Arkansas Tutorials are designed specifically for the Arkansas Standards found in the Curriculum Framework documents to prepare students for the ACT Aspire in English, reading, writing, math and science tests.

Math Tutorials offer targeted instruction, practice and review designed to develop computational fluency, deepen conceptual understanding, and apply mathematical practices. They automatically identify and address learning gaps down to elementary-level content, using adaptive remediation to bring students to grade-level no matter where they start. Students engage with the content in an interactive, feedback-rich environment as they progress through standards-aligned modules. By constantly honing the ability to apply their knowledge in abstract and real world scenarios, students build the depth of knowledge and higher order skills required to demonstrate their mastery when put to the test.

In each module, the Learn It and Try It make complex ideas accessible to students through focused content, modeled logic and process, multi-modal representations, and personalized feedback as students reason through increasingly challenging problems. The Review It offers a high impact summary of key concepts and relates those concepts to students' lives. The Test It assesses students' mastery of the module's concepts, providing granular performance data to students and teachers after each attempt. To help students focus on the content most relevant to them, unit-level pretests and posttests can quickly identify where students are strong and where they're still learning.

1. CREATING AND SOLVING EQUATIONS AND INEQUALITIES

- **FORMULATING AND SOLVING EQUATIONS FROM WORD PROBLEMS**
  - **HSA.CED.A.1** *Create equations and inequalities in one variable and use them to solve problems.*
  - **HSF.IF.C.8** *Write expressions for functions in different but equivalent forms to reveal key features of the function. Use the properties of exponents to interpret expressions for exponential functions.*
  - **HSF.BF.A.1** *Write a function that describes a relationship between two quantities. From a context, determine an explicit expression, a recursive process, or steps for calculation. Combine standard function types using arithmetic operations. (e.g., given that f(x) and g(x) are functions developed from a context, find (f + g)(x), (f – g)(x), (fg)(x), (f/g)(x), and any combination thereof, given g(x) ≠ 0.) Compose functions.*
  - **HSF.LE.A.2** *Construct linear and exponential equations, including arithmetic and geometric sequences, given a graph, a description of a relationship, or two input-output pairs (include reading these from a table).*
  - **HSF.IF.B.4** *For a function that models a relationship between two quantities: interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship.*
  - **HSA.SSE.A.1** *Interpret expressions that represent a quantity in terms of its context. Interpret parts of an expression using appropriate vocabulary, such as terms, factors, and coefficients. Interpret complicated expressions by viewing one or more of their parts as a single entity.*

- **FORMULATING AND SOLVING INEQUALITIES FROM WORD PROBLEMS**
  - **HSA.CED.A.1** *Create equations and inequalities in one variable and use them to solve problems.*
  - **HSA.CED.A.3** *Represent and interpret constraints by equations or inequalities, and by systems of equations and/or inequalities. Interpret solutions as viable or nonviable options in a modeling and/or real-world context.*

2. WORKING WITH EQUATIONS

- **AXIOMS OF EQUALITY**
  - **HSA.SSE.B.3** *Choose and produce an equivalent form of an expression to reveal and explain properties of the quantity represented by the expression. Factor a quadratic expression to reveal the zeros of the function it defines. Complete the square in a quadratic expression to reveal the maximum or minimum value of the function it defines. Use the properties of exponents to transform expressions for exponential functions.*
  - **HSA.SSE.A.2** *Use the structure of an expression to identify ways to rewrite it.*
  - **HSA.REI.A.1** *Assuming that equations have a solution, construct a solution and justify the reasoning used.*

- **LITERAL EQUATIONS**
  - **HSA.CED.A.1** *Create equations and inequalities in one variable and use them to solve problems.*

3. CONCEPTS WITH FUNCTIONS

- **INVERSE FUNCTIONS**
  - **HSF.BF.B.4** *Find inverse functions. Solve an equation of the form $y = f(x)$ for a simple function f that has an inverse and write an expression for the inverse. For example, $f(x) = 2x^2$ or $(x) = (x + 1)/(x - 1)$ for $x \neq 1$. Verify by composition that one function is the inverse of another. (Algebra II) Read values of an inverse function from a graph or a table, given that the function has an inverse. (Algebra II) Produce an invertible function from a non-invertible function by restricting the domain.*

- **GRAPHING AND MANIPULATING Y = MX + B**
  - **HSA.CED.A.2** *Create equations in two or more variables to represent relationships between quantities. Graph equations, in two variables, on a coordinate plane.*
  - **HSF.IF.C.7** *Graph functions expressed algebraically and show key features of the graph, with and without technology. Graph polynomial functions, identifying zeros when suitable factorizations are available, and showing end behavior. Graph rational functions, identifying zeros and asymptotes when suitable factorizations are available, and showing end behavior. Graph exponential and logarithmic functions, showing intercepts and end behavior. Graph trigonometric functions, showing period, midline, and amplitude.*
  - **HSF.IF.B.6** *Calculate and interpret the average rate of change of a function (presented algebraically or as a table) over a specified interval. Estimate the rate of change from a graph.*
  - **HSF.LE.A.2** *Construct linear and exponential equations, including arithmetic and geometric sequences, given a graph, a description of a relationship, or two input-output pairs (include reading these from a table).*
  - **HSF.IF.B.4** *For a function that models a relationship between two quantities: interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship.*

4. EXPONENTS AND EXPONENTIAL FUNCTIONS

- **LAWS OF EXPONENTS**
  - **HSA.SSE.A.2** *Use the structure of an expression to identify ways to rewrite it.*
  - **HSA.APR.D.6** *Rewrite simple rational expressions in different forms; write $a(x)/b(x)$ in the form $q(x) + r(x)/b(x)$, (where $a(x)$ is the dividend, $b(x)$ is the divisor, $q(x)$ is the quotient, and $r(x)$ is the remainder) are polynomials with the degree of $r(x)$ less than the degree of $b(x)$, using inspection, long division, or, for the more complicated examples, a computer algebra system.*
  - **HSA.REI.A.1** *Assuming that equations have a solution, construct a solution and justify the reasoning used.*
  - **HSN.RN.A.1** *Explain how extending the properties of integer exponents to rational exponents provides an alternative notation for radicals.*
  - **HSN.RN.A.2** *Rewrite expressions involving radicals and rational exponents using the properties of exponents.*
  - **HSN.RN.B.4** *Simplify radical expressions. Perform operations (add, subtract, multiply, and divide) with radical expressions. Rationalize denominators and/or numerators.*

