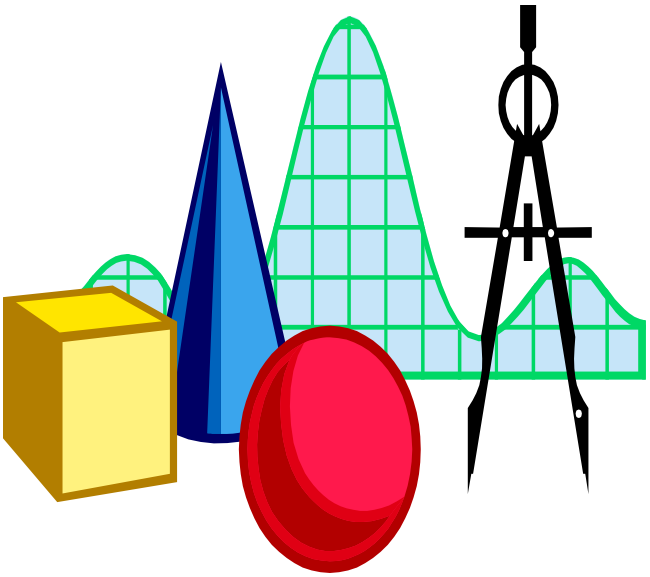
AFNORTH INTERNATIONAL SCHOOL

ALGEBRA I

Course Syllabus



Course Title: **ALGEBRA 1**

Course Code: **MAA301**

Grade Level: **9-12**

DoDEA Curriculum Guide Course Description:

"Algebra is a prerequisite for virtually all mathematics beyond middle school, and thus is a gatekeeper for studying mathematics beyond the basics. The type of quantitative reasoning inherent to the study of algebra is necessary not only for members of today's and tomorrow's technical workforce, but also for well-informed and responsible citizens in our democracy. The two primary goals for studying algebra are (1) preparation for further study – of mathematics and other subjects such as science, statistics, and economics – and (2) preparation for the life and work required in a world of global information."

- 2005-2006 Algebra 1 Curriculum Guide

Big Ideas in Algebra 1

Students will learn how to and practice…

Proportional Problem Solving

including Dimensional Analysis

- CG Unit 3 Proportional Reasoning

Solving and Transforming Equations and Systems of Equations

including with variable and values applying the order of operations, distributive property, etc.

- CG Unit 7 Evaluating Expressions
- CG Unit 8 Solving Equations and Inequalities
- CG Unit 9 Systems of Equations and Inequalities
- Building in complexity through later units…

Exponential Growth and Decay Formula Applications

- CG Unit 11 Exponential Functions

Identifying Families of Functions

- linear, absolute value, inverse, and quadratic - the Graphs, and the Universal Form of these Equations

- CG Unit 4 Linear and Non-Linear Models
- CG Unit 5 Representing Linear Models
- CG Unit 6 Graphing Linear Models
- CG Unit 10 Functions and Their Graphs
- CG Unit 12 Families of Functions

Multiple-Step Sequences in Problem Solving

including but not restricted to such applications as substitution, Gaussian elimination, completing the square and the quadratic formula

- Building in complexity as the year goes on through all units…

CG = DoDEA Algebra 1 Curriculum Guide

Note:

CG Unit 1 Patterns and Variable and Unit 2 Data Representations are primarily review units.

DoDEA Course Description

Source:
http://www.dodea.edu/instruction/curriculum/tech/coursedescriptions07-08/MAA301.htm

Major Concepts/Content: This course may be the most common entry level course for students who have had a rich and varied middle level mathematics program. It expands upon basic algebraic concepts previously acquired and integrates those principles with everyday life. The processes of problem solving, reasoning, communication and making connections are emphasized. Students will use formulas, functions, and equations to describe and clarify relationships, and will use geometry to represent algebraic relationships. Students will learn how to write and translate expressions into mathematical forms, solve first and second degree equations, and use the concept of a function to model real-world phenomena.

Major Instructional Activities: Instructional activities will include tasks as well as problem solving situations which will require students to experiment, collect data, search for patterns, make conjectures, and verify discoveries. Activities will be structured to allow students to work in cooperative learning techniques and appropriate technology should be utilized throughout the course. Students should have access to calculators at all times.

