

Independent School District of Boise City

Mathematics - Math in the Workplace 2

District Course #0842

Course Description

Open to: 11, 12 One Year Course

Prerequisite: Mathematics in the Workplace 1, Instructor/Counselor Approval

Content: Students will continue focusing on arithmetic operations, problem solving techniques, estimation of answers, measurement skills, geometry, data handling, simple statistics, and the use of algebraic formulas to solve problems. Relatively complex mathematics concepts will be studied from an applications approach with reference to technological skills necessary for skilled occupations and advanced learning.

Adopted Materials

Title: AGS Publishing Algebra

Author: Siegfried Haenisch.

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Course Scope for Semester 1

Unit 1 Integers and Rule of arithmetic. Chapters 1 and 2

Unit 2 Solving equations, inequalities, and problem solving. Chapters 3 and 4

Unit 3 Exponents and polynomials. Chapters 5 and 6.

Unit 4 Probability and Statistics. Chapter 7

Course Scope for Semester 2

Unit 5 Fractions and algebra. Chapter 8

Unit 6 Linear equations and inequalities. Systems of Equations. Chapters 9 and 10

Unit 7 Irrational numbers and radical expressions. Chapters 11.

Unit 8 Introduction to geometry. Chapter 12

Unit 9 Introduction to quadratic equations. Chapter 13

Math in the Workplace 2		District Reference 0842
Unit 1	Integers and Rule of Arithmetic	Time Frame: Semester 1

Instructional Objective 0842.01 Understand and use positive and negative numbers, fractions, decimals, percentages, and scientific notation.		Standard Reference AI.1.1.1a	
No.	Performance Objective	Resource Reference	Assessment

			Correlation
01	Find the sum/difference/product/quotient of integers	Ch. 1, section 1-7	TMA, EOC
Instructional Objective 0842.02 Use the order of operations.		Standard Reference AI.1.3.1a	
No.	Performance Objective	Resource Reference	Assessment Correlation
01	Use the order of operations to simplify or solve number sentences.	Ch. 2 section 11	TMA, EOC
Instructional Objective 0842.03 Evaluate algebraic expressions and solve algebraic equations		Standard Reference AI.1.3.1a,b,c,d,f,g, AI.1.3.3a,b,c,	
No.	Performance Objective	Resource Reference	Assessment Correlation
01	Recognize and combine like algebraic terms	Ch. 1 section 8	TMA, EOC
Instructional Objective 0842.04 Solve algebraic equations.		Standard Reference AI.3.2.2	
No.	Performance Objective	Resource Reference	Assessment Correlation
01	Use properties of addition and multiplication to simplify algebraic expressions.	Ch. 2	TMA, EOC

Math in the Workplace 2		District Reference 0842
Unit 2	Solving Equations, Inequalities and Functions	Time Frame: semester1

Instructional Objective 0842.05 Solve linear equations.		Standard Reference AI.3.2.2	
No.	Performance Objective	Resource Reference	Assessment Correlation
01	Find the sum/difference/product/quotient of integers	Ch. 1, section 1-7	TMA, EOC
02	Understand and use properties of equality to solve equations.	Ch. 3	TMA, EOC
03	Solve problems involving perimeter or area of triangles and rectangles.	Ch. 3 section 8	TMA, EOC
Instructional Objective 0842.06 Know and apply the Pythagorean Theorem to solve real world problems.		Standard Reference AI.3.2.2	
No.	Performance Objective	Resource Reference	Assessment Correlation
01	Use Pythagorean theorem to find sides of a right triangle	Ch. 3, sections 9	TMA, EOC

Math in the Workplace 2		District Reference 0842
Unit 3	Exponents and Polynomials	Time Frame: Semester 1

