

MATHEMATICS

GRADES 7 – 12

The following pages list each mathematics course taught in grades 7 through 12 in West Des Moines Community Schools. Each course is described in terms of:

Course Title
Course Description
Course Prerequisites
Essential Learnings
Topics/Skills/Concepts

Mathematics

Courses for Credit

West Des Moines Community Schools

Course Title	10	11	12	One semester	Two semesters	Credit	Pre-requisite Required
Algebra A	X	X	X		X	2	No
Algebra II		X	X		X	2	Yes
Algebra II and Trig B	X	X	X		X	2	Yes
Algebra II and Trig C	X	X	X		X	2	Yes
AP Calculus AB		X	X		X	2	Yes
AP Calculus BC		X	X		X	2	Yes
Developmental Algebra	X	X	X		X	2	Yes
Geometry A	X	X	X		X	2	Yes
Geometry B	X	X	X		X	2	Yes
Mathematics Topics 1	X	X	X	X		1	No
Mathematics Topics 2	X	X	X	X		1	No
Pre-Calculus B	X	X	X		X	2	Yes
Pre-Calculus C	X	X	X		X	2	Yes
Statistics		X	X	X		1	Yes
Trigonometry		X	X	X		1	Yes

Basic Mathematics – 7

Course Description:

This course provides a review for pupils who need assistance with basic computation and problem solving. Topics covered include whole number operations, fractions, decimals, percents, signed numbers, geometry, and consumer mathematics. This course is open to qualified students with parent permission.

Essential Learnings:

1. The student will use the four operations (+, -, \div , \times) to solve problems.
2. The student will use fractions to determine equivalency, parts of a whole, and make connections to ratios, proportions and percents.
3. The student will use reason and demonstrate thinking to make logical conclusions and be persistent and consistent in solving problems.

Topics/Skills/Concepts (Basic Mathematics – 7):

<u>First Semester:</u>	<u>Second Semester:</u>
<ol style="list-style-type: none"> 1. Whole Numbers <ul style="list-style-type: none"> • Addition, subtraction, multiplication, division • Order of operations 2. Number Theory <ul style="list-style-type: none"> • Odds, evens, primes, composites • Factors, multiples • GCF, LCM • Prime factorization 3. Fractions <ul style="list-style-type: none"> • Equivalent fractions • Reducing fractions • Mixed numbers, improper fractions • Common denominators • Addition, subtraction, multiplication, division • Order of rational numbers 4. Decimals <ul style="list-style-type: none"> • Place value • Additions, subtraction, multiplication, division • Fractions to decimals, decimals to fractions 5. Percent <ul style="list-style-type: none"> • Ratio and proportion • Percents to decimals or fractions • Decimals or fractions to percents • Solving percent proportions • Percent applications 	<ol style="list-style-type: none"> 1. Geometry <ul style="list-style-type: none"> • Points, lines, planes • Polygons, circles, prisms • Area, perimeter, volume 2. Integers <ul style="list-style-type: none"> • Addition, subtraction, multiplication, Division • Coordinate graphing 3. Pre-Algebra (optional) <ul style="list-style-type: none"> • Reading and writing math phrases, equations, and inequalities • Solving equations and inequalities • Solving story problems 4. Graphs and Statistics (optional) <ul style="list-style-type: none"> • Bar graphs, line graphs, circle graphs, pictographs • Mean, median, mode, range 5. Exponents <ul style="list-style-type: none"> • Scientific notation • Multiplying and dividing powers of ten

Mathematics – 7

Course Description:

Mathematics consists of a review of number operations and a study of fractions, decimals, percents, measurement, geometry, and focus on problem solving. A common text and supplemental materials are used. The majority of 7th graders take Mathematics-7.

Essential Learnings:

1. Students will understand the relationship and application of percent, decimal, and fractions.
2. Students will learn a variety of problem-solving strategies and know how and when to apply them.
3. Students will recognize the reasonableness of an answer.

Topics/Skills/Concepts (Mathematics – 7):

First Semester:

1. Whole Numbers
 - Addition, subtraction, multiplication, division
 - Order of operations
 - Properties of real numbers
2. Number Theory
 - Odds, evens, primes, composites
 - Factors, multiples
 - GCF, LCM
 - Prime factorization
3. Fractions
 - Equivalent fractions
 - Reducing fractions
 - Mixed numbers, improper fractions
 - Common denominators
 - Addition, subtraction, multiplication, division
 - Order of rational numbers
4. Decimals
 - Place value
 - Additions, subtraction, multiplication, division
 - Fractions to decimals, decimals to fractions
5. Percent
 - Ratio and proportion
 - Percents to decimals or fractions
 - Decimals or fractions to percents
 - Solving percent proportions
 - Percent applications

Second Semester:

1. Geometry
 - Points, lines, planes
 - Polygons, circles, prisms
 - Area, perimeter, volume
2. Integers
 - Absolute value
 - Addition, subtraction, multiplication, division
 - Coordinate graphing
3. Pre-Algebra
 - Reading and writing math phrases, equations, and inequalities
 - Solving equations and inequalities
 - Solving story problems
4. Graphs and Statistics
 - Bar graphs, line graphs, circle graphs, pictographs
 - Mean, median, mode, range
5. Sets and Set Theory (optional)
 - Equal sets, equivalent sets, subsets
 - Intersection, union
 - Venn diagrams
6. Exponents
 - Scientific notation
 - Multiplying and dividing powers of ten

Pre-Algebra – 7

Course Description:

After reviewing basic mathematics skills, this course addresses mathematics concepts such as variables, factoring, and functions that will be encountered in algebra in 8th grade. Enrollment is based on test scores and teacher recommendation. Parent permission is required.

Essential Learnings:

1. The student will apply estimation skills; for example, money spent in store and time lapse and use arithmetic skills to determine if answer is reasonable.
2. The student will use reason and communicate thinking to make logical conclusions and be persistent and consistent in solving problems.
3. The student will have awareness of specifics in accuracy of problem solving and scientific conclusion.

Topics/Skills/Concepts (Pre-Algebra – 7):

<ol style="list-style-type: none">1. Review<ul style="list-style-type: none">• Whole number operations• Number theory• Fractions and operations• Decimals2. Percent<ul style="list-style-type: none">• Ratio and proportion• Percents to decimals or fractions• Decimals or fractions to percents• Solving percent proportions• Percent applications3. Geometry<ul style="list-style-type: none">• Points, lines, planes• Polygons, circles, prisms• Area, perimeter, volume• Surface area• Congruent figures• Parallel lines, transversals, and types of angles4. Integers<ul style="list-style-type: none">• Absolute value• Additions, subtraction, multiplication, division• Coordinate graphing5. Pre-Algebra<ul style="list-style-type: none">• Reading and writing math phrases, equations, and inequalities• Solving equations and inequalities• Solving story problems• Rational expressions	<ol style="list-style-type: none">6. Graphs and Statistics<ul style="list-style-type: none">• Bar graphs, line graphs, circle graphs, pictographs• Mean, median, mode, range7. Sets and Set Theory (optional)<ul style="list-style-type: none">• Equal sets, equivalent sets, subsets• Intersection, union• Venn diagrams8. Probability (Optional)<ul style="list-style-type: none">• Combinations• Permutations
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Basic Mathematics – 8

Course Description:

This course provides a review of basic mathematics concepts using a combination of individual and group instruction. Topics include number operations, fractions, decimals, percents, geometry, and consumer mathematics. Enrollment is based on test scores and teacher recommendation. Parent permission is required.