Major Evaluative Techniques: Many evaluative processes will be used to assess students' written and oral work. These include multiple-choice, short answer, discussions, or open-ended interview; homework ; projects ; journals essays; dramatizations; and class presentation. Testing formats will include restricted-time written tests, two staged tests, take home tests, oral tests and student-produced tests. Assessment methods can be supplemented by student produced analysis of problem situations, solutions to problems, reports on investigations, and journal entries. Students will be provided the opportunity to do chapter projects that capture the concepts and skills presented throughout the chapter unit that emphasizes real world situations.

Essential Expectations: Upon successful completion of Algebra I, the student should be able to:

- Understand and use operations such as opposite, reciprocal, raising to a power, and taking a root
- Compare numbers using order relations, differences, ratios, proportions, percents, proportional change
- Use concepts such as prime, relatively prime, factor, divisor, multiple, and divisibility in solving problems involving integers
- Represent graphs of functions in standard coordinate systems
- Model given situations with formulas and functions, and interprets given formulas and functions in terms of situations
- Describe, generalize, and use linear and exponential functions and explores other function: power, rational, square and square root
- Define, use and manipulate expressions involving variables, parameters, constants, and unknowns in work with formulas, functions, equations, and inequalities
- Represent functional relationships in formulas, tables, and graphs, and translates between pairs of these
- Solve equations symbolically, graphically, and numerically, especially linear, quadratic, and exponential equations; and knows how to use the quadratic formula for solving quadratic equations
- Solve systems of linear equations symbolically, graphically, and numerically and applies them in real world situations
- Use equations to represent lines and parabolas.
- Organize, analyzes, and displays two-variable data using scatter plots, estimated regression lines, and computer-generated regression lines and correlation coefficients
- Interpret representations of data, compares distribution of data, and critiques conclusions and uses of statistics, both in school materials and public documents
- Use technology to create graphs or spreadsheets that contribute to the understanding of a problem.

Last Revised: July 18, 2005

Algebra 1 Readiness:

Before entering Algebra 1, students are expected to be proficient in all of the Pre-Algebra (8th grade math) plus the following but not restricted to:

	Without a Calculator	Without a Calculator	Without a Calculator	Without a Calculator
Integers	add	subtract	multiply	divide
Decimals	add	subtract	multiply	divide
Fractions	add	subtract	multiply	divide

Before entering Algebra 1, students are expected to have mastered or be well on their way to mastering all of the following but not restricted to:

Multiplication table memorized through 12x12 perfectly without hesitation and through 20x20 nearly so.
Conversions: fraction to decimal to percent and percent to decimal to fraction
Repeating decimals to fractions
"What is X percent of Y?" type of problems.
Setting up and solving proportions.
Graphing points on a Cartesian coordinate system (two dimensions only).
Determining the coordinate pair values of a point on a Cartesian coordinate system (two dimensions only).
Proper labeling and scaling of graphs.
Reading, interpreting, and making of dot plots, scatter graphs, histograms, bar graphs, and circle graphs.
Area and perimeter problems involving rectangles and triangles and circles (including Pi).
Measurement (length, volume, mass/weight) in both the English and Metric systems including the units and conversions.
The use of protractor and ruler.
Time – Rate – Distance problems.
Interpreting word problems.
Order of operations, the distributive property, laws of exponents, and simplifying radical expressions (square root).
Setting up and solving equations with one variable.
Prime and composite numbers, prime factorization, factors and multiples.
Proper scientific calculator usage (input).
Writing numbers from standard form into scientific notation and vice versa and performing scientific notation computations with and without a calculator.
Solving right triangle length-of-side problems using the Pythagorean theorem.
The basics of spreadsheet programs like EXCEL.

