

NJSLA EOC Tutorials for New Jersey are designed specifically for the New Jersey Student Learning Standards to prepare students for the New Jersey Student Learning Assessment (NJSLA). EOC Categories are at the heart of NJSLA EOC Tutorial structure – bringing category-based learning to the student experience, and category-based performance and progress tracking to the teacher experience.

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.

Test-Taking Strategies for EOC Tutorials allow students to practice and apply learning approaches that will hone their test-taking skills and focus them for success on the day of their EOC test.

1. REAL NUMBER SYSTEM 1

• LAWS OF EXPONENTS

- **A-SSE.3c-1** Choose and produce an equivalent form of an expression to reveal and explain properties of the quantity represented by the expression, where exponentials are limited to integer exponents. c) Use the properties of exponents to transform expressions for exponential functions.
- **HS-D.2-5** Solve multi-step contextual word problems with degree of difficulty appropriate to the course, requiring application of course-level knowledge and skills articulated in A-CED, N-Q, A-SSE.3, AREI.6, A-REI.12, A-REI.11-1, limited to linear equations and exponential equations with integer exponents.

2. REAL NUMBER SYSTEM 2

• OPERATIONS ON RATIONAL AND IRRATIONAL NUMBERS

- **HS-C.2.1** Base explanations/reasoning on the properties of rational and irrational numbers. Content scope: N-RN.3
- **N-RN.B-1** Apply properties of rational and irrational numbers to identify rational and irrational numbers.

3. EQUATIONS AND INEQUALITIES

• ONE-STEP EQUATIONS AND INEQUALITIES

- **A-REI.3** Solve linear equations and inequalities in one variable, including equations with coefficients represented by letters.

• MULTI-STEP EQUATIONS AND INEQUALITIES

- **A-REI.3** Solve linear equations and inequalities in one variable, including equations with coefficients represented by letters.

4. APPLICATIONS OF EQUATIONS 1

• AXIOMS OF EQUALITY

- **A-REI.3** Solve linear equations and inequalities in one variable, including equations with coefficients represented by letters.
- **A-SSE.2-1** Use the structure of numerical expressions and polynomial expressions in one variable to identify ways to rewrite it.
- **A-SSE.2-4** Use the structure of a numerical expression or polynomial expression in one variable to rewrite it, in a case where two or more rewriting steps are required.

5. APPLICATIONS OF EQUATIONS 2

● LITERAL EQUATIONS

- **HS-D.2-5** Solve multi-step contextual word problems with degree of difficulty appropriate to the course, requiring application of course-level knowledge and skills articulated in A-CED, N-Q, A-SSE.3, AREI.6, A-REI.12, A-REI.11-1, limited to linear equations and exponential equations with integer exponents.
- **A-CED.4-1** Rearrange linear formulas to highlight a quantity of interest, using the same reasoning as in solving equations. For example, rearrange Ohm's law $V = IR$ to highlight resistance R .

6. WRITING EXPRESSIONS AND EQUATIONS 1

● FORMULATING AND SIMPLIFYING ALGEBRAIC EXPRESSIONS

- **A-SSE.2-1** Use the structure of numerical expressions and polynomial expressions in one variable to identify ways to rewrite it.
- **A-SSE.2-4** Use the structure of a numerical expression or polynomial expression in one variable to rewrite it, in a case where two or more rewriting steps are required.

● FORMULATING AND SOLVING INEQUALITIES FROM WORD PROBLEMS

- **A-REI.3** Solve linear equations and inequalities in one variable, including equations with coefficients represented by letters.