Essential Learnings:

4. The student will use proportion/ratio to solve problems.
5. The student will apply estimation skills; for example, money spent in store and time lapse and use arithmetic skills to determine if answer is reasonable.
6. The student will use reason and demonstrate thinking to make logical conclusions and be persistent and consistent in solving problems.

Topics/Skills/Concepts:

1. Rational numbers (all operations)	8. Geometry <ul style="list-style-type: none">• A & P• Line and angle relationship• Coordinate system
2. Ratio/Percent/Proportion	
3. Simple interest	
4. Fractions (all operations) <ul style="list-style-type: none">• Decimals• Percents	9. Transformations (1 and 2-step)
5. Integers – absolute value	10. Statistics – mean, median, mode
6. Rounding and estimation	
7. Number theory and place value <ul style="list-style-type: none">• GCF and LCM• Divisibility rules• Exponents and scientific notation	

Pre-Algebra – 8

Course Description:

This pre-algebra course involves the study of mathematics with attention to variables, problem solving, and the real number system. This course also provides a basic introduction to algebra, geometry, and trigonometry. The majority of 8th graders take Pre-Algebra – 8.

Essential Learnings:

1. The student will use proportion/ratio to solve problems.
2. The student will apply estimation skills; for example, money spent in store and time lapse and use arithmetic skills to determine if answer is reasonable.
3. The student will use reason and communicate thinking to make logical conclusions and be persistent and consistent in solving problems.

Topics/Skills/Concepts (Pre-Algebra – 8):

<ol style="list-style-type: none">1. Set Theory<ul style="list-style-type: none">• Sets of numbers• Union and intersection• Venn Diagrams• Properties• Rounding• Absolute Value• Estimation2. Number Theory<ul style="list-style-type: none">• Divisibility rules• Multiple/factors• Prime factorization• GCF/LCM3. Geometry<ul style="list-style-type: none">• Angles• Lines• Parallel lines• Area, perimeter, irregular shapes, surface area, volume4. Rational Numbers<ul style="list-style-type: none">• Fraction review• Integers• Coordinate planes• Add/subtract/multiply/divide• Order of operations5. Statistics<ul style="list-style-type: none">• Histograms• Stem-and-leaf plot• Scatter plots• Measures of central tendency	<ol style="list-style-type: none">6. Introduction to Algebra<ul style="list-style-type: none">• Write number phrases and sentences• Transformation• Problem-solving (mixtures, coins, integers, age)7. Ratio/Rate/Proportion/Percents<ul style="list-style-type: none">• Interest• Discount8. Exponents<ul style="list-style-type: none">• Scientific notation• Simplify expressions• Square roots• Pythagorean Theorem
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Algebra – 8

Course Description:

The course content is the same as high school algebra which includes several problem-solving techniques, the real number system, polynomials, functions, and quadratic equations. This course is open only to qualified students with parental permission. Completion of algebra will be recognized on the transcript but will not reduce the number of credits needed for graduation.

Essential Learnings:

4. The student will apply estimation skills; for example, money spent in store and time lapse and use arithmetic skills to determine if answer is reasonable.
5. The student will use reason and communicate thinking to make logical conclusions and be persistent and consistent in solving problems.
6. The student will have awareness of specifics in accuracy of problem solving and scientific conclusion.

Topics/Skills/Concepts (Algebra – 8):

<ol style="list-style-type: none">1. Simplify numerical expressions and evaluate algebraic expressions.2. Translate language expressions into mathematical symbols, expressions, and open sentences, and equations.3. Solve equations with one variable, variables on both sides of equations, using several transformations.4. Write equations to represent relationships among integers.5. Transforming formulas6. Explore uniform motion, perimeter, and area, and interest problems.7. Solve equations by factoring.8. Use scientific notation.9. Simplify, multiply, and divide algebraic fractions.10. Find LCD (least common denominator) for adding and subtracting algebraic fractions.11. Solve equations with two variables over a given domain.12. Determine the slope of a line.13. Apply exponent properties14. Monomials, binomials, trinomials (polynomials); add, subtract, multiply, and divide.15. Use slope-intercept form of a linear equation.16. Understand slope of parallel and perpendicular lines.17. Write an equations from a table of ordered pairs.18. Write the equation of a line using slope-intercept, standard, and point-slope forms.19. Graph points, equations, and <i>inequalities</i> in a plane.20. solve systems of equations by graphing, substitution, addition/subtraction, or multiplication.	<ol style="list-style-type: none">21. Solve inequalities using the four basic operations.22. Solve equations and inequalities involving absolute value.23. simplify radicals involving the four basic operations.24. Use the Pythagorean Theorem and the distance formula.25. Solve simple radical equations.26. Solve problem with quadratic equations.27. Explain graph behavior. Linear, Exponential, Quadratic, Rational.
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Basic Mathematics – 9 at Valley Southwoods

Course Description:

Basic Math 9 is a two-semester course for students needing additional mathematical skill development before enrolling in Algebra related courses. This course will build on concepts covered in Basic Math 7 and Basic Math 8. Topics will include order of operations, number properties, operations with integers, exponents, simplifying expressions, evaluating expressions, and solving equations.

Essential Learnings:

1. The student will solve number and word problems involving whole numbers, integers, fractions, decimals, and percents.
2. The student will simplify and evaluate algebraic expressions and solve algebraic equations including word problems.
3. The student will develop a working vocabulary of geometric terms and use formulas to determine perimeter, area, circumference, volume, and surface area.

Topics/Skills/Concepts Basic (Mathematics – 9):

<ol style="list-style-type: none">1. Operations with whole numbers, decimals, fractions, and integers2. Number theory<ul style="list-style-type: none">• Divisibility tests• Factors/multiples• GCF/LCM• Prime factorization• Prime/composites3. Ratio, proportion, and percent<ul style="list-style-type: none">• Rates• Writing/solving proportions• Relationships between decimals, fractions, and percents• Percent proportion4. Geometry<ul style="list-style-type: none">• Vocabulary• Perimeter, circumferences, area• Surface area, volume• Square roots• Pythagorean Theorem	<ol style="list-style-type: none">5. Statistics<ul style="list-style-type: none">• Mean• Median• Mode• Range• Interpretation of charts and graphs6. Pre-Algebra<ul style="list-style-type: none">• Introductions to variables• Order of operations• Powers/exponents• Simplify/evaluate expressions• Absolute value• Properties• Inverse operations• Coordinate plane and number line graphing• Solving equations• Using equations to solve word problems
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Algebra A

Course Description:

Algebra A is a two-semester course which uses the same text and course outline as Algebra B. There is, however, less emphasis on enrichment activities. Topics include operations with real numbers, solving equations and inequalities, factoring, and systems of equations, graphing, and quadratic equations.

