

NC 208B: ALGEBRA IB

Citrus College Course Outline of Record

Heading	Value
Effective Term:	Fall 2022
Credits:	0
Total Contact Hours:	60
Lecture Hours :	60
Lab Hours:	0
Hours Arranged:	0
Outside of Class Hours:	120
Prerequisite:	Placement by high school counselor.
Transferable to CSU:	No
Transferable to UC:	No
Grading Method:	Non-Credit Course

Catalog Course Description

This is a continuation of Algebra IA. This is an integrated course that combines the content of algebra with logical reasoning, statistics, probability, problem-solving, real-life situations, spatial visualization, and introductory topics in geometry. The course format will include activity-based investigations with hands-on activities, concepts, and applications compliant with the adopted California State Mathematics Standards to meet the minimum course requirements for high school graduation. 60 lecture hours.

Course Objectives

- Identify and use the arithmetic properties of subsets of integers and rational, irrational, and real numbers, including closure properties for the four basic arithmetic operations where applicable.
- Understand and use operations such as taking the opposite, finding the reciprocal, taking a root, and raising to a fractional power. Understand and use the rules of exponents.
- Solve equations and inequalities involving absolute values.
- Simplify expressions before solving linear equations and inequalities in one variable.
- Solve multistep problems, including word problems, involving linear equations and linear inequalities in one variable, and provide justification for each step.
- Graph a linear equation.
- Verify that a point lies on a line, given an equation of the line. Derive linear equations by using the point-slope formula.
- Understand the concepts of parallel and perpendicular lines and how those slopes are related. Find the equation of a line perpendicular to a given line that passes through a given point.
- Solve a system of two linear equations in two variables algebraically and interpret the answer graphically. Solve a system of two linear inequalities in two variables and sketch the solution sets.
- Add, subtract, multiply, and divide monomials and polynomials. Solve multistep problems, including word problems, by using these techniques.
- Apply basic factoring techniques to second- and simple third-degree polynomials.

- Simplify fractions with polynomials in the numerator and denominator by factoring both and reducing them to the lowest terms.
- Add, subtract, multiply, and divide rational expressions and functions. Solve both computationally and conceptually challenging problems by using these techniques.
- Solve a quadratic equation by factoring or completing the square.
- Apply algebraic techniques to solve rate, work, and percent mixture problems.
- Understand the concepts of a relation and a function, determine whether a given relation defines a function, and give pertinent information about given relations and functions.
- Determine the domain of independent variables and the range of dependent variables defined by a graph, a set of ordered pairs, or a symbolic expression.
- Determine whether a relation defined by a graph, a set of ordered pairs, or a symbolic expression is a function and justify the conclusion.
- Become familiar with the quadratic formula and its proof by completing the square.
- Use the quadratic formula to find the roots of a second-degree polynomial and to solve quadratic equations.
- Graph quadratic functions. Use the quadratic formula or factoring techniques or both to determine whether the graph of a quadratic function will intersect the x-axis in zero, one, or two points.
- Apply quadratic equations to physical problems.
- Understand and use simple aspects of a logical argument (inductive and deductive reasoning, hypothesis and conclusion in logical deduction, counterexamples).
- Use properties of the number system to judge the validity of results, justify each step of a procedure, and prove or disprove statements.

Major Course Content

- Arithmetic properties of subsets of integers and rational, irrational, and real numbers, including closure properties for the four basic arithmetic operations where applicable $(x-5) + 4(x-2) = 12$. x - and y -intercepts (e.g., graph $2x + 6y =$)
 - Sketching the region defined by linear inequality (e.g., sketch the region defined by $2x + 6y < 4$). x -intercepts
 - Using properties of numbers to demonstrate whether assertions are true or false
- Operations like taking the opposite, finding the reciprocal, taking a root, and rising to a fractional power. Rules of exponents
- Equations and inequalities involving absolute values
- Simplifying expressions before solving linear equations and inequalities in one variable
- Multistep problems, including word problems, involving linear equations and linear inequalities in one variable
- Graphing a linear equation
- Verifying that a point lies on a line, given an equation of the line. Deriving linear equations by using the point-slope formula
- Parallel and perpendicular lines. Relationship between those slopes. Finding the equation of a line perpendicular to a given line that passes through a given point
- Solving a system of two linear equations in two variables algebraically and interpreting the answer graphically. Solving a

system of two linear inequalities in two variables and sketching the solution sets

10. Adding, subtracting, multiplying, and dividing monomials and polynomials. Solving multistep problems, including word problems, by using these techniques
11. Applying basic factoring techniques to second- and simple third-degree polynomials (finding a common factor for all terms in a polynomial, recognizing the difference of two squares, and recognizing perfect squares of binomials)
12. Simplifying fractions with polynomials in the numerator and denominator by factoring both and reducing them to the lowest terms
13. Adding, subtracting, multiplying, and dividing rational expressions and functions. Solving both computationally and conceptually challenging problems by using these techniques
14. Solving a quadratic equation by factoring or completing the square
15. Applying algebraic techniques to solve rate problems, work problems, and percent mixture problems
16. Relations and functions. Determining whether a given relation defines a function, and giving pertinent information about given relations and functions
17. Determining the domain of independent variables and the range of dependent variables defined by a graph, a set of ordered pairs, or a symbolic expression
18. Determining whether a relation defined by a graph, a set of ordered pairs, or a symbolic expression is a function and justifying the conclusion
19. Becoming familiar with the quadratic formula and its proof by completing the square
20. Using the quadratic formula to find the roots of a second-degree polynomial and solve quadratic equations
21. Graphing quadratic functions. Using the quadratic formula, factoring techniques, or both, to determine whether the graph of a quadratic function will intersect the x-axis in zero, one, or two points
22. Applying quadratic equations to physical problems, such as the motion of an object under the force of gravity
23. Understanding and using simple aspects of a logical argument:
 - a. Explaining the difference between inductive and deductive reasoning, identifying them, and providing examples of each
 - b. Identifying the hypothesis and conclusion in logical deduction
 - c. Using counterexamples to show that an assertion is false
 - d. Recognizing that a single counterexample is sufficient to refute an assertion
24. Using properties of the number system to judge the validity of results, justify each step of a procedure, and prove or disprove statements:
 - a. Using properties of numbers to construct simple, valid arguments (direct and indirect) for, or formulate counter examples to claimed assertions
 - b. Judging the validity of an argument according to whether the properties of the real number system and the order of operations have been applied correctly at each step
 - c. Given a specific algebraic statement involving linear, quadratic, or absolute value expressions or equations or inequalities, determining whether the statement is true sometimes, always, or never

Instruction Type(s)

Lecture, Online Education Lecture