Instructional Objective 0842.07 Understand properties of roots, and exponents.		Standard Reference AI.1.2.1a, AI.1.1.2a, AI.1.31.b,c,d	
No.	Performance Objective	Resource Reference	Assessment Correlation
01	Simplify expressions using exponent rules	Ch. 5 sections 1, 2	TMA, EOC
02	Students will convert numbers from scientific notation to the standard form and vice versa.	Ch. 5, section 3	TMA, EOC

Math in the Workplace 2		District Reference 0842
Unit 4	Data and statistics.	Time Frame: Semester 1

Instructional Objective 0842.08 Understand basic statistical concepts including mean, median, mode, and range.		Standard Reference AI.5.2.1a,b,c	
No.	Performance Objective	Resource Reference	Assessment Correlation
01	Compute mean, median, mode, and range from a set of data	Ch. 7 section 2	TMA, EOC
Instructional Objective 0842.09 Collect and organize data, and display the data in tables, charts, and graphs (scatter diagrams, frequency tables, bar graphs, or pie charts).		Standard Reference AI.5.2.1, AI.5.2.2a,b,c	
No.	Performance Objective	Resource Reference	Assessment Correlation
01	Generate the appropriate frequency table, stem and leaf plot, or scatter plot, for a set a data.	Ch. 7 sections 1, 2, 3	TMA, EOC

Math in the Workplace 2		District Reference 0842
Unit 5	Fractions and algebra	Time Frame: Semester 2

Instructional Objective 0842.10 Use appropriate procedures to simplify and solve polynomial equations involving rational expressions.		Standard Reference AI.1.3.3	
No.	Performance Objective	Resource Reference	Assessment Correlation

01	Find excluded values in rational algebraic expressions.	Ch. 8, sections 9	TMA, EOC
02	Simplify rational expressions by factoring	Ch. 9, section 2	TMA, EOC
03	Add, subtract, multiply, and divide rational expressions.	Ch. 8, sections 2-6	TMA, EOC
04	Solve rational equations and proportions.	Ch. 8, sections 7, 8	TMA, EOC

Math in the Workplace 2		District Reference 0842
Unit 6	Two-variable Equations, Functions and Probability	Time Frame: Semester 2

Instructional Objective		Standard Reference	
0842.11 Understands concepts of the Cartesian Coordinate System.		AI.3.1.1c,d,e,f,g, AI.3.2.1, AI.5.2.2,AI.3.1.2a, AI.3.4.1a	
No.	Performance Objective	Resource Reference	Assessment Correlation
01	Graph ordered pairs onto a coordinate plane	Ch. 9 section 1	TMA, EOC
02	Graph linear equation by finding a table of ordered pairs	Ch. 9 section 2	TMA, EOC
03	Identify positive and negative correlations.	Ch. 9 section 4	TMA, EOC
04	Tell whether a group of ordered pairs is a function by using the definition or the vertical line test.	Ch. 9 section 6	TMA, EOC
05	Evaluate functions written in function notation.	Ch. 9	TMA, EOC
06	Graph linear equations with two variables	Ch. 9	TMA, EOC
07	Determine the slope of a line given the coordinates of two points on the line.	Ch. 9 section 4	TMA, EOC
08	Distinguish between zero and undefined slope.	Ch. 9 section 4	TMA, EOC
09	Know the relationships of the slopes of parallel and perpendicular lines.	Ch. 10 sections 1, 2	TMA, EOC
10	Use x- and y-intercepts to graph a linear equation.	Ch. 9 section 3	TMA, EOC
11	Write linear equations in slope-intercept or standard form.	Ch. 9 sections 5	TMA, EOC
12	Write an equation of a line given a point and the slope or given two points.	Ch. 9 section 5	TMA, EOC
Instructional Objective		Standard Reference	
0842.12 Understand and use appropriate procedures to solve simple linear systems of equations and inequalities.		AI.3.2.1a,b	
No.	Performance Objective	Resource Reference	Assessment Correlation
01	Solve a system of equations by graphing.	Ch. 10 section 6	TMA, EOC
02	Solve a system of equations by substitution.	Ch. 10 section 4	TMA, EOC
03	Solve a system of equations by elimination.	Ch. 10 sections 5	TMA, EOC