Essential Learnings:

1. The student will use algebraic equations and systems of equation to solve problems:
 - Properties and laws
 - Factoring
 - Inequalities
2. Students will graph linear and quadratic functions and will learn how to interpret these graphs and determine slope.
3. The student will solve equations with one or two variables:
4. The student will learn to evaluate/simplify algebraic expressions:

Topics/Skills/Concepts (Algebra A): VSW

<ol style="list-style-type: none">1. Translate language expressions into mathematical symbols, expressions, and open sentences.2. Use properties to help students understand the structure of algebra and their importance in simplifying algebraic expressions.3. Use the number line to add integers and rational numbers, find absolute value, and find additive inverses.4. Solve problems using the addition and subtraction properties of equality.5. Use inverse operations in multiplying and dividing signed numbers.6. Solve equations in one variable.7. Study ratio, proportion, and percent.8. Solve inequalities using the four basic operations; graph these on the number line.9. Use cross products as a short cut in comparing rational numbers.10. Solve and graph compound sentences and open sentences containing absolute value.11. Develop the exponent rules when multiplying and dividing monomials.12. Use scientific notation.13. Solve problems involving proportion and percent.14. Use the four basic operations with polynomials including the FOIL method and special products.15. Explore uniform motion, perimeter and area, and simple interest problems.16. Find prime factorization, GCF, and LCM.17. Factor (GCF, difference of squares, and perfect squares).18. Solve equations by factoring.19. Factor trinomials in various forms and four-term polynomials.	<ol style="list-style-type: none">20. Solve integer and area problems.21. Graph points, equations, and inequalities in a plane.22. Introduce the concept of relation, function, and linear equation.23. Write equations from a table of ordered pairs.24. Determine the slope of a line.25. Write the equation of a line using slope-intercept.26. Write equations for parallel and perpendicular lines.27. Find the midpoint of a line segment.28. Solve systems of equations by graphing, substitution, linear combination, and rules.29. Simplify radicals involving the four basic operations.30. Solve radical equations.31. Use the Pythagorean Theorem and the distance formula.32. Solve quadratic equations by graphing the related quadratic function, completing the square, and the quadratic formula.33. Solve problems involving quadratic equations.34. Simplify algebraic fractions involving the four basic operations (including complex fractions). <i>Possibly</i>35. Solve equations containing algebraic fractions.
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Topics/Skills/Concepts (Algebra A): VALLEY

<ol style="list-style-type: none">1. Translate language expressions into mathematical symbols.2. Use properties to help students understand the structure of algebra and their importance in simplifying algebraic expressions.3. Use the number line to add integers and rational numbers, find absolute value, and find additive inverses.4. Solve problems using the addition and subtractions properties of equality.5. Use inverse operations in multiplying and dividing signed numbers.6. solve equations in one variable.7. Study ratio, proportion, and percent.8. Solve inequalities using the four basic operations; graph these on the number line.9. Use cross products as a short cut in comparing rational numbers.10. Solve and graph compound sentences and open sentences containing absolute value.11. Solve problems involving proportion and percent.12. Use the four basic operations with polynomials including FOIL method and special products.13. Find prime factorizations, GCF, and LCM.14. Factor (GCF, difference of squares, and perfect squares).15. solve equations by factoring16. Factor trinomials in various forms.17. Solve integer, velocity, and area problems.18. Graph points and equations in a plane.19. Introduce the concept of relations, functions, and linear equation.20. Write equations from a table of ordered pairs.	<ol style="list-style-type: none">21. Determine the slope of a line.22. Write the equation of a line using slope-intercept, standard, and point-slope forms.23. Write equations for parallel and perpendicular lines.24. Solve systems of equations by graphing, substitution, linear combination, and rules.25. Solve digit, uniform motion, and mixture problems using a system of equations.
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Algebra B

Course Description:

Algebra B is a two-semester course which helps the student acquire an understanding of the structure of the number system and a knowledge of algebraic expressions and equations. This course also provides practice in the interpretation of verbal problems and training in logical thinking. Topics include operations with real numbers, solving equations and inequalities, factoring, and systems of equations, graphing, and quadratic equations.

Essential Learnings:

1. The student will use algebraic equations, systems of equations, and quadratic functions to solve problems.
2. The student will graph linear and quadratic functions, interpret these graphs, and determine slope.

9-12 Standards and Benchmarks addressed in this course:

- Standard #1: Students will use mathematics to solve problems, communicate, and work with others.
- 11.1.a write algebraic expressions.
 - 11.1.b evaluate algebraic expressions.
 - 11.1.c solve for the given variable.
- Standard #3: Students will use reasoning skills, mental mathematics, and estimation skills.
- 11.3.g use deductive reasoning to make a valid conclusion.
 - 11.3.h use divisibility rules and the ability to multiply and divide by powers of 10.
 - 11.3.i use rounding and estimation.
- Standard #4: Students will perform mathematical operations and see relationships among numbers.
- 11.4.j solve linear equations and inequalities.
 - 11.4.k solve proportions.
 - 11.4.l simplify rational expressions.
 - 11.4.m simplify problems using order of operations.
- Standard #7: Students will use patterns and relationships to solve problems.
- 11.7.t use the Pythagorean relationship to solve problems.
 - 11.7.u use a proportion to solve a problem.
 - 11.7.v select and use a formula to find area, surface area, and volume.
 - 11.7.w understand functional notation.

Multicultural/Gender Fair Strategies:

The following strategies are incorporated into lessons of this course:

- I. Affirm cultural/gender diversity as a positive force in our world
 - A. Heritage
 - B. Historical and contemporary contributions of diverse cultural groups
- II. Affirm Gender Fair attitudes and behavior
 - A. Knowledge, respect, and appreciation for the historical and contemporary contributions of women and men to society.
 - B. Knowledge of the wide variety of roles open to both female and males
 - C. Provide equal opportunity of all programs to females and males
- III. Develop positive interpersonal and inter-group relations
 - A. Communication skills
 - B. Problem-solving
 - C. Cooperation
 - D. Conflict Resolution

Topics/Skills/Concepts (Algebra B): VSW

<ol style="list-style-type: none">1. Translate language expressions into mathematical symbols, expressions, and open sentences.2. Use properties to help students understand the structure of algebra and their importance in simplifying algebraic expressions.3. Use the number line to add integers and rational numbers, find absolute value, and find additive inverses.4. Solve problems using the addition and subtraction properties of equality.5. Use inverse operations in multiplying and dividing signed numbers.6. solve equations in one variable.7. Study ratio, proportion, and percent.8. Solve inequalities using the four basic operations; graph these on the number line.9. Use cross products as a short cut in comparing rational numbers.10. Solve and graph compound sentences and open sentences containing absolute value.11. Develop the exponent rules when multiplying and dividing monomials.12. Use scientific notation.13. Solve problems involving proportion and percent.14. Use the four basic operations with polynomials including the FOIL method and special products.15. Find prime factorization, GCF, and LCM16. Factor (GCF, difference of squares, and perfect squares).17. Solve equations by factoring18. Factor trinomials in various forms and four-term polynomials.19. Solve integer, velocity, and area problems20. Graph points, equations, and inequalities in a plane.	<ol style="list-style-type: none">21. Introduce the concept of relation, function, and linear equation.22. Write equations from a table of ordered pairs.23. Determine the slope of a line.24. Write the equation of a line using slope-intercept, standard, and point-slope forms.25. Write equations for parallel and perpendicular lines.26. Find the midpoint of a line segment.27. Simplify radicals involving the four basic operations.28. Solve radical equations.29. Use the Pythagorean Theorem and the distance formula.30. Solve quadratic equations by graphing the related quadratic function and the quadratic formula.31. Solve problems involving quadratic equations.32. Simplify algebraic fractions involving the four basic operations (including complex fractions).33. Solve equations containing algebraic fractions.
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Geometry – 9

Prerequisite: Algebra

Course Description: Geometry is a two-semester course which involves the development and study of a mathematical system. This course is designed to review and strengthen algebraic skills, develop deductive and inductive reasoning ability, and increase spatial perception. The topics include principles of logic, parallelism, congruence, similarity, circles, spheres, constructions and loci, areas, volumes, coordinate geometry, and transformations. Geometry will enable students to move into either Algebra II and Trigonometry B or Algebra II and Trigonometry C.