- **EXPONENTIAL FUNCTIONS**
  - **HSA.SSE.A.1** *Interpret expressions that represent a quantity in terms of its context. Interpret parts of an expression using appropriate vocabulary, such as terms, factors, and coefficients. Interpret complicated expressions by viewing one or more of their parts as a single entity.*
  - **HSF.IF.C.7** *Graph functions expressed algebraically and show key features of the graph, with and without technology. Graph polynomial functions, identifying zeros when suitable factorizations are available, and showing end behavior. Graph rational functions, identifying zeros and asymptotes when suitable factorizations are available, and showing end behavior. Graph exponential and logarithmic functions, showing intercepts and end behavior. Graph trigonometric functions, showing period, midline, and amplitude.*
  - **HSF.IF.B.6** *Calculate and interpret the average rate of change of a function (presented algebraically or as a table) over a specified interval. Estimate the rate of change from a graph.*
  - **HSF.LE.A.2** *Construct linear and exponential equations, including arithmetic and geometric sequences, given a graph, a description of a relationship, or two input-output pairs (include reading these from a table).*
  - **HSA.SSE.B.3** *Choose and produce an equivalent form of an expression to reveal and explain properties of the quantity represented by the expression. Factor a quadratic expression to reveal the zeros of the function it defines. Complete the*

square in a quadratic expression to reveal the maximum or minimum value of the function it defines. Use the properties of exponents to transform expressions for exponential functions.

- **HSF.IF.C.8** *Write expressions for functions in different but equivalent forms to reveal key features of the function. Use the properties of exponents to interpret expressions for exponential functions.*
- **HSF.IF.B.4** *For a function that models a relationship between two quantities: interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship.*
- **HSF.IF.B.5** *Relate the domain of a function to its graph. Relate the domain of a function to the quantitative relationship it describes.*
- **HSA.CED.A.1** *Create equations and inequalities in one variable and use them to solve problems.*
- **HSA.CED.A.2** *Create equations in two or more variables to represent relationships between quantities. Graph equations, in two variables, on a coordinate plane.*
- **HSF.BF.A.1** *Write a function that describes a relationship between two quantities. From a context, determine an explicit expression, a recursive process, or steps for calculation. Combine standard function types using arithmetic operations. (e.g., given that f(x) and g(x) are functions developed from a context, find (f + g)(x), (f – g)(x), (fg)(x), (f/g)(x), and any combination thereof, given g(x) ≠ 0.) Compose functions.*

EXPONENTIAL GROWTH AND DECAY

- **HSA.SSE.A.1** *Interpret expressions that represent a quantity in terms of its context. Interpret parts of an expression using appropriate vocabulary, such as terms, factors, and coefficients. Interpret complicated expressions by viewing one or more of their parts as a single entity.*
- **HSA.SSE.B.3** *Choose and produce an equivalent form of an expression to reveal and explain properties of the quantity represented by the expression. Factor a quadratic expression to reveal the zeros of the function it defines. Complete the square in a quadratic expression to reveal the maximum or minimum value of the function it defines. Use the properties of exponents to transform expressions for exponential functions.*
- **HSF.IF.C.8** *Write expressions for functions in different but equivalent forms to reveal key features of the function. Use the properties of exponents to interpret expressions for exponential functions.*
- **HSF.LE.A.2** *Construct linear and exponential equations, including arithmetic and geometric sequences, given a graph, a description of a relationship, or two input-output pairs (include reading these from a table).*
- **HSA.CED.A.2** *Create equations in two or more variables to represent relationships between quantities. Graph equations, in two variables, on a coordinate plane.*
- **HSF.IF.B.6** *Calculate and interpret the average rate of change of a function (presented algebraically or as a table) over a specified interval. Estimate the rate of change from a graph.*

5. LOGARITHMIC EXPRESSIONS AND FUNCTIONS

EVALUATING LOGARITHMIC EXPRESSIONS

- **HSA.SSE.A.1** *Interpret expressions that represent a quantity in terms of its context. Interpret parts of an expression using appropriate vocabulary, such as terms, factors, and coefficients. Interpret complicated expressions by viewing one or more of their parts as a single entity.*
- **HSF.LE.A.4** *Express exponential models as logarithms. Express logarithmic models as exponentials. Use properties of logarithms to simplify and evaluate logarithmic expressions (expanding and/or condensing logarithms as appropriate). Evaluate logarithms with or without technology.*

LOGARITHMIC FUNCTIONS

- **HSF.BF.B.4** *Find inverse functions. Solve an equation of the form $y = f(x)$ for a simple function f that has an inverse and write an expression for the inverse. For example, $f(x) = 2x^2$ or $(x) = (x + 1)/(x – 1)$ for $x \neq 1$. Verify by composition that one function is the inverse of another. (Algebra II) Read values of an inverse function from a graph or a table, given that the function has an inverse. (Algebra II) Produce an invertible function from a non-invertible function by restricting the domain.*
- **HSF.IF.B.4** *For a function that models a relationship between two quantities: interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship.*
- **HSF.LE.A.4** *Express exponential models as logarithms. Express logarithmic models as exponentials. Use properties of logarithms to simplify and evaluate logarithmic expressions (expanding and/or condensing logarithms as appropriate). Evaluate logarithms with or without technology.*
- **HSF.IF.C.7** *Graph functions expressed algebraically and show key features of the graph, with and without technology. Graph polynomial functions, identifying zeros when suitable factorizations are available, and showing end behavior. Graph rational functions, identifying zeros and asymptotes when suitable factorizations are available, and showing end behavior. Graph exponential and logarithmic functions, showing intercepts and end behavior. Graph trigonometric functions, showing period,*

midline, and amplitude.

6. SOLVING EXPONENTIAL AND LOGARITHMIC EQUATIONS AND INEQUALITIES

- **SOLVING EXPONENTIAL EQUATIONS**
  - **HSF.BF.B.4** *Find inverse functions. Solve an equation of the form $y = f(x)$ for a simple function f that has an inverse and write an expression for the inverse. For example, $f(x) = 2x^2$ or $(x) = (x + 1)/(x - 1)$ for $x \neq 1$. Verify by composition that one function is the inverse of another. (Algebra II) Read values of an inverse function from a graph or a table, given that the function has an inverse. (Algebra II) Produce an invertible function from a non-invertible function by restricting the domain.*
  - **HSA.SSE.B.3** *Choose and produce an equivalent form of an expression to reveal and explain properties of the quantity represented by the expression. Factor a quadratic expression to reveal the zeros of the function it defines. Complete the square in a quadratic expression to reveal the maximum or minimum value of the function it defines. Use the properties of exponents to transform expressions for exponential functions.*
  - **HSF.IF.C.8** *Write expressions for functions in different but equivalent forms to reveal key features of the function. Use the properties of exponents to interpret expressions for exponential functions.*
  - **HSF.IF.C.7** *Graph functions expressed algebraically and show key features of the graph, with and without technology. Graph polynomial functions, identifying zeros when suitable factorizations are available, and showing end behavior. Graph rational functions, identifying zeros and asymptotes when suitable factorizations are available, and showing end behavior. Graph exponential and logarithmic functions, showing intercepts and end behavior. Graph trigonometric functions, showing period, midline, and amplitude.*
  - **HSF.LE.A.2** *Construct linear and exponential equations, including arithmetic and geometric sequences, given a graph, a description of a relationship, or two input-output pairs (include reading these from a table).*
  - **HSF.LE.A.4** *Express exponential models as logarithms. Express logarithmic models as exponentials. Use properties of logarithms to simplify and evaluate logarithmic expressions (expanding and/or condensing logarithms as appropriate). Evaluate logarithms with or without technology.*