Process and Content Mathematics Standards:

DoDEA Grades 9-12 Process and Content Mathematics Standards as applicable to Algebra 1 by unit of instruction based upon the 2005-2006 Algebra 1 Curriculum Guide:

Unit	M1	M2	M3	M5	M6	M7	M8	M9	M10
Fall Semester	Numbers and Operations	Algebra	Geometry	Data Analysis and Probability	Problem Solving	Reasoning and Proof	Communi-cation	Connec-tions	Represen-tation
1st Quarter									
1		×			×		×		×
2		×		×	×		×		×
3		×			×		×		×
2nd Quarter									
4		×			×	×	×	×	×
5		×			×		×		×
6		×			×	×	×	×	×
Spring Semester									

Unit	M1	M2	M3	M5	M6	M7	M8	M9	M10
Spring Semester	Numbers and Operations	Algebra	Geometry	Data Analysis and Probability	Problem Solving	Reasoning and Proof	Communi-cation	Connec-tions	Represen-tation
3rd Quarter									
7		×			×	×	×	×	×
8		×			×	×	×	×	×
9	×	×			×	×	×	×	×
4th Quarter									
10		×			×	×	×	×	×
11		×			×	×	×	×	×
12		×	×		×	×	×	×	×

Online resources:

Syllabus

http://www.afno-is.eu.dodea.edu/highsch/Course_Syllabi_06-07/ALGEBRA_I.htm

Assignments

http://www.webspawner.com/users/DDDoherty/index.html

Scores and Grade

http://www.mygradebook.com/

Classword: DesCartes0809

Password: _____

Textbook

http://keypress7.keymath.com/DA/online/

ClassPass: DesCartes08

Step-By-Step Tutorials and Homework Help

All odd numbered problems are worked out tutorial-style at

http://www.hotmath.com/

with member login: **usa101**

Be sure to select the first edition textbook: Discovering Algebra, 1/e

Other useful web-sites:

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Scope And Sequence:

Fall Semester			
1st Quarter	Algebraic Thinking	UNIT UNDERSTANDING	*Discovering Algebra* *An Investigative Approach*
PV	Unit 1 Patterns & Variables	"Students recognize similarities and generalize patterns; use patterns to create models and make predictions; describe the nature of patterns and relationships; and construct representations of mathematical relationships." - 2005-2006 Algebra 1 Curriculum Guide	Chapter 1 – Data Exploration ❑ Bar Graphs & Dot Plots ❑ Measures of Center ❑ Histograms ❑ Two-Variable Data
DR	Unit 2 Data Representa-tions	"Students demonstrate the ability to interpret or analyze information from visual representations of numerical information, including line graphs, bar graphs, circle graphs, histograms, … scatter plots, charts, and tables. Students can identify trends or patterns, draw conclusions, select the appropriate graph, determine a suitable scale, or create appropriate displays of given data." - 2005-2006 Algebra 1 Curriculum Guide	Chapter 2 - Proportional Reasoning and Probability ❑ Proportions ❑ Measurement Systems ❑ Percent Rate of Change ❑ Circle and Frequency Graphs
PR	Unit 3 Proportional Reasoning	"Students use tables and graphs – an alternative approach – to work with proportions using visual models. Students are asked to discuss proportional relationships, rather than numerical quantities, to force them to discuss the relative size of these relationships without resorting to a "trick" or rule." - 2005-2006 Algebra 1 Curriculum Guide	Chapter 3 - Variation and Graphs ❑ Rates (of Change) ❑ Direct & Indirect Variation ❑ Scale & Similarity

2nd Quarter	Modeling Rates of Change	UNIT UNDERSTANDING	*Discovering Algebra* *An Investigative Approach*
LN	Unit 4 Linear and Non-Linear Models	"The goal of this unit is to expose students to the concept of rate of change in multiple contexts through continued opportunities to analyze relationships. It builds on the work they have already done in studying patterns and variables, developing tools for presenting data, and delving into the concept of proportionality." - 2005-2006 Algebra 1 Curriculum Guide	Chapter 4 – Linear Equations ❑ Order of Operations & Distributive Property ❑ Expressions ❑ Recursive Sequences ❑ Linear Plots ❑ Slope-Intercept Form of a Linear Equation ❑ Solving Equations
RL	Unit 5 Representing Linear Models	"The goal of this unit is to expose students to the concept of rate of change in multiple contexts through continued opportunities to analyze relationships. It builds on the work they have already done in studying patterns and variables, developing tools for presenting data, and delving into the concept of proportionality." - 2005-2006 Algebra 1 Curriculum Guide	Chapter 5 – Fitting a Line to Data ❑ Slope ❑ Point-Slope Form of a Linear Equation ❑ Equivalent Algebraic Equations
GL	Unit 6 Graphing Linear Models	"The Graphing Linear Models unit focuses on linear functions in the coordinate plane. After students' broad experience with linear relationships, both equations and inequalities, in contextual situations, they are ready to intensify and formulize the study of the graphs of such equations and inequalities. As they search for patterns, students will move from graphing the values generated in the tables to generalizing an infinite linear representation of the relationship." - 2005-2006 Algebra 1 Curriculum Guide	Chapter 6 – Systems of Equations and Inequalities ❑ Solving Systems of Equations o Graphing Method o Substitution Method o Elimination Method ❑ Inequalities o One Variable o Two Variables o Systems of Inequalities