7. WRITING EXPRESSIONS AND EQUATIONS 2

● FORMULATING AND SOLVING EQUATIONS FROM WORD PROBLEMS

- **A-REI.3** Solve linear equations and inequalities in one variable, including equations with coefficients represented by letters.
- **HS-Int.3-1** Solve multi-step contextual word problems with degree of difficulty appropriate to the course, requiring application of course-level knowledge and skills articulated in F-LE, ACED.1, A-SSE.3, F-IF.B, F-IF.7, limited to linear functions and exponential functions with domains in the integers.
- **HS-Int.3-2** Solve multi-step contextual word problems with degree of difficulty appropriate to the course, requiring application of course-level knowledge and skills articulated in F-LE, ACED.1, A-SSE.3, F-IF.B, F-IF.7, limited to linear, quadratic, and exponential functions.
- **HS-D.2-5** Solve multi-step contextual word problems with degree of difficulty appropriate to the course, requiring application of course-level knowledge and skills articulated in A-CED, N-Q, A-SSE.3, AREI.6, A-REI.12, A-REI.11-1, limited to linear equations and exponential equations with integer exponents.
- **HS-D.2-6** Solve multi-step contextual word problems with degree of difficulty appropriate to the course, requiring application of course-level knowledge and skills articulated in A-CED, N-Q.2, A-SSE.3, A-REI.6, A-REI.12, A-REI.11-1, limited to linear and quadratic equations.
- **HS-D.2-8** Solve multi-step contextual word problems with degree of difficulty appropriate to the course, requiring application of course-level knowledge and skills articulated in F-BF.1a, F-BF.3, ACED.1, A-SSE.3, F-IF.B, F-IF.7, limited to linear functions and exponential functions with domains in the integers.
- **HS-D.2-9** Solve multi-step contextual word problems with degree of difficulty appropriate to the course, requiring application of course-level knowledge and skills articulated in F-BF.1a, F-BF.3, ACED.1, A-SSE.3, F-IF.B, F-IF.7, limited to linear and quadratic functions.

8. FUNCTIONS 1

● DOMAIN AND RANGE

- **F-IF.1** Understand that a function from one set (called the domain) to another set (called the range) assigns to each element of the domain exactly one element of the range. If f is a function and x is an element of its domain, then $f(x)$ denotes the output of f corresponding to the input x . The graph of f is the graph of the equation $y = f(x)$.
- **F-IF.5-1** Relate the domain of a function to a graph and, where applicable, to the quantitative relationship it describes, limiting

to linear functions, square root functions, cube root functions, piecewise-defined functions (including step functions and absolute-value functions), and exponential functions with domains in the integers. For example, if the function $h(n)$ gives the number of person-hours it takes to assemble n engines in a factory, then the positive integers would be an appropriate domain for this function.

- **F-IF.5-2** Relate the domain of a function to a graph and, where applicable, to the quantitative relationship it describes, limiting to quadratic functions. For example, if the function $h(n)$ gives the number of person-hours it takes to assemble n engines in a factory, then the positive integers would be an appropriate domain for this function.

- **FUNCTIONS AND RELATIONS**

- **F-IF.2** Use function notation, evaluate functions for inputs in their domains, and interpret statements that use function notation in terms of a context.
- **F-IF.1** Understand that a function from one set (called the domain) to another set (called the range) assigns to each element of the domain exactly one element of the range. If f is a function and x is an element of its domain, then $f(x)$ denotes the output of f corresponding to the input x . The graph of f is the graph of the equation $y = f(x)$.
- **F-IF.A.Int.1** Understand the concept of a function and use function notation.

9. FUNCTIONS 2

- **EVALUATING FUNCTIONS**

- **F-IF.2** Use function notation, evaluate functions for inputs in their domains, and interpret statements that use function notation in terms of a context.
- **HS-D.2-9** Solve multi-step contextual word problems with degree of difficulty appropriate to the course, requiring application of course-level knowledge and skills articulated in F-BF.1a, F-BF.3, ACED.1, A-SSE.3, F-IF.B, F-IF.7, limited to linear and quadratic functions.

10. INTRODUCTION TO LINEAR FUNCTIONS 1

- **SLOPE**

- **F-IF.6-6a** Estimate the rate of change from a graph of linear functions and quadratic functions.
- **F-IF.6-6b** Estimate the rate of change from a graph of linear functions, quadratic functions, square root functions, cube root functions, piecewise-defined functions (including step functions and absolute value functions), and/or exponential functions with domains in the integers.
- **F-IF.6-1a** Calculate and interpret the average rate of change of a function (presented symbolically or as a table) over a specified interval with functions limited to linear, exponential (with domains in the integers), and quadratic functions.
- **F-IF.6-1b** Calculate and interpret the average rate of change of a function (presented symbolically or as a table) over a specified interval with functions limited to square root, cube root, and piecewise-defined (including step and absolute value functions) functions.