- **SOLVING LOGARITHMIC EQUATIONS**
  - **HSF.LE.A.4** *Express exponential models as logarithms. Express logarithmic models as exponentials. Use properties of logarithms to simplify and evaluate logarithmic expressions (expanding and/or condensing logarithms as appropriate). Evaluate logarithms with or without technology.*
  - **HSF.IF.B.4** *For a function that models a relationship between two quantities: interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship.*
  - **HSF.BF.B.4** *Find inverse functions. Solve an equation of the form $y = f(x)$ for a simple function f that has an inverse and write an expression for the inverse. For example, $f(x) = 2x^2$ or $(x) = (x + 1)/(x - 1)$ for $x \neq 1$. Verify by composition that one function is the inverse of another. (Algebra II) Read values of an inverse function from a graph or a table, given that the function has an inverse. (Algebra II) Produce an invertible function from a non-invertible function by restricting the domain.*

- **SOLVING EXPONENTIAL INEQUALITIES**
  - **HSF.LE.A.2** *Construct linear and exponential equations, including arithmetic and geometric sequences, given a graph, a description of a relationship, or two input-output pairs (include reading these from a table).*
  - **HSA.CED.A.2** *Create equations in two or more variables to represent relationships between quantities. Graph equations, in two variables, on a coordinate plane.*
  - **HSA.CED.A.3** *Represent and interpret constraints by equations or inequalities, and by systems of equations and/or inequalities. Interpret solutions as viable or nonviable options in a modeling and/or real-world context.*
  - **HSA.CED.A.1** *Create equations and inequalities in one variable and use them to solve problems.*

7. ARITHMETIC WITH POLYNOMIALS

- **ADDITION AND SUBTRACTION OF POLYNOMIALS**
  - **HSA.APR.A.1** *Add, subtract, and multiply polynomials. Understand that polynomials, like the integers, are closed under addition, subtraction, and multiplication.*

- **MULTIPLICATION OF POLYNOMIALS**
  - **HSA.APR.A.1** *Add, subtract, and multiply polynomials. Understand that polynomials, like the integers, are closed under addition, subtraction, and multiplication.*

- **DIVISION OF POLYNOMIALS**
  - **HSA.SSE.A.2** *Use the structure of an expression to identify ways to rewrite it.*
  - **HSA.APR.D.6** *Rewrite simple rational expressions in different forms; write a(x)/b(x) in the form q(x) + r(x)/b(x), (where a(x) is the dividend, b(x) is the divisor, q(x) is the quotient, and r(x) is the remainder) are polynomials with the degree of r(x) less than the degree of b(x), using inspection, long division, or, for the more complicated examples, a computer algebra system.*
  - **HSA.SSE.A.1** *Interpret expressions that represent a quantity in terms of its context. Interpret parts of an expression using appropriate vocabulary, such as terms, factors, and coefficients. Interpret complicated expressions by viewing one or more of their parts as a single entity.*

8. GRAPHS AND REPRESENTATIONS OF QUADRATIC FUNCTIONS

- **PARABOLAS**
  - **HSA.CED.A.2** *Create equations in two or more variables to represent relationships between quantities. Graph equations, in two variables, on a coordinate plane.*

- **ANALYZING GRAPHS OF QUADRATIC FUNCTIONS**
  - **HSA.SSE.A.2** *Use the structure of an expression to identify ways to rewrite it.*
  - **HSF.IF.B.5** *Relate the domain of a function to its graph. Relate the domain of a function to the quantitative relationship it describes.*
  - **HSF.IF.B.4** *For a function that models a relationship between two quantities: interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship.*
  - **HSF.IF.C.7** *Graph functions expressed algebraically and show key features of the graph, with and without technology. Graph polynomial functions, identifying zeros when suitable factorizations are available, and showing end behavior. Graph rational functions, identifying zeros and asymptotes when suitable factorizations are available, and showing end behavior. Graph exponential and logarithmic functions, showing intercepts and end behavior. Graph trigonometric functions, showing period, midline, and amplitude.*
  - **HSA.APR.B.3** *Identify zeros of polynomials when suitable factorizations are available. Use the zeros to construct a rough graph of the function defined by the polynomial.*
  - **HSF.IF.C.8** *Write expressions for functions in different but equivalent forms to reveal key features of the function. Use the properties of exponents to interpret expressions for exponential functions.*
  - **HSA.CED.A.2** *Create equations in two or more variables to represent relationships between quantities. Graph equations, in two variables, on a coordinate plane.*

- **REPRESENTATIONS OF QUADRATIC FUNCTIONS**
  - **HSA.SSE.A.2** *Use the structure of an expression to identify ways to rewrite it.*
  - **HSA.CED.A.3** *Represent and interpret constraints by equations or inequalities, and by systems of equations and/or inequalities. Interpret solutions as viable or nonviable options in a modeling and/or real-world context.*
  - **HSF.IF.B.4** *For a function that models a relationship between two quantities: interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship.*
  - **HSF.IF.C.7** *Graph functions expressed algebraically and show key features of the graph, with and without technology. Graph polynomial functions, identifying zeros when suitable factorizations are available, and showing end behavior. Graph rational functions, identifying zeros and asymptotes when suitable factorizations are available, and showing end behavior. Graph exponential and logarithmic functions, showing intercepts and end behavior. Graph trigonometric functions, showing period, midline, and amplitude.*
  - **HSF.IF.C.8** *Write expressions for functions in different but equivalent forms to reveal key features of the function. Use the properties of exponents to interpret expressions for exponential functions.*
  - **HSF.BF.A.1** *Write a function that describes a relationship between two quantities. From a context, determine an explicit expression, a recursive process, or steps for calculation. Combine standard function types using arithmetic operations. (e.g., given that f(x) and g(x) are functions developed from a context, find (f + g)(x), (f – g)(x), (fg)(x), (f/g)(x), and any combination thereof, given $g(x) \neq 0$.) Compose functions.*
  - **HSA.CED.A.2** *Create equations in two or more variables to represent relationships between quantities. Graph equations, in two variables, on a coordinate plane.*
  - **HSA.REI.B.4** *Solve quadratic equations in one variable. Use the method of completing the square to transform any quadratic equation in x into an equation of the form $(x - p)^2 = q$ that has the same solutions. Solve quadratic equations (as appropriate to the initial form of the equation) by: inspection of a graph, taking square roots, completing the square, using the quadratic formula, factoring. Recognize complex solutions and write them as $a \pm bi$ for real numbers a and b.*