Essential Learnings:

The students will have knowledge of:

1. Geometry basics
 - Vocabulary
 - Patterns
 - Points, lines, planes, angles, bisectors
 - Constructions
2. Logic and reasoning
 - Deductive reasoning
 - Proofs
3. Perpendicular/parallel lines
 - L relationships
 - Proving lines + 1”
4. Congruent figures
 - Proving triangles congruent
 - Relationship between congruent figures
5. Polygons/circles
 - Area
 - Circle relationships
 - Perimeter
6. Similar Figures
 - Proving triangles similar
 - Relationship of similar figures
7. 3-D geometry
 - Volume
 - Surface area
8. Coordinate geometry
 - Graphing lines
 - Coordinate proofs using midpoint formula, distance formula, and slope
 - Transformations

Topics/Skills/Concepts (Geometry – 9):

<ol style="list-style-type: none">1. Apply inductive reasoning by finding patterns2. Review, strengthen, and apply algebraic skills3. Verify and apply geometric constructions4. Study principles of logic5. Prove statements deductively using both two-column and paragraph form6. Develop concepts about points, lines, and planes in space7. Apply concepts of parallelism and perpendicularity, including equidistant theorems8. Write and use equations of lines9. Prove triangles congruent by SSS, SAS, ASA, AAS, and HL10. Develop and apply properties of triangles (bisectors, medians, altitudes, mid-segments)11. Review and apply the algebra of inequalities to situations involving triangles and other polygons12. Construct indirect proofs and coordinate proofs13. Prove and apply theorems about quadrilaterals14. Discuss transformations study symmetry15. Understand and apply ratios and proportions	<ol style="list-style-type: none">16. Prove and apply similar triangles (AA, SSS~, SAS~)17. Define and apply concepts of right triangles, including trigonometric ratios and Pythagorean Theorem.18. Derive and apply theorems concerning circles, angles, and segments19. Derive and apply formulas for areas of polygons, circles, sectors, and segments20. Solve locus problems (in both plane and space situations)21. Derive and apply formulas for surface area and volume of prisms, cylinders, pyramids, cones, and related figures22. Understand how areas and volume of similar figures are related23. Derive and apply Pythagorean Theorem, including applications to three-dimensional figures24. Compute distances in the plane and in space. Write equations of circles25. Consider probability applications throughout the course26. Discuss other geometry (non-Euclidean)
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Geometry 9 is a 2-semester course involving the development and study of a mathematical system. It will enable students to enter Algebra II and Trigonometry C (or B, in some cases). Completion of one year of Algebra I is required.

Geometry A

Prerequisite: Algebra

Course Description:

Geometry A is a two-semester course which uses the same text and course outline as Geometry B and C. Topics include congruence and similarity of figures, right triangles, area, volume, and coordinate geometry. Students learn to analyze and solve problems, maintain their algebra skills, and organize and compose proofs.

Essential Learnings:

1. The student will learn to solve problems involving:
 - Basic geometric definitions
 - Logical reasoning, patterns, proofs
 - Geometric figures and parallel lines
2. The student will learn to identify and work with triangles.
 - Congruent triangles
 - Similar triangles
 - Areas and volume
3. The student will learn to identify and work with:
 - Quadrilaterals, pentagons, hexagons
 - Circles: tangents, secants, chords
 - Angles and areas of the circle
 - Area and volume

Topics/Skills/Concepts (Geometry A):

<ol style="list-style-type: none">1. Review, strengthen, and apply algebraic skills.2. Prove statements inductively/deductively using two-column proofs.3. Prove triangles congruent by SSS, SAS, ASA, AAS, and HL.4. Apply concepts of parallelism and perpendicularity, including equidistance theorems.5. Prove and apply theorems about triangles.6. Prove and apply theorems about quadrilaterals.7. Develop concepts about lines and planes in space.8. Define and apply sine, cosine, and tangent ratios (right triangle trigonometry).9. Derive and apply theorems concerning circles, angles, and segments.10. Apply formulas for area of polygons and circles.11. Apply formulas for volume of cylinders, pyramids, cones, and related figures.	<ol style="list-style-type: none">12. Derive and apply the Pythagorean Theorem, including application to three-dimensional figures.13. Write equation of lines with emphasis on $y - y_1 = m(x - x_1)$.14. Solve systems of linear equations and/or inequalities.15. Compute distances in the plane and in space. Write equation of circles.16. Compute distances in the plane and in space.17. Write the equation of circles.
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Geometry B

Prerequisite: Algebra

Course Description:

Geometry B is a two-semester course, which involves the development and study of a mathematical system. This course is designed to review and strengthen algebraic skills, develop deductive and inductive reasoning ability, and increase spatial perception. The topics include principles of logic, parallelism, congruence, similarity, circles, spheres, constructions, loci, areas, volumes, coordinate geometry, and transformations. Changes from this course to Geometry A may be made with teacher recommendation and must be completed during the first ten weeks of class.

Essential Learnings:

1. The student will learn to write two-column proofs.
 - Segments and angles; properties of equality
 - Parallel lines/perpendicular lines
 - Congruent triangles
 - Similar triangles
2. The student will learn to solve problems involving
 - Area and circumference
 - Surface area and volume
 - Chords, tangents, secants
 - Sectors and arcs of the circle
 - Angles and areas of the circle
 - Right triangles and Trigonometry
3. The student will learn to identify and work with polygons.
 - Congruent and similar triangles
 - Quadrilaterals, pentagons, etc.
 - Areas and volume
4. The student will identify/work with solids
 - Surface area and volume
 - Pyramids, prisms, etc.
 - Similar 3-dimensional shapes

Topics/Skills/Concepts (Geometry B):

<ol style="list-style-type: none">1. Review, strengthen, and apply algebraic skills.2. Prove statements deductively/ inductively using two-column proofs.3. Prove triangles congruent by SSS, SAS, ASA, AAS, and HL.4. Apply concepts of parallelism and perpendicularity, including equidistance theorems.5. Prove and apply theorems about triangles6. Prove and apply theorems about quadrilaterals.7. Develop concepts about line and planes in space.8. Develop properties of polygons, with emphasis on regular polygons.9. Define and apply the sine, cosine, and tangent ratios (right triangle trigonometry).10. Derive and apply theorems concerning circles, angles, and segments.11. Derive and apply formulas for area of polygons, circles, sectors, and segments.12. Derive and apply formulas for surface area and volume of prisms, cylinders, pyramid, cones, and related figures.13. Understand how areas and volume of similar figures are related.	<ol style="list-style-type: none">14. Derive and apply the Pythagorean Theorem, including application to three-dimensional figures.15. Write equation of lines with emphasis on $y = mx + b$.16. Solve systems of linear equation and/or inequalities.17. Compute distances in the plane and in space. Write equation of circles.18. Write the equations of circles.19. Solve locus problems in both line and space situations.20. Verify and apply geometric constructions.21. Consider probability application through the course.22. Vectors.23. Recognize various angle pair relationships.24. Write conditional statements and apply them in arguments and proofs.25. Develop properties and applications of the various types of triangles.26. Prove triangles similar.27. Apply ratios and proportions to similar triangles.
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Algebra II A

Prerequisite: Geometry

Course Description:

Algebra II A is a two-semester course for students who have successfully completed Geometry and desire another year of mathematics. The same text is used as in Algebra II and Trigonometry B or C; however, there is less emphasis on challenge and enrichment exercises and no trigonometry topics are covered. Topics that are covered include a review of algebra, complex numbers, quadratic functions, polynomial equations, conic sections, exponents, logarithms, sequences, series, statistics, probability, and matrixes.