Spring Semester			
3rd Quarter	Processes and Symbols	UNIT UNDERSTANDING	*Discovering Algebra* *An Investigative Approach*
EE	Unit 7 Evaluating Expressions	"This unit focuses on using algebra tiles to model, simplify, and evaluate expressions, and solve equations. Students use the algebra tile models to assist them in translating the visual representation to the symbolic representation of the problem. Students also analyze the soundness of the problem. Students also analyze the soundness of the results of symbol manipulation by evaluating the expression for each procedural step in solving the problem." - 2005-2006 Algebra 1 Curriculum Guide	Chapter 7 – Exponents and Exponential Models ❑ Recursive Routines ❑ Exponential Equation and Rules of Exponents ❑ Scientific Notation ❑ Exponential Growth and Decay
SE	Unit 8 Solving Equations and Inequalities	"The goal for students in this unit is to solve problems involving equations and inequalities. This involves finding solutions for linear equations and linear absolute value equations, solution sets for linear inequalities, and approximate solutions for simple quadratic equations. Additionally, the student should check their work by applying these solutions to the original problem." - 2005-2006 Algebra 1 Curriculum Guide	Chapter 8 – Functions ❑ Function Notation ❑ Interpreting Graphs ❑ Absolute Value Functions ❑ Parabolic Functions
SS	Unit 9 Systems of Equations and Inequalities	"Building on the work of solving equations and inequalities, the section conclude with solving systems of equations and systems of inequalities. A table is used to build the linear inequalities from the written situation. Solving the system step-by-step graphically builds understanding of systems of equations and inequalities. We make the distinction between the solution to a system of linear equations as being an ordered pair, the intersection point, and the solution to a system of linear inequalities as being a set of ordered pairs." - 2005-2006 Algebra 1 Curriculum Guide	TERRA NOVA ASSESSMENTS

4th Quarter	Algebraic Structures	UNIT UNDERSTANDING	*Discovering Algebra* *An Investigative Approach*
FG	Unit 10 Functions and Their Graphs	"The goal for students in this unit is to understand the role of functions in describing relationships mathematically in order to predict behavior, to be able to use the language and notation of functions, and to extend the kinds of functions they are able to use graphically in order to model real world situations." - 2005-2006 Algebra 1 Curriculum Guide	Chapter 9 – Transformations ❑ Translating Points and Graphs ❑ Reflecting Points and Graphs ❑ Stretching and Shrinking Graphs Rational Functions
EF	Unit 11 Exponential Functions	"The goal for students in this unit is to be able to model real world situations that have an exponential pattern of change, to represent such situations using tables, graphs, explicit and recursive functions, and to analyze and interpret such functions to answer questions and solve problems." - 2005-2006 Algebra 1 Curriculum Guide	Chapter 10 – Quadratic Models ❑ Solving Quadratic Equations ❑ Finding Roots and Vertex ❑ Vertex Form of the Equation ❑ General Form of the Equation ❑ Factored Form ❑ Completing the Square ❑ Quadratic Formula ❑ Cubic Functions
FF	Unit 12 Families of Functions	"The goal for students in this capstone unit is to summarize and synthesize the learning of the course, by examining the two families of functions studied in depth – linear and exponential – as well as those that have been studied less formally – absolute value, quadratic, and step or piecewise functions – and to analyze and connect these functions to problem situations, the shape of their graphs, patterns in tables, and the form of their equations, as well as the effect of transformations on their graphs or equations." - 2005-2006 Algebra 1Curriculum Guide	Chapter 11 – Introduction to Geometry ❑ Parallel and Perpendicular ❑ Midpoint ❑ Pythagorean Theorem ❑ Radical Expressions ❑ Similar Triangles ❑ Trigonometric Functions

Continuous School Progress:

AFNORTH International Middle/High School's CSP (Continuous School Progress) goal is, **"All students will improve their written communication skills across the curriculum."** The 6 + 1 trait is the model selected to improve school-wide writing in all subject areas. The 6+1 Trait writing framework is a powerful way to learn and use a common language to refer to characteristics of writing as well as establish a common vision of what "strong" writing looks like. Teachers and students will use the 6+1 Trait model to identify areas of strength and weakness as they continue to strive towards continued writing improvement. Success of all students requires that the 6 + 1 Trait become a consistent and integral component of each course taught at AFNORTH International Middle/High School.