- **HSA.APR.B.3** *Identify zeros of polynomials when suitable factorizations are available. Use the zeros to construct a rough graph of the function defined by the polynomial.*

9. SOLVING QUADRATIC EQUATIONS 1

- **SOLVING QUADRATIC EQUATIONS BY FACTORING**
  - **HSA.REI.B.4** *Solve quadratic equations in one variable. Use the method of completing the square to transform any quadratic equation in x into an equation of the form $(x - p)^2 = q$ that has the same solutions. Solve quadratic equations (as appropriate to the initial form of the equation) by: inspection of a graph, taking square roots, completing the square, using the quadratic formula, factoring. Recognize complex solutions and write them as $a \pm bi$ for real numbers a and b.*
  - **HSA.SSE.B.3** *Choose and produce an equivalent form of an expression to reveal and explain properties of the quantity represented by the expression. Factor a quadratic expression to reveal the zeros of the function it defines. Complete the square in a quadratic expression to reveal the maximum or minimum value of the function it defines. Use the properties of exponents to transform expressions for exponential functions.*
  - **HSF.IF.C.8** *Write expressions for functions in different but equivalent forms to reveal key features of the function. Use the properties of exponents to interpret expressions for exponential functions.*
  - **HSA.APR.C.4** *Prove polynomial identities and use them to describe numerical relationships.*
  - **HSA.APR.B.3** *Identify zeros of polynomials when suitable factorizations are available. Use the zeros to construct a rough graph of the function defined by the polynomial.*
  - **HSF.IF.C.7** *Graph functions expressed algebraically and show key features of the graph, with and without technology. Graph polynomial functions, identifying zeros when suitable factorizations are available, and showing end behavior. Graph rational functions, identifying zeros and asymptotes when suitable factorizations are available, and showing end behavior. Graph exponential and logarithmic functions, showing intercepts and end behavior. Graph trigonometric functions, showing period, midline, and amplitude.*
  - **HSF.BF.A.1** *Write a function that describes a relationship between two quantities. From a context, determine an explicit expression, a recursive process, or steps for calculation. Combine standard function types using arithmetic operations. (e.g., given that f(x) and g(x) are functions developed from a context, find (f + g)(x), (f – g)(x), (fg)(x), (f/g)(x), and any combination thereof, given $g(x) \neq 0$.) Compose functions.*

- **QUADRATIC FORMULA**
  - **HSA.SSE.A.1** *Interpret expressions that represent a quantity in terms of its context. Interpret parts of an expression using appropriate vocabulary, such as terms, factors, and coefficients. Interpret complicated expressions by viewing one or more of their parts as a single entity.*
  - **HSA.SSE.B.3** *Choose and produce an equivalent form of an expression to reveal and explain properties of the quantity represented by the expression. Factor a quadratic expression to reveal the zeros of the function it defines. Complete the square in a quadratic expression to reveal the maximum or minimum value of the function it defines. Use the properties of exponents to transform expressions for exponential functions.*
  - **HSA.REI.B.4** *Solve quadratic equations in one variable. Use the method of completing the square to transform any quadratic equation in x into an equation of the form $(x - p)^2 = q$ that has the same solutions. Solve quadratic equations (as appropriate to the initial form of the equation) by: inspection of a graph, taking square roots, completing the square, using the quadratic formula, factoring. Recognize complex solutions and write them as $a \pm bi$ for real numbers a and b.*
  - **HSN.CN.C.7** *Solve quadratic equations with real coefficients that have real or complex solutions.*
  - **HSF.IF.B.4** *For a function that models a relationship between two quantities: interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship.*
  - **HSF.IF.C.7** *Graph functions expressed algebraically and show key features of the graph, with and without technology. Graph polynomial functions, identifying zeros when suitable factorizations are available, and showing end behavior. Graph rational functions, identifying zeros and asymptotes when suitable factorizations are available, and showing end behavior. Graph exponential and logarithmic functions, showing intercepts and end behavior. Graph trigonometric functions, showing period, midline, and amplitude.*
  - **HSF.BF.A.1** *Write a function that describes a relationship between two quantities. From a context, determine an explicit expression, a recursive process, or steps for calculation. Combine standard function types using arithmetic operations. (e.g., given that f(x) and g(x) are functions developed from a context, find (f + g)(x), (f – g)(x), (fg)(x), (f/g)(x), and any combination thereof, given $g(x) \neq 0$.) Compose functions.*
  - **HSA.CED.A.3** *Represent and interpret constraints by equations or inequalities, and by systems of equations and/or inequalities. Interpret solutions as viable or nonviable options in a modeling and/or real-world context.*

10. SOLVING QUADRATIC EQUATIONS 2

- **COMPLETING THE SQUARE**
  - **HSA.REI.B.4** *Solve quadratic equations in one variable. Use the method of completing the square to transform any quadratic equation in x into an equation of the form $(x - p)^2 = q$ that has the same solutions. Solve quadratic equations (as appropriate to the initial form of the equation) by: inspection of a graph, taking square roots, completing the square, using the quadratic formula, factoring. Recognize complex solutions and write them as $a \pm bi$ for real numbers a and b.*
  - **HSA.SSE.B.3** *Choose and produce an equivalent form of an expression to reveal and explain properties of the quantity represented by the expression. Factor a quadratic expression to reveal the zeros of the function it defines. Complete the square in a quadratic expression to reveal the maximum or minimum value of the function it defines. Use the properties of exponents to transform expressions for exponential functions.*
  - **HSF.IF.C.8** *Write expressions for functions in different but equivalent forms to reveal key features of the function. Use the properties of exponents to interpret expressions for exponential functions.*
  - **HSA.SSE.A.2** *Use the structure of an expression to identify ways to rewrite it.*
  - **HSF.IF.C.7** *Graph functions expressed algebraically and show key features of the graph, with and without technology. Graph polynomial functions, identifying zeros when suitable factorizations are available, and showing end behavior. Graph rational functions, identifying zeros and asymptotes when suitable factorizations are available, and showing end behavior. Graph exponential and logarithmic functions, showing intercepts and end behavior. Graph trigonometric functions, showing period, midline, and amplitude.*