11. INTRODUCTION TO LINEAR FUNCTIONS 2

- **GRAPHING AND ANALYZING LINEAR FUNCTIONS**

- **A-REI.10** Understand that the graph of an equation in two variables is the set of all its solutions plotted in the coordinate plane, often forming a curve (which could be a line).
- **F-LE.2-2** Solve multi-step contextual problems with degree of difficulty appropriate to the course by constructing linear and/or exponential function models, where exponentials are limited to integer exponents.
- **F-Int.1-1** Given a verbal description of a linear or quadratic functional dependence, write an expression for the function and demonstrate various knowledge and skills articulated in the Functions category in relation to this function.
- **S-ID.Int.1** Solve multi-step contextual word problems with degree of difficulty appropriate to the course, requiring application of course-level knowledge and skills articulated in S-ID, excluding normal distributions and limiting function fitting to linear functions and exponential functions with domains in the integers.
- **S-ID.Int.2** Solve multi-step contextual word problems with degree of difficulty appropriate to the course, requiring application of course-level knowledge and skills articulated in S-ID, excluding normal distributions and limiting function fitting to quadratic, linear, and exponential (with domains in the integers) functions with an emphasis on quadratic functions.
- **HS-D.2-8** Solve multi-step contextual word problems with degree of difficulty appropriate to the course, requiring application of course-level knowledge and skills articulated in F-BF.1a, F-BF.3, ACED.1, A-SSE.3, F-IF.B, F-IF.7, limited to linear functions and exponential functions with domains in the integers.

- **HS-D.2-9** Solve multi-step contextual word problems with degree of difficulty appropriate to the course, requiring application of course-level knowledge and skills articulated in F-BF.1a, F-BF.3, ACED.1, A-SSE.3, F-IF.B, F-IF.7, limited to linear and quadratic functions.
- **F-IF.4-1** For a linear or quadratic 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. Key features include: intercepts; intervals where the function is increasing, decreasing, positive, or negative; relative maximums and minimums; end behavior; and symmetries.
- **F-IF.7a-1** Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases. a) Graph linear functions and show intercepts.

12. GRAPHING LINEAR FUNCTIONS

● GRAPHING AND MANIPULATING $Y = MX + B$

- **F-IF.6-1a** Calculate and interpret the average rate of change of a function (presented symbolically or as a table) over a specified interval with functions limited to linear, exponential (with domains in the integers), and quadratic functions.
- **F-IF.6-6a** Estimate the rate of change from a graph of linear functions and quadratic functions.
- **F-IF.6-6b** Estimate the rate of change from a graph of linear functions, quadratic functions, square root functions, cube root functions, piecewise-defined functions (including step functions and absolute value functions), and/or exponential functions with domains in the integers.
- **HS-C.18.1** Construct, autonomously, chains of reasoning that will justify or refute propositions or conjectures about linear equations in one or two variables. Content scope: 8.EE.B
- **HS-D.1-1** Solve multi-step contextual problems with degree of difficulty appropriate to the course, requiring application of knowledge and skills articulated in 7.RP.A, 7.NS.3, 7.EE, and/or 8.EE.
- **HS-D.2-8** Solve multi-step contextual word problems with degree of difficulty appropriate to the course, requiring application of course-level knowledge and skills articulated in F-BF.1a, F-BF.3, ACED.1, A-SSE.3, F-IF.B, F-IF.7, limited to linear functions and exponential functions with domains in the integers.
- **HS-D.2-9** Solve multi-step contextual word problems with degree of difficulty appropriate to the course, requiring application of course-level knowledge and skills articulated in F-BF.1a, F-BF.3, ACED.1, A-SSE.3, F-IF.B, F-IF.7, limited to linear and quadratic functions.