As part of the Algebra 1 curriculum students will, on a regular basis in activities, assignments, as well as on assessments, explain, and justify their solutions and the process through which they came to those solutions. These activities will help the student to learn how to

- Organize and consolidate their mathematical thinking through communication;
- Communicate their mathematical thinking coherently and clearly to peers, teachers, and others;
- Analyze and evaluate the mathematical thinking and strategies of others and;
- Use the language of mathematics to express mathematical ideas precisely.

In addition beginning with the 2007-2008 school year, Mathematical Computation has been added to the CSP goals.

As part of the Algebra 1 curriculum students will, on a regular basis in activities, assignments, as well as on assessments, be expected to perform basic mathematical operations (multiplying, dividing, adding, and subtracting integers, fractions, and decimals) without a calculator.

Course Grading And Assessment:

AFNORTH HIGH SCHOOL GRADING SCALE:

A+	97 – 100%	A	93 – 96	A-	90 - 92
B+	87 – 89	B	83 – 86	B-	80 - 82
C+	77 – 79	C	73 – 76	C-	70 - 72
D+	67 – 69	D	63 – 66	D-	60 - 62
		F	Below 60%		

Quarter grades are determined by:

Daily Preparedness, Participation, & Effort	approx.	10	% +/-
Scored Assignments, Quizzes, etc.	approx.	20	% +/-
Constructive Response Assessments	approx.	30	% +/-
Textbook Assessments	approx.	40	% +/-

The final semester grade is calculated using 80% of the average of the two-quarter grades plus 20% of the End of Course Algebra 1 (final exam) Assessment grade.

Course Expectations/Consequences:

It is expected that all students come to class prepared and with a willingness to learn. Students needing to use the restroom or get a drink of water should do so during the very generous 10-minute passing period. Classroom time is to be used for learning Algebra only. Behavior should never interfere with learning or teaching. Students will be expected to enter the room quietly and respectfully and maintain that decorum the entire time they are in the classroom.

- Students are not to bring gum, candy, snacks, food or drink of any kind into the classroom.
- Hats and head covers of any kind (including bandanas, hair nets, sweat bands, etc.) not to be worn inside the classroom by students.
- No electronic devices of any kind are to be visible or used in the classroom by students at any time except when specific technology is incorporated into the Algebra instruction.

Students will be expected to put forth whatever effort is required for them to master the Algebra skills presented to them. Since every student has a different level of mathematical talent and ability as well as prior skill, the amount of effort required for each individual student to master the course material may vary significantly. "Trying" will never be an acceptable alternative for "doing".

Please note the following:

All assignments are posted in the classroom and to the website
http://www.webspawner.com/users/DDDoherty/index.html.

All notes, work, and assignments must be kept for the duration of the course (the entire school year!). It is recommended that the notebook be kept intact as reference for Geometry and Algebra 2 as well.

Please note that a majority of quizzes, chapter tests, and the end of quarter and final exams are created from the same pool of problems. It is essential that students keep all returned scored and practice assessments as study guides for future tests. Any assessment may have review problems from any previously covered topic or skill.

Participation And Preparedness:

Participation and preparedness points may only be earned if the student is physically in the classroom properly prepared and participating. For excused absences, participation points may be made up during seminar, after school during detention as available, or during other approved tutoring sessions. For excused absences, preparedness points may be made up by presenting the completed assignment during seminar within the time allotted for make-up work per the AFNORTH Student/Parent Handbook.