- **COMPLEX NUMBERS AND QUADRATIC FUNCTIONS**
  - **HSN.CN.C.7** *Solve quadratic equations with real coefficients that have real or complex solutions.*
  - **HSA.REI.B.4** *Solve quadratic equations in one variable. Use the method of completing the square to transform any quadratic equation in x into an equation of the form $(x - p)^2 = q$ that has the same solutions. Solve quadratic equations (as appropriate to the initial form of the equation) by: inspection of a graph, taking square roots, completing the square, using the quadratic formula, factoring. Recognize complex solutions and write them as $a \pm bi$ for real numbers a and b.*
  - **HSN.CN.A.1** *Know there is a complex number i such that $i^2 = -1$, and every complex number has the form $a + bi$ with a and b real.*
  - **HSN.CN.A.2** *Use the relation $i^2 = -1$ and the commutative, associative, and distributive properties to add, subtract, and multiply complex numbers.*
  - **HSN.CN.A.3** *Find the conjugate of a complex number. Use conjugates to find quotients of complex numbers.*

11. FACTORING POLYNOMIALS

- **FACTORING SPECIAL CASES**
  - **HSA.SSE.A.2** *Use the structure of an expression to identify ways to rewrite it.*
  - **HSA.APR.C.4** *Prove polynomial identities and use them to describe numerical relationships.*
  - **HSA.SSE.A.1** *Interpret expressions that represent a quantity in terms of its context. Interpret parts of an expression using appropriate vocabulary, such as terms, factors, and coefficients. Interpret complicated expressions by viewing one or more of their parts as a single entity.*
  - **HSA.APR.B.3** *Identify zeros of polynomials when suitable factorizations are available. Use the zeros to construct a rough graph of the function defined by the polynomial.*

- **FACTORING CUBIC POLYNOMIALS**
  - **HSA.SSE.A.2** *Use the structure of an expression to identify ways to rewrite it.*
  - **HSA.APR.C.4** *Prove polynomial identities and use them to describe numerical relationships.*
  - **HSA.SSE.A.1** *Interpret expressions that represent a quantity in terms of its context. Interpret parts of an expression using appropriate vocabulary, such as terms, factors, and coefficients. Interpret complicated expressions by viewing one or more of their parts as a single entity.*
  - **HSA.APR.B.3** *Identify zeros of polynomials when suitable factorizations are available. Use the zeros to construct a rough graph of the function defined by the polynomial.*

12. FACTORING HIGHER-ORDER POLYNOMIALS

- **FACTORING HIGHER-ORDER POLYNOMIALS**
  - **HSA.SSE.A.1** *Interpret expressions that represent a quantity in terms of its context. Interpret parts of an expression using appropriate vocabulary, such as terms, factors, and coefficients. Interpret complicated expressions by viewing one or more of their parts as a single entity.*

- **HSA.APR.B.3** *Identify zeros of polynomials when suitable factorizations are available. Use the zeros to construct a rough graph of the function defined by the polynomial.*
- **HSA.SSE.A.2** *Use the structure of an expression to identify ways to rewrite it.*
- **HSA.APR.C.4** *Prove polynomial identities and use them to describe numerical relationships.*
- **HSN.CN.C.9** *Know the Fundamental Theorem of Algebra. Show that it is true for quadratic polynomials.*

- **FACTOR THEOREM AND REMAINDER THEOREM**
  - **HSA.APR.D.6** *Rewrite simple rational expressions in different forms; write a(x)/b(x) in the form q(x) + r(x)/b(x), (where a(x) is the dividend, b(x) is the divisor, q(x) is the quotient, and r(x) is the remainder) are polynomials with the degree of r(x) less than the degree of b(x), using inspection, long division, or, for the more complicated examples, a computer algebra system.*
  - **HSA.APR.B.2** *Know and apply the Factor and Remainder Theorems: For a polynomial p(x) and a number a, the remainder on division by x - a is p(a), so p(a) = 0 if and only if (x - a) is a factor of p(x).*

13. POLYNOMIAL FUNCTIONS AND COMPLEX NUMBERS

- **GRAPHS OF POLYNOMIAL FUNCTIONS**
  - **HSA.APR.B.3** *Identify zeros of polynomials when suitable factorizations are available. Use the zeros to construct a rough graph of the function defined by the polynomial.*
  - **HSF.IF.B.4** *For a function that models a relationship between two quantities: interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship.*
  - **HSF.IF.C.7** *Graph functions expressed algebraically and show key features of the graph, with and without technology. Graph polynomial functions, identifying zeros when suitable factorizations are available, and showing end behavior. Graph rational functions, identifying zeros and asymptotes when suitable factorizations are available, and showing end behavior. Graph exponential and logarithmic functions, showing intercepts and end behavior. Graph trigonometric functions, showing period, midline, and amplitude.*
  - **HSF.BF.B.3** *Identify the effect on the graph of replacing f(x) by f(x) + k, k f(x), f(kx), and f(x + k) for specific values of k (both positive and negative); Find the value of k given the graphs of the transformed functions. Experiment with multiple transformations and illustrate an explanation of the effects on the graph with or without technology. Include recognizing even and odd functions from their graphs and algebraic expressions for them.*

- **COMPLEX NUMBERS**
  - **HSN.CN.A.1** *Know there is a complex number i such that $i^2 = -1$, and every complex number has the form $a + bi$ with a and b real.*
  - **HSN.CN.A.3** *Find the conjugate of a complex number. Use conjugates to find quotients of complex numbers.*
  - **HSN.CN.A.2** *Use the relation $i^2 = -1$ and the commutative, associative, and distributive properties to add, subtract, and multiply complex numbers.*

14. POLYNOMIAL IDENTITIES AND COMPLEX NUMBERS

- **POLYNOMIAL IDENTITIES**
  - **HSA.APR.C.4** *Prove polynomial identities and use them to describe numerical relationships.*
  - **HSA.REI.B.4** *Solve quadratic equations in one variable. Use the method of completing the square to transform any quadratic equation in x into an equation of the form $(x - p)^2 = q$ that has the same solutions. Solve quadratic equations (as appropriate to the initial form of the equation) by: inspection of a graph, taking square roots, completing the square, using the quadratic formula, factoring. Recognize complex solutions and write them as $a \pm bi$ for real numbers a and b.*
  - **HSA.SSE.A.2** *Use the structure of an expression to identify ways to rewrite it.*

- **POLYNOMIAL IDENTITIES AND COMPLEX NUMBERS**
  - **HSN.CN.C.8** *Extend polynomial identities to the complex numbers.*
  - **HSA.SSE.A.2** *Use the structure of an expression to identify ways to rewrite it.*
  - **HSA.APR.C.4** *Prove polynomial identities and use them to describe numerical relationships.*
  - **HSA.SSE.A.1** *Interpret expressions that represent a quantity in terms of its context. Interpret parts of an expression using appropriate vocabulary, such as terms, factors, and coefficients. Interpret complicated expressions by viewing one or more of their parts as a single entity.*
  - **HSN.CN.A.1** *Know there is a complex number i such that $i^2 = -1$, and every complex number has the form $a + bi$ with a*

and b real.

