NC 208A: ALGEBRA IA

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 or math placement exam.
Transferable to CSU:	No
Transferable to UC:	No
Grading Method:	Non-Credit Course

Catalog Course Description

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 and compute the x- and y-intercepts. Sketch the region defined by linear inequality.
- 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.
- Be 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 solve quadratic equations.
- Graph quadratic functions and know that their roots are the x-intercepts.
- Use 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.
- Apply quadratic equations to physical problems.
- Understand and use simple aspects of a logical argument.
- 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

1. Arithmetic properties of subsets of integers, and rational, irrational, and real numbers, including closure properties for the four basic arithmetic operations where applicable:
   a. Use properties of numbers to demonstrate whether assertions are true or false.
2. Operations like taking the opposite, finding the reciprocal, taking a root, and raising to a fractional power. Rules of exponents.
3. Equations and inequalities involving absolute values
4. Simplify expressions before solving linear equations and inequalities in one variable, such as $3(2x\text{-}5) + 4(x\text{-}2) = 12$.
5. Multistep problems, including word problems, involving linear equations and linear inequalities in one variable.
6. Graph a linear equation and compute the x- and y-intercepts (e.g., graph $2x + 6y = 4$). Sketch the region defined by linear inequality (e.g., sketch the region defined by $2x + 6y < 4$).
7. Verify that a point lies on a line, given an equation of the line. Derive linear equations by using the point-slope formula.
8. Understand the concepts of parallel lines 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.
9. 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.

10. Add, subtract, multiply, and divide monomials and polynomials. Solve multistep problems, including word problems, by using these techniques.
11. Apply 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. Simplify fractions with polynomials in the numerator and denominator by factoring both and reducing them to the lowest terms.
13. Add, subtract, multiply, and divide rational expressions and functions. Solve both computationally and conceptually challenging problems by using these techniques.
14. Solve a quadratic equation by factoring or completing the square.
15. Apply algebraic techniques to solve rate, work, and percent mixture problems.
16. 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.
17. 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.
18. Determine whether a relation defined by a graph, a set of ordered pairs, or a symbolic expression is a function and justify the conclusion.
19. Be familiar with the quadratic formula and its proof by completing the square.
20. Use the quadratic formula to find the roots of a second-degree polynomial and solve quadratic equations.
21. Graph quadratic functions and know that their roots are the x-intercepts.
22. Use 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.
23. Apply quadratic equations to physical problems, such as the motion of an object under the force of gravity.
24. Use and know simple aspects of a logical argument:
    a. Explain the difference between inductive and deductive reasoning and identify and provide examples of each.
    b. Identify the hypothesis and conclusion in logical deduction.
    c. Use counterexamples to show that an assertion is false and recognize that a single counterexample is sufficient to refute an assertion.
25. Use properties of the number system to judge the validity of results, justify each step of a procedure, and prove or disprove statements:
    a. Use properties of numbers to construct simple, valid arguments (direct and indirect) for, or formulate counter examples to claimed assertions.
    b. Judge 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, determine whether the statement is true sometimes, always, or never.

Instruction Type(s)

Lecture, Online Education Lecture