Essential Learnings:

1. The student will solve equations, such as:
 - Linear
 - Quadratic
 - Systems
2. The student will apply problem solving strategies to solve:
 - Story problems
 - Formulas
3. The student will graph:
 - Points
 - Linear equations
 - Quadratic equations

Topics/Skills/Concepts (Algebra II A):

Quarter 1:

Chapter 1

- a. Real number sets and their graphs—solve simple open sentences and graph.
- b. Simplify and evaluate expressions.
- c. Basic properties of real numbers—use theorems in solving properties of real numbers.
- d. Translate expressions/ equations/word problems, and solve equations/word problems in one variable. Solve first degree equations including word problems.
- e. Solve (and graph) inequalities in one variable/combined inequalities/word problems, including absolute value. Solve linear inequalities, including absolute value.
- f. Satisfying open sentences in two variables/domains.
- g. Define and apply functions and relations, including domain and range.
- h. Graph linear equations and inequalities.
- i. Graph lines and write their equations.
- j. Solve systems of equations in two variables.
- k. Solve systems of inequalities in two variables.

Chapter 3

Quarter 2:

Chapter 4

- a. Operations with polynomials.
- b. Laws of exponents.
- c. Factor polynomials.
- d. Solve equations by factoring.
- e. Work with and simplify radicals and radical expressions.
- f. Work with fractional equations.
- g. Solve radical equations.
- h. Work with imaginary and complex numbers.
- i. Scientific notation.
- j. Find and simplify n^{th} root.

Chapter 6

Quarter 3:

Chapter 7

- a. Solve quadratic equations using factoring, completing the square, and using the quadratic formula.
- b. Use the discriminant to determine the nature of roots.
- c. Graph quadratic equations.
- d. Identify the vertex, axis of symmetry, maximum or minimum, and roots of quadratic equations.
- e. Write a quadratic equation given a variety of characteristics.
- f. Apply quadratic equations to story problems.
- g. Recognize and solve situations that involve direct, inverse, and joint variation.
- h. Use long and synthetic division to divide polynomials.

Chapter 8

Topics/Skills/Concepts (Algebra II A – Cont'd.)

<p>Quarter 4: <i>Chapter 10</i></p> <ol style="list-style-type: none">Extend the meaning of exponents to include rational numbers.Define exponential and logarithmic functions and demonstrate their relationship.Find composite and inverses of functions.Extend exponents to use logarithms: derive and apply properties of logarithms.Solve equations using logarithms and exponential function.Introduce and work with arithmetic and geometric sequences.Introduce and work arithmetic and geometric series. <p><i>Chapter 11</i></p>	<p><u>TECHNOLOGY</u> – graphing calculators:</p> <ol style="list-style-type: none">Graph functions.Use the zoom feature of the graphing calculator. <p><u>RESOURCES</u></p> <p><u>EVALUATIONS</u></p>
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Algebra II and Trigonometry B

Prerequisite: Geometry

Course Description:

Algebra II and Trigonometry B is a two-semester course which places an emphasis on the understanding of mathematical structures and processes. Functions of real numbers, one of the central ideas in mathematics, are studied throughout the course and skill in algebraic manipulation is strengthened. Topics of study include rational exponents, complex numbers, and trigonometry. Challenge exercises encourage students to apply their knowledge at higher levels. Changes from this course to Algebra II and Trigonometry A may be made with teacher recommendation and must be completed during the first ten weeks of class.

Essential Learnings:

1. The student will solve mathematics equations, such as:
 - Linear equations
 - Quadratic equations
 - Systems of equations
 - Trigonometric equations
 - Rational equations
2. The student will apply problem solving strategies to solve:
 - Story problems
 - Formulas
3. The students will graph:
 - Points
 - Linear functions
 - Quadratic functions
 - Trigonometric functions

Topics/Skills/Concepts (Algebra II and Trigonometry B):

<p>Quarter 1:</p> <ol style="list-style-type: none">Real number sets and their graphs—solve simple open sentences and graphs.Simply and evaluate expressions.Basic properties of real numbers—use theorems in solving properties of real numbers.Translate expressions/ equations/word problems, and solve equations/word problems in one variable. Solve first degree equations including word problems.Solve (and graph) inequalities in one variable/combined inequalities/word problems, including absolute value. Solve linear inequalities, including absolute value.Satisfy open sentences in two variables/domains.Define and apply functions and relations, including domain and range.Graph linear equations and inequalities, including linear programming applications.Graph lines and write their equations.Apply linear relations.Solve systems of equations in two variables.Solve systems of inequalities in two variables. <p>Quarter 2:</p> <ol style="list-style-type: none">Operations with polynomials.Factor polynomials.Laws of exponents. <p>Topics/Skills/Concepts (Algebra II and Trigonometry B) continued:</p> <p>Quarter 4:</p> <ol style="list-style-type: none">Use degrees to measure angles.Define and apply the six basic	<p>Quarter 2 (cont'd):</p> <ol style="list-style-type: none">Rational expressions and equations.Irrational and complex numbers. <p>Quarter 3:</p> <ol style="list-style-type: none">Solve quadratic equations using factoring, completing the square, and using the quadratic formula.Derive the quadratic formula by completing the square.Use the discriminant to determine the nature of roots.Graph quadratic equations.Identify the vertex, axis of symmetry, maximum or minimum, and roots of quadratic equations.Write a quadratic equation given a variety of characteristics.Apply quadratic equations to story problems.Recognize and solve situations that involve direct, inverse, and joint variation.Use long and synthetic division to divide polynomials.Solve n-degree polynomials.Extend the meaning of exponents to include rational numbers.Define exponential and logarithmic functions and demonstrate their relation.Find composite and inverses of functions.Extend exponents to use logarithms: derive and apply properties of logarithms.Solve equations using <p><u>TECHNOLOGY</u>— graphing calculators:</p>
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<p>trigonometric functions.</p> <ul style="list-style-type: none">c. Evaluate values of trigonometric functions using triangles and a calculator.d. Prove trigonometric identities.e. Solve general triangles.f. Use Law of Sine and Law of Cosinesg. Solve trigonometric functions.h. Use Remainder Theorem and DeCartes Rule of Signs to determine factors.	<ul style="list-style-type: none">1. Graph functions.2. Use the zoom feature of the graphing calculator.3. Use POLY, SIMULT, and conversion. <p><u>RESOURCES</u></p> <p><u>EVALUATIONS</u></p>
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Algebra II and Trigonometry C

Prerequisite: Geometry

Course Description:

Algebra II and Trigonometry C is an enriched two-semester course with text identical to Algebra II and Trigonometry B. All topics are covered in greater depth than in the other Algebra II and Trigonometry course, and additional enrichment topics are discussed. Algebra II and Trigonometry C is recommended for students who plan to take AP Calculus at Valley. Changes from this course to Algebra II and Trig B may be made with teacher recommendations and must be completed during the first ten weeks of class.