- **HSN.CN.C.7** *Solve quadratic equations with real coefficients that have real or complex solutions.*
- **HSA.REI.B.4** *Solve quadratic equations in one variable. Use the method of completing the square to transform any quadratic equation in x into an equation of the form $(x - p)^2 = q$ that has the same solutions. Solve quadratic equations (as appropriate to the initial form of the equation) by: inspection of a graph, taking square roots, completing the square, using the quadratic formula, factoring. Recognize complex solutions and write them as $a \pm bi$ for real numbers a and b.*
- **HSN.CN.A.3** *Find the conjugate of a complex number. Use conjugates to find quotients of complex numbers.*
- **HSN.CN.C.9** *Know the Fundamental Theorem of Algebra. Show that it is true for quadratic polynomials.*

15. RADICAL FUNCTIONS AND EQUATIONS

ANALYZING GRAPHS OF SQUARE ROOT FUNCTIONS

- **HSF.BF.B.3** *Identify the effect on the graph of replacing f(x) by f(x) + k, k f(x), f(kx), and f(x + k) for specific values of k (both positive and negative); Find the value of k given the graphs of the transformed functions. Experiment with multiple transformations and illustrate an explanation of the effects on the graph with or without technology. Include recognizing even and odd functions from their graphs and algebraic expressions for them.*
- **HSF.IF.C.7** *Graph functions expressed algebraically and show key features of the graph, with and without technology. Graph polynomial functions, identifying zeros when suitable factorizations are available, and showing end behavior. Graph rational functions, identifying zeros and asymptotes when suitable factorizations are available, and showing end behavior. Graph exponential and logarithmic functions, showing intercepts and end behavior. Graph trigonometric functions, showing period, midline, and amplitude.*
- **HSF.BF.B.4** *Find inverse functions. Solve an equation of the form $y = f(x)$ for a simple function f that has an inverse and write an expression for the inverse. For example, $f(x) = 2x^2$ or $(x) = (x + 1)/(x – 1)$ for $x \neq 1$. Verify by composition that one function is the inverse of another. (Algebra II) Read values of an inverse function from a graph or a table, given that the function has an inverse. (Algebra II) Produce an invertible function from a non-invertible function by restricting the domain.*

SOLVING SQUARE ROOT EQUATIONS

- **HSA.REI.A.2** *Solve simple rational and radical equations in one variable, and give examples showing how extraneous solutions may arise.*
- **HSA.REI.A.1** *Assuming that equations have a solution, construct a solution and justify the reasoning used.*
- **HSF.BF.A.1** *Write a function that describes a relationship between two quantities. From a context, determine an explicit expression, a recursive process, or steps for calculation. Combine standard function types using arithmetic operations. (e.g., given that f(x) and g(x) are functions developed from a context, find $(f + g)(x)$, $(f – g)(x)$, $(fg)(x)$, $(f/g)(x)$, and any combination thereof, given $g(x) \neq 0$.) Compose functions.*

16. RATIONAL EXPRESSIONS AND EQUATIONS

OPERATIONS WITH RATIONAL EXPRESSIONS

- **HSA.SSE.A.1** *Interpret expressions that represent a quantity in terms of its context. Interpret parts of an expression using appropriate vocabulary, such as terms, factors, and coefficients. Interpret complicated expressions by viewing one or more of their parts as a single entity.*
- **HSA.APR.D.7** *Add, subtract, multiply, and divide by nonzero rational expressions. Understand that rational expressions, like the integers, are closed under addition, subtraction, and multiplication.*
- **HSA.SSE.A.2** *Use the structure of an expression to identify ways to rewrite it.*
- **HSA.APR.D.6** *Rewrite simple rational expressions in different forms; write a(x)/b(x) in the form q(x) + r(x)/b(x), (where a(x) is the dividend, b(x) is the divisor, q(x) is the quotient, and r(x) is the remainder) are polynomials with the degree of r(x) less than the degree of b(x), using inspection, long division, or, for the more complicated examples, a computer algebra system.*
- **HSA.SSE.B.3** *Choose and produce an equivalent form of an expression to reveal and explain properties of the quantity represented by the expression. Factor a quadratic expression to reveal the zeros of the function it defines. Complete the square in a quadratic expression to reveal the maximum or minimum value of the function it defines. Use the properties of exponents to transform expressions for exponential functions.*

SOLVING RATIONAL EQUATIONS

- **HSA.REI.A.1** *Assuming that equations have a solution, construct a solution and justify the reasoning used.*
- **HSF.IF.C.7** *Graph functions expressed algebraically and show key features of the graph, with and without technology. Graph polynomial functions, identifying zeros when suitable factorizations are available, and showing end behavior. Graph rational*

functions, identifying zeros and asymptotes when suitable factorizations are available, and showing end behavior. Graph exponential and logarithmic functions, showing intercepts and end behavior. Graph trigonometric functions, showing period, midline, and amplitude.

- **HSA.CED.A.3** *Represent and interpret constraints by equations or inequalities, and by systems of equations and/or inequalities. Interpret solutions as viable or nonviable options in a modeling and/or real-world context.*
- **HSA.REI.A.2** *Solve simple rational and radical equations in one variable, and give examples showing how extraneous solutions may arise.*

17. RATIONAL FUNCTIONS

ANALYZING GRAPHS OF RATIONAL FUNCTIONS

- **HSA.CED.A.2** *Create equations in two or more variables to represent relationships between quantities. Graph equations, in two variables, on a coordinate plane.*
- **HSF.IF.C.7** *Graph functions expressed algebraically and show key features of the graph, with and without technology. Graph polynomial functions, identifying zeros when suitable factorizations are available, and showing end behavior. Graph rational functions, identifying zeros and asymptotes when suitable factorizations are available, and showing end behavior. Graph exponential and logarithmic functions, showing intercepts and end behavior. Graph trigonometric functions, showing period, midline, and amplitude.*
- **HSF.BF.B.3** *Identify the effect on the graph of replacing f(x) by f(x) + k, k f(x), f(kx), and f(x + k) for specific values of k (both positive and negative); Find the value of k given the graphs of the transformed functions. Experiment with multiple transformations and illustrate an explanation of the effects on the graph with or without technology. Include recognizing even and odd functions from their graphs and algebraic expressions for them.*
- **HSF.IF.B.4** *For a function that models a relationship between two quantities: interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship.*
- **HSF.IF.B.5** *Relate the domain of a function to its graph. Relate the domain of a function to the quantitative relationship it describes.*