Math in the Workplace 2		District Reference 0842
Unit 7	Irrational, Radicals and rational expressions	Time Frame: Semester 2

Instructional Objective		Standard Reference	
0842.13 Understand properties of roots and exponents		AI.1.1.1b,c,d,e, AI.1.1.2a, AI.1.2.1a, AI.3.2.2	
No.	Performance Objective	Resource Reference	Assessment Correlation
01	Simplify radicals	Ch. 11, section 3-6	TMA, EOC
02	Add, subtract, multiply, and divide radicals	Ch. 11, sections 4, 5, 6	TMA, EOC
03	Solve a radical equation	Ch. 11, section 7	TMA, EOC
Instructional Objective		Standard Reference	
0842.14 Understand experimental and theoretical probability		AI.5.2.1,AI.5.2.2	
No.	Performance Objective	Resource Reference	Assessment Correlation
01	Students will use counting techniques (permutations and combinations) to determine outcomes	Ch. 7 sections 7, 8	TMA, EOC
02	Determine probability of an event.	Ch. 7 sections 4, 5	TMA, EOC
03	Determine the probability of two independent events.	Ch. 7 section 7	TMA, EOC
04	Determine the probability of two dependent events.	Ch. 7 section 7	TMA, EOC

Math in the Workplace 2		District Reference 0842
Unit 8	Introduction to Geometry	Time Frame: Semester 2

Instructional Objective		Standard Reference	
0842.15 Apply concepts of size, shape, and spatial relationships		AI.2.1.1a, AI.3.3.1	
No.	Performance Objective	Resource Reference	Assessment Correlation
01	Recognize and apply congruency and similarity of two-dimensional figures	Ch. 12	TMA, EOC

Math in the Workplace 2		District Reference 0842
Unit 9	Introduction to Quadratic Equations	Time Frame: Semester 2

Instructional Objective		Standard Reference	
0842.16 Apply concepts of size, shape, and spatial relationships		AI.2.1.1a, AI.3.3.1	
No.	Performance Objective	Resource Reference	Assessment Correlation
01	Graph quadratic equations using a table of values and identify zeros.	Ch. 13, sections 5	TMA, EOC
Instructional Objective		Standard Reference	
0842.17 Use appropriate procedures to simplify and solve polynomial equations such as $y = x^2 + 3x - 7$		AI.3.1.2b,c,d,	
No.	Performance Objective	Resource Reference	Assessment Correlation
01	Solve a quadratic equation by using the quadratic formula	Ch. 13, section 4	TMA, EOC
02	Solve quadratic equation by taking the square root of both sides of the equal sign	Ch. 2, section 9	TMA, EOC
03	Simplify polynomials using addition, subtraction, and multiplication	Ch.5, sections 6-11	TMA, EOC
04	Factor polynomials	Ch. 6, sections 1-6	TMA, EOC
05	Use zero product property to solve equations by factoring	Ch. 6, sections 7, 8	TMA, EOC

**IDAHO CONTENT STANDARDS
ALGEBRA I
MATHEMATICS**

Students are expected to know content and apply skills from the K-8 standards.

Mathematical reasoning and problem solving processes will be incorporated throughout all mathematics standards. When solving problems, students should think ahead about a strategy, form conjectures, test ideas with special cases, try different approaches, check for errors and reasonableness of solutions as a regular part of routine work, and devise independent ways to verify results. Students will demonstrate knowledge and communicate mathematical thinking through words, numbers, symbols, charts, graphs, tables, diagrams, and models.

Maintenance Concepts should have been taught previously and are important foundational concepts that will be applied in this course. Continued facility with and understanding of the Maintenance Concepts is essential for success in the objectives for this course.