● SLOPE-INTERCEPT FORM OF A LINEAR EQUATION

- **HS-C.18.1** Construct, autonomously, chains of reasoning that will justify or refute propositions or conjectures about linear equations in one or two variables. Content scope: 8.EE.B
- **HS-D.1-1** Solve multi-step contextual problems with degree of difficulty appropriate to the course, requiring application of knowledge and skills articulated in 7.RP.A, 7.NS.3, 7.EE, and/or 8.EE.
- **F-IF.6-1a** Calculate and interpret the average rate of change of a function (presented symbolically or as a table) over a specified interval with functions limited to linear, exponential (with domains in the integers), and quadratic functions.
- **F-IF.6-6a** Estimate the rate of change from a graph of linear functions and quadratic functions.
- **HS-Int.3-1** Solve multi-step contextual word problems with degree of difficulty appropriate to the course, requiring application of course-level knowledge and skills articulated in F-LE, ACED.1, A-SSE.3, F-IF.B, F-IF.7, limited to linear functions and exponential functions with domains in the integers.
- **HS-Int.3-2** Solve multi-step contextual word problems with degree of difficulty appropriate to the course, requiring application of course-level knowledge and skills articulated in F-LE, ACED.1, A-SSE.3, F-IF.B, F-IF.7, limited to linear, quadratic, and exponential functions.
- **HS-D.2-5** Solve multi-step contextual word problems with degree of difficulty appropriate to the course, requiring application of course-level knowledge and skills articulated in A-CED, N-Q, A-SSE.3, AREI.6, A-REI.12, A-REI.11-1, limited to linear equations and exponential equations with integer exponents.
- **HS-D.2-6** Solve multi-step contextual word problems with degree of difficulty appropriate to the course, requiring application of course-level knowledge and skills articulated in A-CED, N-Q.2, A-SSE.3, A-REI.6, A-REI.12, A-REI.11-1, limited to linear and quadratic equations.
- **HS-D.2-8** Solve multi-step contextual word problems with degree of difficulty appropriate to the course, requiring application of course-level knowledge and skills articulated in F-BF.1a, F-BF.3, ACED.1, A-SSE.3, F-IF.B, F-IF.7, limited to linear functions and exponential functions with domains in the integers.
- **HS-D.2-9** Solve multi-step contextual word problems with degree of difficulty appropriate to the course, requiring application of course-level knowledge and skills articulated in F-BF.1a, F-BF.3, ACED.1, A-SSE.3, F-IF.B, F-IF.7, limited to linear and quadratic functions.

13. LINEAR EQUATIONS

• POINT-SLOPE FORM OF A LINEAR EQUATION

- **F-LE.2-1** Construct linear and exponential functions, including arithmetic and geometric sequences, given a graph, a description of a relationship, or two input-output pairs (include reading these from a table).
- **HS-C.18.1** Construct, autonomously, chains of reasoning that will justify or refute propositions or conjectures about linear equations in one or two variables. Content scope: 8.EE.B
- **HS-D.1-1** Solve multi-step contextual problems with degree of difficulty appropriate to the course, requiring application of knowledge and skills articulated in 7.RP.A, 7.NS.3, 7.EE, and/or 8.EE.

14. SOLVING SYSTEMS OF LINEAR EQUATIONS 1

• SOLVING SYSTEMS OF LINEAR EQUATIONS: GUESS AND CHECK

- **A-REI.6-1** Solve multi-step contextual problems that require writing and analyzing systems of linear equations exactly and approximately (e.g., with graphs), focusing on pairs of linear equations in two variables.
- **A-REI.11-1** Find the solutions of where the graphs of the equations $y = f(x)$ and $y = g(x)$ intersect, e.g., using technology to graph the functions, make tables of values or find successive approximations. Limit $f(x)$ and/or $g(x)$ to linear and quadratic functions.
- **HS-C.5.10-1** Given an equation or system of equations, reason about the number or nature of the solutions. Content scope: A-REI.11, limited to equations of the form $f(x) = g(x)$ where f and g are linear or quadratic.
- **HS-D.2-5** Solve multi-step contextual word problems with degree of difficulty appropriate to the course, requiring application of course-level knowledge and skills articulated in A-CED, N-Q, A-SSE.3, AREI.6, A-REI.12, A-REI.11-1, limited to linear equations and exponential equations with integer exponents.
- **HS-D.2-6** Solve multi-step contextual word problems with degree of difficulty appropriate to the course, requiring application of course-level knowledge and skills articulated in A-CED, N-Q.2, A-SSE.3, A-REI.6, A-REI.12, A-REI.11-1, limited to linear and quadratic equations.
- **HS-C.5.6** Given a system of equations, reason about the number or nature of the solutions. Content scope: A-REI.5