MODELING SITUATIONS WITH RATIONAL FUNCTIONS

- **HSN.Q.A.2** *Define appropriate quantities for the purpose of descriptive modeling. (I.E., Use units appropriate to the problem being solved.)*
- **HSA.REI.A.2** *Solve simple rational and radical equations in one variable, and give examples showing how extraneous solutions may arise.*
- **HSA.SSE.A.1** *Interpret expressions that represent a quantity in terms of its context. Interpret parts of an expression using appropriate vocabulary, such as terms, factors, and coefficients. Interpret complicated expressions by viewing one or more of their parts as a single entity.*
- **HSA.CED.A.2** *Create equations in two or more variables to represent relationships between quantities. Graph equations, in two variables, on a coordinate plane.*
- **HSA.CED.A.3** *Represent and interpret constraints by equations or inequalities, and by systems of equations and/or inequalities. Interpret solutions as viable or nonviable options in a modeling and/or real-world context.*
- **HSF.BF.A.1** *Write a function that describes a relationship between two quantities. From a context, determine an explicit expression, a recursive process, or steps for calculation. Combine standard function types using arithmetic operations. (e.g., given that f(x) and g(x) are functions developed from a context, find (f + g)(x), (f – g)(x), (fg)(x), (f/g)(x), and any combination thereof, given $g(x) \neq 0$.) Compose functions.*

18. SEQUENCES

SEQUENCES

- **HSF.IF.A.3** *Recognize that sequences are functions, sometimes defined recursively, whose domain is a subset of the integers.*
- **HSF.BF.A.1** *Write a function that describes a relationship between two quantities. From a context, determine an explicit expression, a recursive process, or steps for calculation. Combine standard function types using arithmetic operations. (e.g., given that f(x) and g(x) are functions developed from a context, find (f + g)(x), (f – g)(x), (fg)(x), (f/g)(x), and any combination thereof, given $g(x) \neq 0$.) Compose functions.*
- **HSF.BF.A.2** *Write arithmetic and geometric sequences both recursively and with an explicit formula, and translate between the two forms. Use arithmetic and geometric sequences to model situations.*
- **HSF.LE.A.2** *Construct linear and exponential equations, including arithmetic and geometric sequences, given a graph, a description of a relationship, or two input-output pairs (include reading these from a table).*

- **ARITHMETIC AND GEOMETRIC SEQUENCES**
  - **HSF.BF.A.2** *Write arithmetic and geometric sequences both recursively and with an explicit formula, and translate between the two forms. Use arithmetic and geometric sequences to model situations.*
  - **HSF.IF.A.3** *Recognize that sequences are functions, sometimes defined recursively, whose domain is a subset of the integers.*
  - **HSF.BF.A.1** *Write a function that describes a relationship between two quantities. From a context, determine an explicit expression, a recursive process, or steps for calculation. Combine standard function types using arithmetic operations. (e.g., given that f(x) and g(x) are functions developed from a context, find (f + g)(x), (f – g)(x), (fg)(x), (f/g)(x), and any combination thereof, given g(x) ≠ 0.) Compose functions.*
  - **HSF.LE.A.2** *Construct linear and exponential equations, including arithmetic and geometric sequences, given a graph, a description of a relationship, or two input-output pairs (include reading these from a table).*

- **SUMS OF GEOMETRIC SEQUENCES**

19. WORKING WITH FUNCTIONS

- **LINEAR VERSUS NONLINEAR FUNCTIONS**
  - **HSF.IF.C.7** *Graph functions expressed algebraically and show key features of the graph, with and without technology. Graph polynomial functions, identifying zeros when suitable factorizations are available, and showing end behavior. Graph rational functions, identifying zeros and asymptotes when suitable factorizations are available, and showing end behavior. Graph exponential and logarithmic functions, showing intercepts and end behavior. Graph trigonometric functions, showing period, midline, and amplitude.*
  - **HSF.IF.B.6** *Calculate and interpret the average rate of change of a function (presented algebraically or as a table) over a specified interval. Estimate the rate of change from a graph.*
  - **HSF.LE.A.2** *Construct linear and exponential equations, including arithmetic and geometric sequences, given a graph, a description of a relationship, or two input-output pairs (include reading these from a table).*
  - **HSF.IF.B.4** *For a function that models a relationship between two quantities: interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship.*

- **ARITHMETIC OPERATIONS ON FUNCTIONS**
  - **HSF.BF.A.1** *Write a function that describes a relationship between two quantities. From a context, determine an explicit expression, a recursive process, or steps for calculation. Combine standard function types using arithmetic operations. (e.g., given that f(x) and g(x) are functions developed from a context, find (f + g)(x), (f – g)(x), (fg)(x), (f/g)(x), and any combination thereof, given g(x) ≠ 0.) Compose functions.*

- **MULTIPLE REPRESENTATIONS OF FUNCTIONS**
  - **HSA.CED.A.2** *Create equations in two or more variables to represent relationships between quantities. Graph equations, in two variables, on a coordinate plane.*
  - **HSF.IF.B.4** *For a function that models a relationship between two quantities: interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship.*
  - **HSF.LE.A.2** *Construct linear and exponential equations, including arithmetic and geometric sequences, given a graph, a description of a relationship, or two input-output pairs (include reading these from a table).*

20. TRIGONOMETRY AND TRIGONOMETRIC FUNCTIONS

- **RADIANS AND THE UNIT CIRCLE**

- **TRIGONOMETRIC FUNCTIONS**
  - **HSF.IF.C.7** *Graph functions expressed algebraically and show key features of the graph, with and without technology. Graph polynomial functions, identifying zeros when suitable factorizations are available, and showing end behavior. Graph rational functions, identifying zeros and asymptotes when suitable factorizations are available, and showing end behavior. Graph exponential and logarithmic functions, showing intercepts and end behavior. Graph trigonometric functions, showing period, midline, and amplitude.*
  - **HSF.BF.B.3** *Identify the effect on the graph of replacing f(x) by f(x) + k, k f(x), f(kx), and f(x + k) for specific values of k (both positive and negative); Find the value of k given the graphs of the transformed functions. Experiment with multiple transformations and illustrate an explanation of the effects on the graph with or without technology. Include*

recognizing even and odd functions from their graphs and algebraic expressions for them.