Objectives provide the focus for this course. They will be taught using a variety of methods and applications so that students attain a deep understanding of these concepts and are able to apply them to solve contextual situations.

Skill Statements are provided when appropriate for clarity and direction to achieve each objective. Students need to demonstrate proficiency in these skills upon completion of this course.

The appropriate use of technological tools is encouraged to assist students in the formation and testing of conjectures, creating graphs and data displays, and determining and assessing lines of best fit for data.

Standard 1: Number and Operation

Maintenance Concepts for Standard 1

- Compare, order, describe, and classify rational numbers to include integers, fractions, decimals, and absolute values.
- Add, subtract, multiply, and divide rational numbers.
- Read, write, and represent rational numbers.
- Convert between standard and scientific notation.
- Evaluate numerical expressions with whole number exponents.
- Apply number theory concepts to include primes, composites, prime factorizations, least common multiples, and greatest common factors.
- Evaluate numerical expressions using order of operations.
- Estimate to predict computation results.
- Understand the meanings and effects of operations with fractions, decimals, and integers.

Goal 1.1: Understand numbers, ways of representing numbers, relationships among numbers, and number systems.

Objective(s): By the end of Algebra I, the student will be able to:

- AI.1.1.1 Demonstrate meanings for real numbers, absolute value, integer exponents, and square roots.

Skill Statements:

- a. Classify real numbers as rational or irrational.
- b. Distinguish between exact and approximate values of irrational numbers.
- c. Locate the position of a number on the number line and know its distance from the origin is its absolute value.
- d. Approximate the location of an irrational number on a number line.
- e. Demonstrate the meanings of terms with exponents which are integers.

- AI.1.1.2 Demonstrate how the properties of real numbers apply to rational numbers.

Skill Statement:

- a. Demonstrate that squaring and taking the square root are inverse operations.

Goal 1.2: Understand meanings of operations and how they relate to one another.

Objective(s): By the end of Algebra I, the student will be able to:

- AI.1.2.1 Judge the effects of multiplication, division, addition, subtraction, exponents, and square roots on the magnitudes of quantities.

Skill Statement:

- a. Estimate square roots between consecutive integers.

Goal 1.3: Compute fluently and make reasonable estimates.

Objective(s): By the end of Algebra I, the student will be able to:

- AI.1.3.1 Perform computations with exponents, radicals, and scientific notation.

Skill Statements:

- a. Use order of operations and the properties of real numbers (substitution, commutative, associative, distributive, inverse, identity, multiplicative property of zero) to simplify expressions including polynomials, rational expressions, and expressions containing radicals and absolute values.
- b. Simplify square roots containing radicands which are not perfect squares.
- c. Add, subtract, and multiply square roots.
- d. Multiply and divide numbers in scientific notation.

- AI.1.3.2 Apply number sense to contextual situations and judge reasonableness of solutions.

Skill Statements:

- a. Use appropriate methods to estimate answers and know if they are reasonable.
- b. Select a suitable method of computing from mental mathematics, paper and pencil, calculators, or computers.

AI.1.3.3 Use the properties of real numbers to simplify expressions.

Skill Statements:

- a. Use the properties of exponents to add, subtract, and multiply polynomials, and to divide a polynomial by a monomial.
- b. Factor polynomials using greatest common factor.
- c. Factor quadratic expressions where the leading coefficient is 1 or -1.

Suggested Vocabulary and Symbols

absolute value, base, power, exponent, radical, radicand, rationalize, distributive property, evaluate, irrational number, perfect squares and cubes, principal square root, properties of the real number system, rational number, real number system, square root, squaring, monomial, binomial, trinomial, polynomial, coefficient, leading coefficient, like terms, factor (noun and verb), FOIL, simplest form, term, constant, degree of polynomial, degree of a term

Standard 2: Concepts and Principles of Measurement

Maintenance Concepts for Standard 2

- Understand both metric and customary systems of measurement.
- Understand relationships among units and convert from one unit to another within the same system.
- Understand, select, and use units of appropriate size and type to measure angles, perimeter, area, surface area, and volume.
- Use appropriate methods and units to estimate measurements.
- Select and apply techniques and tools to accurately find length, area, volume, and angle measures to appropriate levels of precision.
- Select and use formulas to determine the circumference and area of circles.
- Select and use formulas to determine the perimeters and areas of triangles and quadrilaterals.
- Develop strategies to determine the areas of irregular shapes.
- Solve problems involving scale factors, rates, ratios, and proportions.