Essential Learnings:

1. The student will solve mathematical equations, such as:
 - Linear equations
 - Quadratic equations
 - Systems of equations
 - Trigonometric equations
 - Logarithmic equations
 - Matrix equations
 - Rational equations
2. The student will apply problem solving strategies to solve:
 - Story problems
 - Formulas
3. The student will graph (and be able to state the domain and range) for:
 - Points
 - Linear functions
 - Quadratic functions
 - Trigonometric functions
 - Rational functions
 - Polynomial functions
 - Exponential functions
 - Conic sections

Topics/Skills/Concepts (Algebra II and Trigonometry C):

<p>Quarter 1:</p> <ul style="list-style-type: none"> a. Real number set b. Solve simple open sentences and graph c. Basic properties of real numbers d. Axioms and theorems for real numbers e. Translating expressions/equations/word problems and solving equations/word problems in one variable f. Solving and graphing inequalities one variable/combined inequalities/word problems including absolute value g. Truth tables and symbolic logic h. Satisfying open sentences in two variables/domains i. Define and apply functions and relations including domain and range j. Graph lines and write their equations k. Apply linear relations l. Solve systems of equations in two variables m. Solve systems of inequalities in two variables n. Linear programming o. Operations with polynomials p. Factoring polynomials <p>Quarter 2:</p> <ul style="list-style-type: none"> a. Laws of exponents b. Rational expressions and equations c. Graphing rational functions d. Operating with radicals e. Operations with complex numbers f. Solving quadratic equations by factoring, completing the square, 	<ul style="list-style-type: none"> g. Derive the quadratic formula by completing the square h. Use the discriminate to determine the nature of roots i. Identify the vertex, axis of symmetry, maximum or minimum, and roots of quadratic equations j. Write a quadratic equation given a variety of characteristics k. Apply quadratic equations to story problems l. Recognize and solve situations that involve direct, inverse, and joint variations <p>Quarter 3:</p> <ul style="list-style-type: none"> a. Use long and synthetic division to divide polynomials b. Determine factors of an equation from a graph, the Remainder Theorem c. Solve n-degree polynomials d. DesCartes Rule of Signs e. Distance and midpoint formulas f. Conic sections <ul style="list-style-type: none"> i. circles ii. parabola iii. ellipse iv. hyperbola g. Solving systems in three variables h. Rational exponents i. Arithmetic and geometric sequences and series j. Series an sigma notation k. Binomial expansion l. Use degrees to measure angles m. Define and apply the six basic trigonometric functions n. Evaluate values of trigonometric functions using triangles and a calculator o. Solve right triangles
<p>Topics/Skills/Concepts (Algebra II and Trigonometry C):</p>	
<p>Quarter 4:</p> <ul style="list-style-type: none"> a. Law of Sines and Law of Cosines 	<p><u>TECHNOLOGY</u></p> <ul style="list-style-type: none"> 1. Graph functions; find maximum, minimum,

<ul style="list-style-type: none">b. Solve general trianglesc. Radian measure, arc length, and angular and linear speedd. Graph trigonometric equationse. Prove trigonometric identitiesf. Solve trigonometric equationsg. Inverse trigonometric functionsh. Rational exponentsi. Composite and inverse functionsj. Logarithmic functions and their applicationsk. Operations with matrixesl. Determinantsm. Cramer's Rulen. Fundamental counting principleso. Permutations and combinationsp. Probability	<p>points of intersection, intercepts, domain, and range.</p> <p>2. Use POLY, SIMULT, and conversion features</p> <p><u>RESOURCES</u> Graphing calculators</p>
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Pre-Calculus B

Prerequisite: Algebra II and Trigonometry/Teacher Recommendation

Course Description:

Pre-Calculus B is a two-semester course that begins with a study of mathematical systems. Other topics include trigonometric and inverse trigonometric functions, exponential and logarithmic functions, linear relations and functions, theory of equations, sequences and series, mathematical induction.

Essential Learnings:

The student will learn to:

1. Identify and graph a variety of functions:
 - Rational
 - Trigonometric
 - Polynomial
 - Quadratic
 - Linear
 - Logarithmic
 - Polar
 - Parametric
2. Solve and simplify equations, inequalities, and expressions
 - Rational
 - Trigonometric
 - Polynomial
 - Quadratic
 - Linear
 - Logarithmic
 - Polar
 - Parametric
 - Conics
 - Vectors
3. Apply problem solving strategies in the above mentioned content areas.
4. Integrate technology to visualize and solve problems in the above-mentioned content areas.
5. Explore limits

Topics/Skills/Concepts (Pre-Calculus B):

Quarter 1:

- a) Write equations for lines (standard Cartesian, point-slope, slope-intercept).
- c) Solve and graph inequalities.
- e) Identify and define functions/mappings, including their domain/range, zeros, intercepts, asymptotes.
- g) Find compositions and inverses of functions.
- i) Linear/quadratic curve fitting.
- k) Root theory: rational roots, Descartes' rule of signs, remainder theorem.
- m) Define trig functions (circular functions) using the unit circle and right triangles.
- o) Solve right triangle using trig functions.
- q) Naming curves.
- b) Review linear and quadratic equations.
- d) Solve equations and inequalities involving absolute value.
- g) Consider special functions: greatest interger, even-odd, piecewise, rational, polynomial functions.
- h) Perform operations involving complex numbers, both algebraically and geometrically in a plane.
- j) Transformations.
- l) Linear/angular speed, arc length, radian measure.
- n) Find values of trig functions for special angles.
- q) Graph sine waves adjusting amplitude, period, and phase.
- r) Graphing calculators are used to to investigate/reinforce previously stated topics.

Quarter 2:

- s) Prove trig identities.
- u) Define, graph, and apply inverse trig functions.
- w) Derive and apply the law of cosines and the law of sines.
- y) Define and use real and rational exponents.
- aa) Define the logarithmic function $f(x) = \log_a x$ as the inverse of the exponential function
- cc) Define, discuss, and sketch logarithmic, exponential functions.
- t) Derive trig identities.
- v) Solve trig equations.
- x) Find the area of triangles and other polygons.
- z) Define and apply the exponential function $f(x) = a^x$
- bb) Prove and apply properties of logarithms.
- dd) Graphing calculators are used to investigate/reinforce previously stated topics.

Topics/Skills/Concepts (Pre-Calculus B continued):

TECHNOLOGY

1. Find the Roots of an equation.
2. Find intersection points.

<p>3. Be able to apply solutions found from a calculator to application problems.</p> <p>5. Minimum/maximum values of functions.</p> <p>6. Transformations.</p> <p>RESOURCES Graphing calculators Pre-calculus: Fifth edition, Michael Sullivan</p> <p>Quarter 3:</p> <p>a) Define, perform operations with, and apply vectors (including additions, subtraction, scalar multiples, unit vector and scalar and vector components of one vector on another in 2- and 3-dimensional space.</p> <p>c) Discuss and apply the dot and cross product of two vectors</p> <p>e) Parallel and perpendicular vectors.</p> <p>g) Derive and apply DeMoivre's Theorem.</p> <p>i) Discuss the focus-directrix property property of conic sections.</p> <p>k) Graph curves defined parametrically.</p>	<p>4. Curve fitting.</p> <p>6. Investigate domain/range.</p> <p>EVALUATIONS</p> <p>1. Weekly quizzes – 30%</p> <p>2. Chapter exams – 60%</p> <p>3. Daily work – approx. 10%</p> <p>4. Semester Exam (departmentalized) – 20/20/40</p> <p>b) Define and apply the dot and cross product of two vectors.</p> <p>d) Find the angle between two vectors.</p> <p>f) Polar coordinates, graphs, and equations (real and complex).</p> <p>h) Discuss conic sections (circles, ellipsis, parabolas, hyperbolas, and degenerated cases). Give algebraic, geometric, and locus definitions.</p> <p>j) Translate and rotate axes: identify the graph of any quadratic equation in two variables.</p> <p>l) Graph polar equation; consider polar equations for conic sections.</p>
<p>Topics/Skills/Concepts (Pre-Calculus B) continued:</p>	
<p>Quarter 4:</p> <p>a) Solve systems of equations (independent, dependent, consistent, inconsistent) by substitution.</p> <p>c) Solving determinants.</p>	<p>b) Matrix algebra.</p> <p>d) Partial fraction decomposition.</p>

<ul style="list-style-type: none"> e) Solve systems of inequalities. g) Sequences and series. i) Mathematical induction. k) Permutations/combinations/probability 	<ul style="list-style-type: none"> f) Linear programming h) Sigma notation j) Binomial theorem. l) Find the following distances: between two points, between a point and a line.
<p><u>TECHNOLOGY</u></p> <ul style="list-style-type: none"> 1. Be able to apply solutions found from a calculator to application problems. 3. Matrix algebra 	<ul style="list-style-type: none"> 2. Have the ability to graph polar and parametric equations using the calculator. 4. Vectors
<p><u>RESOURCES</u></p> <p>Graphing calculators Pre-calculus: Fifth edition, Michael Sullivan</p>	<p><u>EVALUATIONS</u></p> <ul style="list-style-type: none"> 5. Weekly quizzes – 30% 6. Chapter exams – 60% 7. Daily work – approx. 10% 8. Semester Exam (departmentalized) – 20/20/40

Pre-Calculus C

Prerequisite: Algebra II and Trigonometry

Course Description:

Pre-calculus C is a two-semester enrichment course with text and outline identical to Pre-calculus B; however, all topics are covered in greater depth. Pre-calculus C is recommended for students who plan to take AP Calculus at Valley.