21. PARENT FUNCTIONS AND TRANSFORMATIONS

- **PARENT FUNCTIONS**
  - **HSF.IF.B.4** *For a function that models a relationship between two quantities: interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship.*
  - **HSF.IF.C.7** *Graph functions expressed algebraically and show key features of the graph, with and without technology. Graph polynomial functions, identifying zeros when suitable factorizations are available, and showing end behavior. Graph rational functions, identifying zeros and asymptotes when suitable factorizations are available, and showing end behavior. Graph exponential and logarithmic functions, showing intercepts and end behavior. Graph trigonometric functions, showing period, midline, and amplitude.*
  - **HSF.IF.B.5** *Relate the domain of a function to its graph. Relate the domain of a function to the quantitative relationship it describes.*
  - **HSF.LE.A.2** *Construct linear and exponential equations, including arithmetic and geometric sequences, given a graph, a description of a relationship, or two input-output pairs (include reading these from a table).*

- **TRANSFORMATIONS OF PARENT FUNCTIONS**
  - **HSF.IF.C.7** *Graph functions expressed algebraically and show key features of the graph, with and without technology. Graph polynomial functions, identifying zeros when suitable factorizations are available, and showing end behavior. Graph rational functions, identifying zeros and asymptotes when suitable factorizations are available, and showing end behavior. Graph exponential and logarithmic functions, showing intercepts and end behavior. Graph trigonometric functions, showing period, midline, and amplitude.*
  - **HSF.BF.B.3** *Identify the effect on the graph of replacing f(x) by f(x) + k, k f(x), f(kx), and f(x + k) for specific values of k (both positive and negative); Find the value of k given the graphs of the transformed functions. Experiment with multiple transformations and illustrate an explanation of the effects on the graph with or without technology. Include recognizing even and odd functions from their graphs and algebraic expressions for them.*

- **MULTIPLE TRANSFORMATIONS OF PARENT FUNCTIONS**
  - **HSF.BF.B.3** *Identify the effect on the graph of replacing f(x) by f(x) + k, k f(x), f(kx), and f(x + k) for specific values of k (both positive and negative); Find the value of k given the graphs of the transformed functions. Experiment with multiple transformations and illustrate an explanation of the effects on the graph with or without technology. Include recognizing even and odd functions from their graphs and algebraic expressions for them.*
  - **HSF.IF.C.7** *Graph functions expressed algebraically and show key features of the graph, with and without technology. Graph polynomial functions, identifying zeros when suitable factorizations are available, and showing end behavior. Graph rational functions, identifying zeros and asymptotes when suitable factorizations are available, and showing end behavior. Graph exponential and logarithmic functions, showing intercepts and end behavior. Graph trigonometric functions, showing period, midline, and amplitude.*

22. LINEAR INEQUALITIES

- **GRAPHS OF LINEAR INEQUALITIES**
  - **HSA.REI.D.12** *Solve linear inequalities and systems of linear inequalities in two variables by graphing.*

- **SOLVING SYSTEMS OF LINEAR INEQUALITIES**
  - **HSA.CED.A.3** *Represent and interpret constraints by equations or inequalities, and by systems of equations and/or inequalities. Interpret solutions as viable or nonviable options in a modeling and/or real-world context.*
  - **HSA.REI.D.12** *Solve linear inequalities and systems of linear inequalities in two variables by graphing.*

23. SYSTEMS OF EQUATIONS

- **SOLVING THREE-VARIABLE SYSTEMS OF LINEAR EQUATIONS**
  - **HSA.CED.A.2** *Create equations in two or more variables to represent relationships between quantities. Graph equations, in two variables, on a coordinate plane.*
  - **HSA.CED.A.3** *Represent and interpret constraints by equations or inequalities, and by systems of equations and/or*

inequalities. Interpret solutions as viable or nonviable options in a modeling and/or real-world context.

- **HSA.REI.C.5** *Solve systems of equations in two variables using substitution and elimination. Understand that the solution to a system of equations will be the same when using substitution and elimination.*
- **HSA.REI.C.6** *Solve systems of equations algebraically and graphically.*

- **SYSTEMS OF NONLINEAR EQUATIONS**
  - **HSA.REI.C.6** *Solve systems of equations algebraically and graphically.*
  - **HSA.REI.C.7** *Solve systems of equations consisting of linear equations and nonlinear equations in two variables algebraically and graphically.*
  - **HSA.REI.C.5** *Solve systems of equations in two variables using substitution and elimination. Understand that the solution to a system of equations will be the same when using substitution and elimination.*
  - **HSA.REI.D.11** *Explain why the x-coordinates of the points where the graphs of the equations y = f(x) and y = g(x) intersect are the solutions of the equation f(x) = g(x); Find the solutions approximately by using technology to graph the functions, making tables of values, finding successive approximations. Include cases (but not limited to) where f(x) and/or g(x) are linear, polynomial, rational, exponential (Introduction in Algebra 1, Mastery in Algebra 2), logarithmic functions.*
  - **HSA.CED.A.3** *Represent and interpret constraints by equations or inequalities, and by systems of equations and/or inequalities. Interpret solutions as viable or nonviable options in a modeling and/or real-world context.*
  - **HSF.LE.A.2** *Construct linear and exponential equations, including arithmetic and geometric sequences, given a graph, a description of a relationship, or two input-output pairs (include reading these from a table).*

24. STATISTICAL DESIGN AND ANALYSIS

- **ANALYZING STATISTICAL SAMPLES**
  - **HSS.IC.A.1** *Recognize statistics as a process for making inferences about population parameters based on a random sample from that population.*

- **EXPERIMENTAL AND OBSERVATIONAL DESIGN**
  - **HSS.IC.B.3** *Recognize the purposes of and differences among sample surveys, experiments, and observational studies. Explain how randomization relates to sample surveys, experiments, and observational studies.*

25. STATISTICS

- **SCATTERPLOTS AND MODELING**
  - **HSS.ID.B.6** *Represent data on two quantitative variables on a scatter plot, and describe how the variables are related. Fit a function to the data; use functions fitted to data to solve problems in the context of the data.*

- **CONCLUSIONS IN DATA**
  - **HSS.IC.B.6** *Read and explain, in context, the validity of data from outside reports by identifying the variables as quantitative or categorical, describing how the data was collected, indicating any potential biases or flaws, identifying inferences the author of the report made from sample data.*

- **NORMAL DISTRIBUTION**
  - **HSS.ID.A.4** *Use the mean and standard deviation of a data set to fit it to a normal distribution and to estimate population percentages. Recognize that there are data sets for which such a procedure is not appropriate. Use calculators and/or spreadsheets to estimate areas under the normal curve.*

26. PROBABILITY

- **INTRODUCTION TO PROBABILITY**
- **CONDITIONAL PROBABILITY**
- **GEOMETRIC PROBABILITIES**