Goal 2.1: Understand measurable attributes of objects and the units, systems, and processes of measurement.

Objective(s): By the end of Algebra I, the student will be able to:

AI.2.1.1 Make decisions about units and scales that are appropriate for a given problem.

Skill Statement:

- a. Appropriately scale a graph for a given situation.

Goal 2.2: Apply appropriate techniques, tools, and formulas to determine measurements.

Objective(s): By the end of Algebra I, the student will be able to:

AI.2.2.1 Convert rates using dimensional analysis.

Skill Statement:

- a. Use dimensional analysis to convert rates within the U.S. customary system and within the metric system.

Suggested Vocabulary and Symbols

dimensional analysis, unit rate, scaling, intervals

Standard 3: Concepts and Language of Algebra and Functions

Maintenance Concepts for Standard 3

- Represent, analyze, and generalize a variety of patterns with tables, graphs, words, and, when possible, symbolic rules.
- Relate and compare different forms of representation for a relationship.
- Demonstrate an initial conceptual understanding of different uses of variables.
- Determine solutions for one- and two-step linear equations.
- Recognize and generate equivalent forms for simple algebraic expressions.
- Model and solve contextualized problems using various representations such as graphs, tables, and equations.
- Identify attributes of the Cartesian coordinate system, such as quadrants, origin, and axes.

Goal 3.1: Understand patterns, relations, and functions.

Objective(s): By the end of Algebra I, the student will be able to:

AI.3.1.1 Represent linear patterns and functional relationships in a table and as a graph.

Skill Statements:

- a. Determine whether a relation is a function given graphs, charts, ordered pairs, mappings, or equations.
- b. Define and interpret relations and functions numerically, graphically, and algebraically.
- c. Use patterns of change in function tables to develop the concept of rate of change.
- d. Identify domain and range for given graphs, charts, ordered pairs, and mappings.
- e. Graph linear equations and inequalities on a coordinate plane when given a contextual situation, a table of values, two or more colinear points, the slope and intercept of the line, or an equation.
- f. Create a table of values given a contextual situation or a linear equation.
- g. Graph one-variable inequalities, compound inequalities, and absolute value equations and inequalities on a number line.

AI.3.1.2 Describe the graphs of linear and quadratic functions and discuss their appearances in terms of the basic concepts of intercepts and rate of change.

Skill Statements:

- a. Given the graph of a line, appropriate context, two or more collinear points, or an equation, determine the slope, x-intercept, and y-intercept of a line.
- b. Identify a quadratic function by its degree.
- c. Identify the graphs of quadratic functions as parabolas that open up or down depending upon the leading coefficients in the equations.
- d. Relate the solutions of quadratic functions to the points where the graphs of the functions cross the x-axes.

Goal 3.2: Represent and analyze mathematical situations and structures using algebraic symbols.

Objective(s): By the end of Algebra I, the student will be able to:

AI.3.2.1 Represent linear patterns and relationships with an equation.

Skill Statements:

- a. Evaluate functions written in function notation.
- b. Write linear equations and inequalities in various forms given the graph of a line, a contextual situation, two or more collinear points, a point and the slope of a line, or a set of data.

AI.3.2.2 Recognize and generate equivalent forms of algebraic expressions and solve equations, inequalities, and systems of equations.