Essential Learnings:

The student will learn to:

1. Identify and graph a variety of functions:
 - Rational
 - Trigonometric
 - Polynomial
 - Quadratic
 - Linear
 - Logarithmic
 - Polar
 - Parametric
2. Solve and simplify equations, inequalities, and expressions.
 - Rational
 - Trigonometric
 - Polynomial
 - Quadratic
 - Linear
 - Logarithmic
 - Polar
 - Parametric
 - Conics
 - vectors
3. Apply problem solving strategies in the above-mentioned content areas.
4. Integrate technology to visualize and solve problems in the above-mentioned content areas.
5. Explore limits and derivatives and their applications.

Topics/Skills/Concepts (Pre-Calculus C):

1. Understand:

- domain
 - range
 - intercepts
 - zeros
 - increasing
 - decreasing
 - constant intervals
 - graph transformations
2. Know trigonometry values and identities (without a calculator or other reference materials).
3. Use the graphing calculator to:
- solve polynomials
 - matrix & vector operations
 - graph functions
 - find intercepts
 - zeros
 - maximum/minimum values
 - points of equations
 - intersects
 - setting windows

AP Calculus AB

Prerequisite: Pre-calculus B or C

Course Description:

AP Calculus AB is a two-semester college-level calculus course. Topics include the algebra of functions, limits, continuity, the derivative and its applications, differentials, integration and integration techniques, and the definite integral (including volumes and areas). Technology will be used to explore functions graphically, use numerical data and model real-world applications. Students may elect to take this course for DMACC credit.

Essential Learnings:

1. Students will explore characteristics of functions through a visual and algebraic approach. Limits and derivatives will be used to assist in the analysis.
2. Students will explore the area under a curve using summation limits and integrals.
3. Students will see how derivatives and integrals will assist in relating the position, velocity, and acceleration functions. They will also be used to relate rates, optimize, and find volumes of solids.

Topics/Skills/Concepts:

1. Limits and their properties
 - Find limits graphically, numerically, and analytically.
 - Explore continuity and its relationship to limits.
 - Introduce infinite limits and their graphical representation.
2. Differentiation
 - Derive the definition of derivative through the basic slope concept.
 - Use the definition of derivative to find basic rules for differentiation.
 - Introduce Chain Rule and Implicit Differentiation.
 - Apply differentiation to rates of change, related rates, and optimization.
 - Explore visually the first and second derivative and its connection to the graph of a function.

Topics/Skills/Concepts (AP Calculus AB) -

3. Integration

- Find the area under a curve using Riemann sums.
- Work for Riemann sums to define integrals.
- Introduce logarithmic, exponential, and transcendental functions and their integrals.
- Apply integrals to find area under a curve, volumes at re----- shapes, and displacement

AP Calculus BC

Prerequisite: Pre-Calculus C

Course Description:

AP Calculus BC is a two-semester college-level course which includes all of the topics of AP Calculus AB, most in greater depth. Additional topics include vector functions and parametrically defined functions, polar coordinates, integral applications (arc length, work, area of a surface of revolution), sequences and series, and elementary differential equations. Technology will be used to explore functions graphically, use numerical data and model real-world applications. Students may elect to take this course for DMACC credit.

Essential Learnings:

1. Students will analyze functions by examining their graphs.
 - a. Limits of functions
 - Algebraic
 - Tables/graphs
 - b. Asymptotes, unbounded graphs
 - Extreme value Theorem
 - Intermediate Value Theorem
2. Students will calculate derivatives and apply the results as rates of change.
 - a. Increasing, decreasing functions and the derivative
 - b. Tangent line to a curve
 - c. Slope of a curve
 - d. Find extreme values of function
 - e. Implicit differentiation
 - f. Velocity, speed, and acceleration
3. Students will apply integration techniques to examine area under a curve.
 - a. Limit of partial sums
 - b. Apply integration to find area of region, volume of solid
 - c. Problems that model exponential growth
4. Students will apply advanced integration techniques
 - a. integration by parts
 - b. trigonometry substitution
 - c. partial fractions
 - d. improper integrals

Essential Learnings (AP Calculus BC) continued –

5. Students will understand infinite series
 - a. integration by parts
 - b. trig substitution
 - c. partial fractions
 - d. improper integrals

6. Students will know how to calculate conics, polar, and parametric equations
 - a) Polar graphs/equations
 - b) parametric graph/equations
 - c) area and arc length

Topics/Skills/Concepts:

1. Limits and their properties
 - Find limits graphically, numerically, and analytically.
 - Explore continuity and its relationship to limits.
 - Introduce infinite limits and their graphical representation.

2. Differentiation
 - Derive the definition of derivative through the basic slope concept.
 - Use the definition of derivative to find basic rules for differentiation.
 - Introduce Chain Rule and Implicit Differentiation.
 - Apply differentiation to rates of change, related rates, and optimization.
 - Explore visually the first and second derivative and its connection to the graph of a function.

3. Integration
 - Find the area under a curve using Riemann sums.
 - Work for Riemann sums to define integrals.
 - Introduce logarithmic, exponential, and transcendental functions and their integrals.
 - Apply integrals to find area under a curve, volumes at re----- shapes, and displacement

4. Series
 - Identify different types of series
 - apply various tests for convergence/divergence
 - represent functions by power series

Developmental Algebra

Developmental Algebra (Elective 10-11-12)

4=MTH111-MTH112

4=MTH113-MTH114

Prerequisite: Basic Math 9

Developmental Algebra is a two-year course designed to address the skills and concepts of a traditional one-year algebra course. The first year of Developmental Algebra includes pre-algebra and the skills and concepts of early first year algebra. The second year of the course completes the skills and concepts of first year algebra. Developmental Algebra has a focus on slower-paced, concrete development of algebra thinking through the use of hands-on manipulatives, practical application of algebra thinking to the students' lives, and using mathematics to solve problems. This course fulfills the algebra graduation requirement for West Des Moines Community Schools. This course does not meet NCAA clearinghouse requirements.

This course is under construction during the 06-07 and 07-08 school years.

Mathematics Topics 1

Course Description:

Mathematics Topics 1 is a one-semester course for students who have experienced difficulty in previous mathematics courses. It emphasizes upgrading and mastering basic skills and becoming familiar with concepts which involve these skills. Students who have successfully completed another high school math course should not register for this course.