Part of being prepared for class is arriving early enough to be set and ready to go at the appointed start of class time having made use of the very generous 10 minute passing period go to locker, water fountain, and bathroom. Failure to be fully prepared for class on time will result in not earning all available preparedness points for that class meeting. In addition, students requesting a pass out of class due to not being prepared for reasons such as going to their locker, getting a drink, going to the toilet, etc., may also be asked to make up the time they were out of the classroom immediately following dismissal of that period. Failure to do so may result in a lunch period or an after school detention or other disciplinary action consistent with the procedures outlined in the AFNORTH Student/Parent Handbook.

Part of being prepared for class is bringing all necessary materials to every class including the Algebra notebook (with all notes, work, and handouts completed and neatly labeled and organized for that quarter although notebooks from prior quarters may be required for particular lessons as posted in the classroom and/or assignment web-page) as well as all of the student's personal supplies (see below). Failure to be fully prepared for class on time will result in not earning all available preparedness points for that class meeting.

Part of participating appropriately means allowing others to participate fully in the learning process and the teacher to instruct without unwarranted distractions. Failure to follow classroom and school rules, using class time inappropriately, interfering or disrupting the learning / teaching process will result in not earning all available participation points for that class meeting as well as possibly disciplinary action consistent with the procedures outlined in the AFNORTH Student/Parent Handbook.

Textbooks:

DoDEA Algebra 1 Curriculum Guide

Discovering Algebra – An Investigative Approach, Jerald Murdock, Ellen Kamischke, Eric Kamischke, Key Curriculum Press, 2002.

Algebra; Tools for a Changing World, William Handlin, Sr., Prentice Hall, 1998

Supplies:

Please come to class prepared with the following materials:

- 3-ring Binder with loose lined paper
- Two Spiral Notebooks for notes, daily practice, and homework (that can be secured into the 3-ring binder)
- Graph paper
- Plastics zip pocket with the following: pencils, large eraser, bright marker or pen plus a highlighter (for correcting assignments)
- Tissues (personal use)
- TI-83 Plus calculator (Note: a TI-83 calculator may be checked out from supply for use during the academic year. A form must be completed and signed by the parent and student prior to the student being issued the calculator.)
- Textbook unless told otherwise

Homework Policy:

Work must be completed on time for the full benefit of the assignment to be realized.

Independent, individual practice is essential for algebra skill mastery.

It is recommended that students do half of the unfinished assignment the night of class then complete it the following evening. **Do not wait until the last minute to complete the assignments.**

If no specific assignment has been given, then the student is expected to study or practice algebra for 30 minutes every school day evening. **There is no such thing as not having any algebra to do or practice or learn!**

Work must be neat and directions followed correctly. Organize your work and label your paper **with first and last name** properly. Show your work**. No work? No credit! No name? No credit!** Answers alone will not be awarded points.

Make-Up Work Policy:

Mathematics is a challenging subject. One topic builds on another. Daily participation is a must. Many of our math activities will involve group work, graphing calculators, and the use of manipulatives and technology. These activities cannot always be made up at home, so class attendance is extremely important. If it is necessary for you to miss class please, during seminar, ask for the work that you miss.

You have one day per day of absence to make-up any missed work or assessment as outlined in the AFNORTH Student/Parent Handbook. If a test or quiz is assigned for the day you return, you will have to take it. Any missed test or quiz must be made-up within **ONE** week outside of class during seminar, lunch, or after school detention (as available). All students are impacted by tests and quizzes missed by even one student. No student may receive feedback on their progress until all students, within a reasonable time period, have completed the assessment. Once the assessments are scored, no make-ups will be allowed.

Extra Help:

Seminar is the first stop for extra help. Second, IYS daily homework club after school should be utilized at JFC across the street from AIS. In the rare event that a student who has taken ***full advantage*** of seminars and AIS still needs extra help, an appointment may be made to discuss the student's individual situation. A private tutor may also be advisable in some situations.

Seminar:

All students (even those with a Principal's Pass) must make an appointment for **specific** help during Seminar. Students may not just drop in nor will students be allowed to come to B1.17 just to work on their Algebra 1 assignments during Seminar. Passes will not be written during the passing period immediately prior to Seminar. Appointments specify a time that the student will receive one-on-one or small group help from the instructor. If a student is late (or too early) for their appointment, the student may be turned away if their presence interferes with other students receiving help at their appointed time. If a student does not have an appointment, they may ask their seminar teacher to e-mail the Algebra 1 instructor with the specific reason for the request to see if a time slot is available that block.