• SOLVING SYSTEMS OF LINEAR EQUATIONS: GRAPHING

- **A-REI.6-1** Solve multi-step contextual problems that require writing and analyzing systems of linear equations exactly and approximately (e.g., with graphs), focusing on pairs of linear equations in two variables.
- **HS-C.6.1** Base explanations/reasoning on the principle that the graph of an equation and inequalities in two variables is the set of all its solutions plotted in the coordinate plane. Content scope: A-REI.D, excluding exponential and logarithmic functions.
- **A-REI.11-1** Find the solutions of where the graphs of the equations $y = f(x)$ and $y = g(x)$ intersect, e.g., using technology to graph the functions, make tables of values or find successive approximations. Limit $f(x)$ and/or $g(x)$ to linear and quadratic functions.
- **HS-C.5.10-1** Given an equation or system of equations, reason about the number or nature of the solutions. Content scope: A-REI.11, limited to equations of the form $f(x) = g(x)$ where f and g are linear or quadratic.
- **HS-D.2-5** Solve multi-step contextual word problems with degree of difficulty appropriate to the course, requiring application of course-level knowledge and skills articulated in A-CED, N-Q, A-SSE.3, AREI.6, A-REI.12, A-REI.11-1, limited to linear equations and exponential equations with integer exponents.
- **HS-D.2-6** Solve multi-step contextual word problems with degree of difficulty appropriate to the course, requiring application of course-level knowledge and skills articulated in A-CED, N-Q.2, A-SSE.3, A-REI.6, A-REI.12, A-REI.11-1, limited to linear and quadratic equations.
- **HS-C.5.6** Given a system of equations, reason about the number or nature of the solutions. Content scope: A-REI.5

15. SOLVING SYSTEMS OF LINEAR EQUATIONS 2

• SOLVING SYSTEMS OF LINEAR EQUATIONS: SUBSTITUTION

- **A-REI.6-1** Solve multi-step contextual problems that require writing and analyzing systems of linear equations exactly and approximately (e.g., with graphs), focusing on pairs of linear equations in two variables.
- **HS-D.2-5** Solve multi-step contextual word problems with degree of difficulty appropriate to the course, requiring application of course-level knowledge and skills articulated in A-CED, N-Q, A-SSE.3, AREI.6, A-REI.12, A-REI.11-1, limited to linear equations and exponential equations with integer exponents.
- **HS-D.2-6** Solve multi-step contextual word problems with degree of difficulty appropriate to the course, requiring application of course-level knowledge and skills articulated in A-CED, N-Q.2, A-SSE.3, A-REI.6, A-REI.12, A-REI.11-1, limited to linear

and quadratic equations.

- **HS-C.5.6** Given a system of equations, reason about the number or nature of the solutions. Content scope: A-REI.5
- **HS-C.5.10-1** Given an equation or system of equations, reason about the number or nature of the solutions. Content scope: A-REI.11, limited to equations of the form $f(x) = g(x)$ where f and g are linear or quadratic.

• SOLVING SYSTEMS OF LINEAR EQUATIONS: ELIMINATION

- **A-REI.6-1** Solve multi-step contextual problems that require writing and analyzing systems of linear equations exactly and approximately (e.g., with graphs), focusing on pairs of linear equations in two variables.
- **HS-C.5.10-1** Given an equation or system of equations, reason about the number or nature of the solutions. Content scope: A-REI.11, limited to equations of the form $f(x) = g(x)$ where f and g are linear or quadratic.
- **HS-D.2-5** Solve multi-step contextual word problems with degree of difficulty appropriate to the course, requiring application of course-level knowledge and skills articulated in A-CED, N-Q, A-SSE.3, A-REI.6, A-REI.12, A-REI.11-1, limited to linear equations and exponential equations with integer exponents.
- **HS-D.2-6** Solve multi-step contextual word problems with degree of difficulty appropriate to the course, requiring application of course-level knowledge and skills articulated in A-CED, N-Q.2, A-SSE.3, A-REI.6, A-REI.12, A-REI.11-1, limited to linear and quadratic equations.
- **HS-C.5.6** Given a system of equations, reason about the number or nature of the solutions. Content scope: A-REI.5

16. LINEAR INEQUALITIES

• GRAPHS OF LINEAR INEQUALITIES

- **A-REI.12** Graph the solutions to a linear inequality in two variables as a half-plane (excluding the boundary in the case of a strict inequality), and graph the solution set to a system of linear inequalities in two variables as the intersection of the corresponding half-planes.
- **HS-C.6.1** Base explanations/reasoning on the principle that the graph of an equation and inequalities in two variables is the set of all its solutions plotted in the coordinate plane. Content scope: A-REI.D, excluding exponential and logarithmic functions.
- **HS-D.3-3a** Reasoned estimates: Use reasonable estimates of known quantities in a chain of reasoning that yields an estimate of an unknown quantity. Content Scope: Knowledge and skills articulated in the Algebra I Type I, Sub-Claim A Evidence Statements.