Essential Learnings:

Students will learn daily mathematics skills that will enhance their ability to make wise financial decisions in areas, such as:

- Part-time jobs
- Full-time jobs
- Recreation and sports
- Basic purchases
- Checking and savings accounts
- Credit

Topics/Skills/Concepts:

1. Fractions, Decimals, and Percents
2. Mean, Median, Mode
3. Finding a job
 - Investigating want ads
 - Hourly wages and overtime pay
 - Time sheets and time cards
 - Computing pay
 - Tips
 - Salary
 - Commission
 - Social security
 - Payroll deductions and net pay
4. Insurance
 - Health insurance
 - Life Insurance
5. Banking
 - Writing checks
 - Balancing checkbooks
 - Overdraft checking charges
 - Savings accounts
 - Simple and compound interest

Topics/Skills/Concepts (Mathematics Topics 1) continued:

6. Credit
 - Using credit cards
 - Credit finance charge
 - Installment buying
 - Loans
 - Taking out a loan
7. Opening savings accounts
8. Sports and Leisure
 - Movies and shows
 - Hobbies
 - Restaurants
 - Parks and sports events
 - Sports equipment and fees
 - Health clubs and fitness clubs
9. Shopping
 - Video equipment
 - Clothes
 - Catalogs
 - Food
 - Sales Tax

Mathematics Topics 2

Course Description:

Mathematics Topics 2 is a one-semester course where the emphasis is on the study of mathematics involved in consumer decisions. Topics covered include earning money, check accounts, savings accounts, credit cards, income tax, buying a car, comparative shopping, reading and constructing graphs, and pre-algebra. A student may take a full year of Math Topics (1 and 2) or one semester (either 1 or 2).

Essential Learnings:

1. Students will apply daily math skills that will enhance their ability to make wise financial decisions in areas, such as:
 - Automobile expenses
 - Transportation
 - Taxes
 - Housing
 - Personal finance
 - Investments

Topics/Skills/Concepts:

<ol style="list-style-type: none"> 1. Automobiles <ul style="list-style-type: none"> • Buying a car • Auto loans • Operating expense • Insurance • Renting a car 2. Travel <ul style="list-style-type: none"> • Estimating distance and travel time • Using a map • Bus and train travel • Air travel • Using a subway • Taxi fares • Determining cost of a trip 3. Taxes <ul style="list-style-type: none"> • Reporting income • Federal income tax 	<ul style="list-style-type: none"> • Using Tax Form 1040 EZ • Itemized deductions • State and city income taxes <ol style="list-style-type: none"> 4. Housing Costs <ul style="list-style-type: none"> • Renting an apartment • Buying a house • Buying a condo • Getting a mortgage • Real estate taxes • Homeowners insurance • Utilities • Decorating and remodeling 5. Money <ul style="list-style-type: none"> • Purchasing power • Fixed and variable expenses • Budgets • Raising a family • Determining net worth
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Trigonometry

Prerequisite: Algebra II or current enrollment in Algebra II

Course Description:

A one-semester course covering trig functions, inverse trig functions, graphing, trig identities, applications, trig equations, and polar coordinates.

Essential Learnings:

1. The students will find solutions to problems involving triangles through the methods of trigonometry.
2. The students will understand and interpret the graphs of trigonometric functions.
3. The students will use the laws of sine and cosine to solve triangles, find the components of vectors, and apply this knowledge to solving problems.

Topics/Skills/Concepts (Trigonometry):

<ol style="list-style-type: none">1. The Six Trig Functions<ul style="list-style-type: none">• Angles and the Pythagorean Theorem• 3-60-90 and 45-45-90 triangles• Graphing lines, parabolas, and circles• Distance formula• Sohcahtoa and y/r, x/r, y/x• Reciprocal, ratio, and Pythagorean identities2. Right Triangle Trig<ul style="list-style-type: none">• Solve triangles• Degrees, minutes, and seconds• Using the calculator to find trig values and angles• Applications to story problems• Introduction to Vectors-Geometric3. Radian Measures<ul style="list-style-type: none">• Reference angles• Converting to degrees• Exact values• Finding arcs on a circle• Finding area of a sector• Odd and even functions• Angular and linear velocities4. Graphing and Inverses<ul style="list-style-type: none">• Graphs of all six trig functions• Amplitude and period• Sliding graphs left, right, up, and down• Finding equations from graphs• Graphing inverse trig functions	<ol style="list-style-type: none">5. Identities<ul style="list-style-type: none">• Proof• Sum and difference formulas• Double-angle formulas• Half-angle formulas6. Solving trig equations<ul style="list-style-type: none">• Law of Sines• Ambiguous case• Law of Cosines• Area of triangles• Vectors – Algebraic7. Logarithms<ul style="list-style-type: none">• Converting to Exponents• Properties• Solving Equations
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Statistics

Prerequisite: Algebra II or Algebra II and Trigonometry

Course Description:

Statistics is a one-semester course with topics including data collection, graphical representation of data, percentiles, measures of central tendency, measures of dispersion, standard scores and hypotheses testing.

Essential Learnings:

1. The students will be able to give concise descriptions of masses of numerical data.
2. The students will gain an understanding of basic probability theory.
3. The students should be able to understand and use basic descriptive statistics to test hypotheses and measure the confidence with which conclusions may be drawn by sampling.

Topics/Skills/Concepts (Statistics):

<ol style="list-style-type: none">1. Introduction<ul style="list-style-type: none">• Parameter/statistic, quantitative/qualitative, continuous/discrete• Nominal/ordinal/interval/ratio• Uses and abuses of statistics• Observational/experimental, simple random sample• Systematic/convenience/stratified/cluster2. Describing, Exploring, and Comparing Data<ul style="list-style-type: none">• Frequency/relative frequency/cumulative frequency tables• Lower/upper class limits, class boundaries, class widths, class midpoints• Frequency/relative frequency histograms, frequency polygon, ogive, stem-and-leaf plot, pie chart, scatter plot• Mean, median, mode, midrange, weighted mean, positively/negatively skewed• Range, standard deviation of sample/population, variance• Quartiles, deciles, percentiles, IQR, z-scores• Box plots, outliers3. Probability<ul style="list-style-type: none">• Probability, odds, complement• Addition rule, mutually exclusive• Multiplication rule, independent events• Conditional probability, 'at least one'• Factorial, permutations, combinations	<ol style="list-style-type: none">4. Probability Distribution<ul style="list-style-type: none">• Expected value, mean and standard deviation from probability distributions, discrete/continuous• Binomial distribution• Mean and standard deviation from binomial distributions• Poisson distributions5. Normal Probability Distribution<ul style="list-style-type: none">• Density curve, standard normal distribution• Finding probability• Finding values• Central Limit Theorem, standard error, finite population correction factor• Continuity correction6. Estimates and Sample Size<ul style="list-style-type: none">• Margin of error, confidence interval• Student t-distribution, degrees of freedom• Finding sample size• Population proportions• Chi-square, confidence interval for standard deviation7. Hypothesis Testing<ul style="list-style-type: none">• Null/alternative hypotheses, critical region, significance level, retain/reject,• Type 1/type II error, two-/right-/left-tailed• Testing with z, p-value• Testing with t• Testing with a proportion• Chi-square testing
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Topics/Skills/Concepts (Statistics – Cont'd.)

<p>8. Inferences from 2 Samples</p> <ul style="list-style-type: none">• Two means--large and independent• Two means, matched pairs• Two proportions• Two sample variations• Two means, small and independent <p>9. Correlation and Regression</p> <ul style="list-style-type: none">• Correlation, scatter plot, r-value, r^2-value• Regression equation, prediction• Multinomial experiment• Observed/expected, goodness of fit• Two-way table <p>10. ANOVA</p> <ul style="list-style-type: none">• One-way• Two-way <p>11. Nonparametric</p> <ul style="list-style-type: none">• Sign test• Wilcoxon• Mann-Whitney• Kruskal-Wallis	
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