Skill Statements:

- a. Model contextual situations by writing systems of linear equations containing no more than two variables.
- b. Solve an equation involving several variables for one variable in terms of the others.
- c. Solve multi-step linear equations and inequalities.
- d. Solve one-variable compound inequalities.
- e. Solve one-variable absolute value equations and inequalities.
- f. Solve linear systems of equations and inequalities involving two variables using multiple strategies.
- g. Solve quadratic equations by factoring.

Goal 3.3: Use mathematical models to represent and understand quantitative relationships.

Objective(s): By the end of Algebra I, the student will be able to:

AI.3.3.1 Develop proportional relationships to solve problems.

Skill Statements:

- a. Solve problems using proportions.
- b. Solve percent application problems.

Goal 3.4: Analyze change in various contexts.

Objective(s): By the end of Algebra I, the student will be able to:

AI.3.4.1 Interpret changes to the parent function $y = x$.

Skill Statement:

- a. Compare and contrast the graphs of $x = k$, $y = k$, $y = kx$ and $y = kx + b$ where k and b are rational numbers.

Suggested Vocabulary and Symbols

compound inequality, direct variation, inverse variation, domain, range, function, equation, function notation ($f(x)$), half-plane, inequality, intersecting lines, linear, parabola, roots, zeros, parallel, perpendicular, percent of increase and decrease, point-slope form, proportion, quadratic equation in standard form, rate of change, relation, slope, slope-intercept form, solution, standard form, system of linear equations, x-intercept, y-intercept, zero product property, addition and multiplication properties of equality

Standard 4: Concepts and Principles of Geometry

No objectives at this course level.

Standard 5: Data Analysis, Probability, and Statistics

Rather than looking at statistics and algebra as separate entities, these concepts will be interwoven throughout the course. The study of graphs and functions will be conducted in conjunction with real data sets to further develop the natural link between statistics and algebra.

Maintenance Concepts for Standard 5

- Analyze and interpret tables, charts, and graphs including frequency tables, scatter plots, broken line graphs, line plots, bar graphs, histograms, circle graphs, and stem-and-leaf plots.
- Explain and justify conclusions drawn from tables, charts, and graphs.
- Collect, organize, and display data with appropriate notation in tables, charts, and graphs, including scatter plots, broken line graphs, line plots, bar graphs, histograms, and stem-and-leaf plots.
- Choose and calculate the appropriate measure of central tendency—mean, median, and mode.

- Explain the significance of distribution of data, including range, frequency, gaps, and clusters.
- Model situations of probability using simulations.
- Recognize equally likely outcomes.
- Explain that probability ranges from 0% to 100% and identify a situation as having high or low probability.
- Make predictions based on experimental and theoretical probabilities.
- Conduct statistical experiments and interpret results using tables, charts, or graphs.
- Use proportionality and the basic understanding of probability to make and test conjectures about the results of experiments and simulations.

Goal 5.1: Collect, organize, and display data using a variety of formats.

No objectives at this course level.

Goal 5.2: Select and use appropriate statistical methods to analyze data.

Objective(s): By the end of Algebra I, the student will be able to:

AI.5.2.1 Make predictions and draw conclusions based on measures of central tendency.

Skill Statements:

- Find missing data when given an expected mean.
- Predict how changes in data (such as inclusion/exclusion of additional data or outliers) will affect measures of central tendency.
- Identify and explain misleading uses of data.

AI.5.2.2 Make predictions using linear relations, scatter plots, trend lines, charts, and tables.

Skill Statements:

- Graph scatter plots, sketch lines of best fit, and identify positive and negative correlations.
- Predict how changes in data will affect line of best fit.
- Write the equation of a line of best fit.

Goal 5.3: Develop and evaluate inferences and predictions that are based on data.

No objectives at this course level.

Goal 5.4: Understand basic concepts of probability.

No objectives at this course level.

Suggested Vocabulary and Symbols

line of best fit, positive and negative correlation, data, central tendency, frequency, gap, cluster, probability