6

More Representation of Data

Topics	Stem and leaf plots; box and whiskers plots, matrices, operations with matrices
Competencies	<ol style="list-style-type: none"> 1. Demonstrates understanding of real numbers 11. Interprets a given representation 12. Organizes and displays one and two variable data using a variety of representations
Knowledge/Skills	<p>Determine the characteristics of a data set statistics by creating stem and leaf and plots and box and whisker plots</p> <p>Create matrices and problem applications</p> <p>Add and subtract matrices with numerical and algebraic entries</p> <p>Perform scalar and matrix multiplication</p>
Process Skills	<ol style="list-style-type: none"> 1. Students will use problem-solving strategies to investigate and understand increasingly complex mathematical content. 2. Students will use mathematical reasoning and proof. 3. Students will communicate their understanding of mathematics. 4. Students will recognize, explore, and develop mathematical connections.

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Geometry and Measurement Stem 7
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Angles and Lines

Topics	Notation for geometric figures; angle types, parallel and perpendicular lines; angle relationships
Competencies	<ul style="list-style-type: none"> 2. Uses properties of angle relationships 4. Applies concepts of congruence
Knowledge/Skills	<ul style="list-style-type: none"> Identify and name geometric figures Recognize different classes of angles Use a protractor to measure angles Identify parallel and perpendicular lines Use relationships among complementary, supplementary and congruent angles
Process Skills	<ul style="list-style-type: none"> 2. Students will use mathematical reasoning and proof. 3. Students will communicate their understanding of mathematics. 4. Students will recognize, explore, and develop mathematical connections.

Numbers and Operations - Stem 8
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Operations with Negative Numbers

Topics	Operations with negative numbers; operations with matrices; expressions with negatives
Competencies	1. Demonstrates understanding of real numbers

	9. Demonstrates conceptual understanding of algebraic expressions
Knowledge/Skills	<p>Add, subtract, multiply and divide integers</p> <p>Evaluate absolute value expressions</p> <p>Add, subtract and multiply matrices</p> <p>Simplify and evaluate algebraic equations with negatives</p>
Process Skills	<ol style="list-style-type: none"> 1. Students will use problem-solving strategies to investigate and understand increasingly complex mathematical content. 2. Students will use mathematical reasoning and proof. 3. Students will communicate their understanding of mathematics. 4. Students will recognize, explore, and develop mathematical connections.

Functions and Algebra - Stem 9

Simplifying Expressions and Solving Equations with Negatives

Topics	Simplifying expressions with negatives; equations with negatives; equations with variables on both sides of the equal sign
Competencies	<ol style="list-style-type: none"> 1. Demonstrates understanding of real numbers 9. Demonstrates conceptual understanding of algebraic expressions

	10. Demonstrates conceptual understanding of equality
Knowledge/Skills	<p>Solve equations using the inverse method</p> <p>Solve equations by combining like terms</p> <p>Solve equations by applying the distributive property</p> <p>Solve equations with variables on both sides of the equal sign</p>
Process Skills	<ol style="list-style-type: none"> 1. Students will use problem-solving strategies to investigate and understand increasingly complex mathematical content. 3. Students will communicate their understanding of mathematics. 4. Students will recognize, explore, and develop mathematical connections.

Functions and Algebra - Stem 10

Word Problems

Topics	Algebraic word problems
Competencies	<ol style="list-style-type: none"> 1. Demonstrates understanding of real numbers 10. Demonstrates conceptual understanding of equality 11. Interprets a given representation
Knowledge/Skills	<p>Translate verbal phrases into algebraic expressions</p> <p>Convert coin problems into algebraic equations and solve</p> <p>Convert consecutive integer problems into algebraic equations and solve</p>

	Convert age problems into algebraic equations and solve
Process Skills	<ol style="list-style-type: none"> 1. Students will use problem-solving strategies to investigate and understand increasingly complex mathematical content. 2. Students will use mathematical reasoning and proof. 3. Students will communicate their understanding of mathematics. 4. Students will recognize, explore, and develop mathematical connections.

Geometry and Measurement - Stem 11

Polygons

Topics	Types of triangles; types of quadrilaterals; unions and intersections; congruent polygons; perimeter and area of polygons
Competencies	<ol style="list-style-type: none"> 2. Uses properties of angle relationships 3. Applies concepts of similarity 4. Applies concepts of congruence 6. Solves problems involving perimeter, circumference, or area
Knowledge/Skills	<p>Distinguish between acute, right and obtuse triangles</p> <p>Distinguish between scalene, isosceles and equilateral triangles</p> <p>Distinguish between parallelograms, rectangles, rhombii, squares, trapezoids, and kites</p>

	<p>Identify congruent, similar, and regular polygons</p> <p>Find the perimeters and areas of triangles and quadrilaterals</p>
Process Skills	<ol style="list-style-type: none"> 1. Students will use problem-solving strategies to investigate and understand increasingly complex mathematical content. 2. Students will use mathematical reasoning and proof. 3. Students will communicate their understanding of mathematics. 4. Students will recognize, explore, and develop mathematical connections.

Geometry and Measurement - Stem 12

Trigonometry

Topics	Trigonometry ratios; using trigonometry to find angles and sides of triangles, Pythagorean Theorem
Competencies	<ol style="list-style-type: none"> 2. Uses properties of angle relationships 3. Applies concepts of similarity 5. Applies trigonometric formulas
Knowledge/Skills	<p>Apply the definitions for sine, cosine and tangent ratios to right triangles</p> <p>Solve simple trigonometric equations using a table and using a calculator</p> <p>Find the indicated sides or angles in right triangles using trigonometry</p>

Process Skills	<ol style="list-style-type: none"> 1. Students will use problem-solving strategies to investigate and understand increasingly complex mathematical content. 2. Students will use mathematical reasoning and proof. 3. Students will communicate their understanding of mathematics. 4. Students will recognize, explore, and develop mathematical connections.
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Functions and Algebra - Stem 13

Inequalities

Topics	Graphing inequalities, solving inequalities, compound inequalities
Competencies	<ol style="list-style-type: none"> 1. Demonstrates understanding of real numbers 12. Organizes and displays one and two variable data using a variety of representations
Knowledge/Skills	<p>Graph simple inequalities on a number line</p> <p>Solve inequalities with multiple transformations</p> <p>Change the inequality sign when multiplying or dividing by a negative</p> <p>Solving and graphing compound inequalities</p>
Process Skills	<ol style="list-style-type: none"> 1. Students will use problem-solving strategies to investigate and understand increasingly complex mathematical content. 2. Students will use mathematical reasoning and proof. 3. Students will communicate their understanding of mathematics. 4. Students will recognize, explore, and

	develop mathematical connections.
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Functions and Algebra – Stem 14
Linear Equations

Topics	Linear equations; graphing on Cartesian Plane; slope; midpoint; distance
Competencies	<ol style="list-style-type: none"> 1. Demonstrates understanding of real numbers 7. Solves problems on and off the coordinate plane
Knowledge/Skills	<p>Create tables of x-y values given an equation</p> <p>Graph linear equations given in slope-intercept form</p> <p>Apply the formulas for slope, midpoint and distance to determine their values between two given points</p>
Process Skills	<ol style="list-style-type: none"> 1. Students will use problem-solving strategies to investigate and understand increasingly complex mathematical content. 2. Students will use mathematical reasoning and proof. 3. Students will communicate their understanding of mathematics. 4. Students will recognize, explore, and develop mathematical connections.