Arkansas Mathematics Standards

Algebra 2

Radicals and Complex Numbers RC

Radical Expressions and Rational Exponents: Students apply properties to radical expressions and rational exponents.

1 Explain how extending the properties of integer exponents to rational exponents provides an alternative notation for radicals. A2.RC.1

2 Apply the properties of exponents to translate between radical and exponential forms of expressions. A2.RC.2

3 Simplify and perform operations with radical expressions with and without variables; rationalizing denominators should include conjugates. A2.RC.3

Complex Numbers: Students apply properties to complex numbers.

4 Know there is a complex number i and describe contexts from which complex numbers appear. A2.RC.4

5 Perform the operations of addition, subtraction, multiplication, and conjugation of complex numbers. A2.RC.5

6 Use polynomial identities with complex numbers. A2.RC.6

Functions FN

Compositions: Students compose and compare functions.

1 Combine functions by addition, subtraction, multiplication, division, and composition to model the relationship between two quantities in mathematical and real-world contexts. A2.FN.1

Transformations: Students perform transformations in the coordinate plane.

2 Decide if a function is even or odd from a graph or an algebraic expression. A2.FN.2

3 Explain how restricting the domain of a function allows the creation of its inverse. A2.FN.3

4 Write and graph the inverse of a given function; understand that the graph of an inverse function is a reflection of the function over the line $y = x$. A2.FN.4

Linear Functions and Equations LFE

Arithmetic Sequences: Students use arithmetic sequences to model problems.

1 Write and use arithmetic sequences recursively and explicitly to model situations; translate between the two forms when given a graph, a description of the relationship, or two input-output pairs. A2.LFE.1

Matrices: Students perform operations and matrices.

2 Multiply a matrix by a scalar. A2.LFE.2

3 Add and subtract matrices. A2.LFE.3

Systems of Equations: Students solve systems of equations.

4 Solve systems of linear equations in three variables using matrices; use Gaussian elimination or technology. A2.LFE.4

Quadratic Functions, Equations and Inequalities QFE

Create & Solve: Students create and solve problems that model quadratic relationships.

1 Calculate and interpret the average rate of change of a quadratic function represented in a table, graph, or as an equation in the context of mathematical and real-world problems. A2.QFE.1

2 Solve quadratic equations with complex number solutions. A2.QFE.2

3 Represent and solve real-world problems using quadratic inequalities. A2.QFE.3

Graph & Key Features: Students graph and interpret key features of equations that model quadratic relationships.

4 Use the discriminant to determine the number and type of solutions of a quadratic equation. A2.QFE.4

5 Sketch the graph of a quadratic function given a verbal description and show key features. A2.QFE.5

Systems of Equations: Students solve systems of equations.

6 Solve a system of equations consisting of a linear equation and a nonlinear equation in two variables by choosing substitution or graphically (with or without technology) as appropriate for the system of equations. A2.QFE.6

Exponential & Logarithmic Functions & Equations

Create & Solve: Students create and solve problems that model exponential and logarithmic relationships.

1 Use the properties of exponents to find equivalent expressions and to solve equations, including those involving rational exponents. A2.ELF.1

2 Write and solve equations from real-world problems that can be represented as a logarithmic or exponential function in one variable. A2.ELF.2

3 Write exponential equations that model the relationship between two quantities when given a graph, a written description, or a table of values within a mathematical or real-world context. A2.ELF.3

4 Write and use geometric sequences recursively and explicitly to model situations; translate between the two forms when given a graph, a description of the relationship, or two input-output pairs. A2.ELF.4

Logarithms: Students define and use logarithms.

5 Translate between logarithmic and exponential forms of an equation. A2.ELF.5

6 Use properties of logarithms to simplify and evaluate logarithmic expressions, with or without technology. A2.ELF.6

7 Use the inverse relationship between exponents and logarithms to solve problems. A2.ELF.7

Graph & Key Features: Students graph and interpret key features of exponential and logarithmic models.

8 Determine the domain and range of logarithmic functions in mathematical problems. A2.ELF.8

9 Determine reasonable domain and range values of logarithmic functions representing real-world situations, both continuous and discrete; interpret the solution as reasonable or unreasonable in context. A2.ELF.9

10 Sketch the graph of an exponential function given a verbal description and show key features. A2.ELF.10

11 Calculate and interpret the average rate of change of an exponential function represented in a table, graph, or as an equation in the context of mathematical and real-world problems. A2.ELF.11

12 Graph exponential and logarithmic functions with and without context, identifying key features, and determining constraints in a given context. A2.ELF.12

13 Graph and generalize the effect of transformations on exponential and logarithmic functions. A2.ELF.13

- a Transformations include: stretches, compressions, vertical shifts, and horizontal shifts A2.ELF.13.A

14 Given the graphs of exponential and logarithmic functions, explain the effects of the transformation from the parent function. A2.ELF.14

- a Exponentials: $y = ab\,x$, $a \neq 0$, $b > 0$, and $b \neq 1$ A2.ELF.14.A
- b Logarithms: $y = logb(x)$, $b > 0$, $x > 0$ and $b \neq 1$ A2.ELF.14.B

Polynomial, Rational, & Other Functions & Equations PRF

Create & Solve: Students create and solve rational and polynomial equations.

1 Write and solve equations from real-world problems that can be represented as a rational or square root function in one variable. A2.PRF.1

2 Solve non-linear formulas for a specified variable. A2.PRF.2

3 Find zeros of polynomial functions with a degree of 3 or higher when suitable factorizations are available in a real-world and mathematical context. A2.PRF.3

4 Use zeros and an understanding of multiplicity to sketch a graph of a polynomial function with a degree of 3 or higher. A2.PRF.4

5 Apply the Fundamental Theorem of Algebra to determine the number and potential types of roots of polynomial functions based on the degree of the polynomial. A2.PRF.5

6 Solve rational and radical equations containing one variable specifying extraneous solutions. A2.PRF.6

Graph & Key Features: Students graph and identify key features of functions.

7 Determine the domain and range of polynomial and rational functions in mathematical problems. A2.PRF.7

8 Determine reasonable domain and range values of polynomial and rational functions representing real-world situations, both continuous and discrete; interpret the solution as reasonable or unreasonable in context. A2.PRF.8

9 Interpret the key features of polynomial functions that model a relationship between two quantities in a given context; translate between different representations of the function, especially graphs, tables, and equations. A2.PRF.9

10 Sketch the graph of a polynomial function given a verbal description and show key features. A2.PRF.10

11 Calculate and interpret the average rate of change of polynomial functions represented in a table, graph, or as an equation in context of mathematical and real-world problems. A2.PRF.11

12 Graph functions with and without context, identifying key features and determining constraints in a given context. A2.PRF.12

- a Functions include: polynomial, rational, square root, and piecewise-defined A2.PRF.12.A

13 Graph and generalize the effect of transformations on square root, cubic, and rational functions. A2.PRF.13

- a Transformations include: stretches, compressions, vertical shifts, and horizontal shifts A2.PRF.13.A

14 Given a graph, explain the effects of the transformation from the parent function. A2.PRF.14

- a Square Roots: $y = \sqrt{}$ A2.PRF.14.A
- b Cubics: $y = x^3$ A2.PRF.14.B
- c Rationals: $y = \frac{1}{}$ A2.PRF.14.C

Factor Polynomials: Students factor polynomials.

15 Apply the Remainder Theorem to factor and create equivalent forms of polynomial functions. A2.PRF.15

16 Verify polynomial identities and use them to describe numerical relationships. A2.PRF.16

Rational Expressions: Students perform operations on rational expressions.

17 Apply understanding of rational number operations to add, subtract, multiply, and divide by nonzero rational expressions. A2.PRF.17

18 Rewrite simple rational expressions in different forms. A2.PRF.18

19 Divide polynomial expressions using inspection, long division, and synthetic division, with and without a remainder. A2.PRF.19

Systems of Equations: Students solve systems of equations.

20 Explain why a solution to the equation $f(x) = g(x)$ is the x-coordinate where the y-coordinate of $f(x)$and $g(x)$ are the same using graphs, tables, or approximations. A2.PRF.20

- a Include cases where $f(x)$ and/or $g(x)$ are linear, polynomial, exponential, logarithmic, or rational and where at least one of the functions is not linear. A2.PRF.20.A

Statistics & Probability SP

Statistical Experiments & Studies: Students evaluate processes for statistical experiments, make inferences, and justify conclusions from statistical studies.

1 Use data from a random sample to make inferences about a population. A2.SP.1

2 Compare theoretical and empirical probabilities using simulations. A2.SP.2

3 Distinguish between sample surveys, experiments, and observational studies and explain the purpose of randomization in statistical studies. A2.SP.3

4 Read and explain, in context, the validity of data from outside reports by: A2.SP.4

- a Identifying the variables as quantitative or categorical. A2.SP.4.A
- b Describing how the data was collected. A2.SP.4.B
- c Indicating any potential biases or flaws. A2.SP.4.C
- d Identifying inferences the author of the report made from sample data. A2.SP.4.D