• SOLVING SYSTEMS OF LINEAR INEQUALITIES

- **A-CED.3-1** Solve multi-step contextual problems that require writing and analyzing systems of linear inequalities in two variables to find viable solutions.
- **HS-C.6.1** Base explanations/reasoning on the principle that the graph of an equation and inequalities in two variables is the set of all its solutions plotted in the coordinate plane. Content scope: A-REI.D, excluding exponential and logarithmic functions.
- **HS-D.3-3a** Reasoned estimates: Use reasonable estimates of known quantities in a chain of reasoning that yields an estimate of an unknown quantity. Content Scope: Knowledge and skills articulated in the Algebra I Type I, Sub-Claim A Evidence Statements.

17. EXPONENTIAL FUNCTIONS

• EXPONENTIAL FUNCTIONS

- **F-IF.5-1** Relate the domain of a function to a graph and, where applicable, to the quantitative relationship it describes, limiting to linear functions, square root functions, cube root functions, piecewise-defined functions (including step functions and absolute-value functions), and exponential functions with domains in the integers. For example, if the function $h(n)$ gives the number of person-hours it takes to assemble n engines in a factory, then the positive integers would be an appropriate domain for this function.
- **F-IF.6-1a** Calculate and interpret the average rate of change of a function (presented symbolically or as a table) over a specified interval with functions limited to linear, exponential (with domains in the integers), and quadratic functions.
- **F-IF.6-6b** Estimate the rate of change from a graph of linear functions, quadratic functions, square root functions, cube root functions, piecewise-defined functions (including step functions and absolute value functions), and/or exponential functions with domains in the integers.
- **HS-C.10.1** Express reasoning about linear and exponential growth. Content scope: F-LE.1a
- **A-SSE.1-1** Interpret exponential expressions, including related numerical expressions that represent a quantity in terms of its

context. a) Interpret parts of an expression, such as terms, factors, and coefficients. b) Interpret complicated expressions by viewing one or more of their parts as a single entity. For example, interpret $P(1 + r)^n$ as the product of P and a factor not depending on P .

- **S-ID.Int.1** Solve multi-step contextual word problems with degree of difficulty appropriate to the course, requiring application of course-level knowledge and skills articulated in S-ID, excluding normal distributions and limiting function fitting to linear functions and exponential functions with domains in the integers.
- **S-ID.Int.2** Solve multi-step contextual word problems with degree of difficulty appropriate to the course, requiring application of course-level knowledge and skills articulated in S-ID, excluding normal distributions and limiting function fitting to quadratic, linear, and exponential (with domains in the integers) functions with an emphasis on quadratic functions.
- **HS-Int.3-1** Solve multi-step contextual word problems with degree of difficulty appropriate to the course, requiring application of course-level knowledge and skills articulated in F-LE, ACED.1, A-SSE.3, F-IF.B, F-IF.7, limited to linear functions and exponential functions with domains in the integers.
- **HS-Int.3-2** Solve multi-step contextual word problems with degree of difficulty appropriate to the course, requiring application of course-level knowledge and skills articulated in F-LE, ACED.1, A-SSE.3, F-IF.B, F-IF.7, limited to linear, quadratic, and exponential functions.
- **HS-D.2-5** Solve multi-step contextual word problems with degree of difficulty appropriate to the course, requiring application of course-level knowledge and skills articulated in A-CED, N-Q, A-SSE.3, AREI.6, A-REI.12, A-REI.11-1, limited to linear equations and exponential equations with integer exponents.
- **HS-D.2-8** Solve multi-step contextual word problems with degree of difficulty appropriate to the course, requiring application of course-level knowledge and skills articulated in F-BF.1a, F-BF.3, ACED.1, A-SSE.3, F-IF.B, F-IF.7, limited to linear functions and exponential functions with domains in the integers.

● EXPONENTIAL GROWTH AND DECAY

- **A-SSE.1-1** Interpret exponential expressions, including related numerical expressions that represent a quantity in terms of its context. a) Interpret parts of an expression, such as terms, factors, and coefficients. b) Interpret complicated expressions by viewing one or more of their parts as a single entity. For example, interpret $P(1 + r)^n$ as the product of P and a factor not depending on P .
- **F-IF.6-1a** Calculate and interpret the average rate of change of a function (presented symbolically or as a table) over a specified interval with functions limited to linear, exponential (with domains in the integers), and quadratic functions.
- **HS-C.10.1** Express reasoning about linear and exponential growth. Content scope: F-LE.1a
- **HS-D.2-5** Solve multi-step contextual word problems with degree of difficulty appropriate to the course, requiring application of course-level knowledge and skills articulated in A-CED, N-Q, A-SSE.3, AREI.6, A-REI.12, A-REI.11-1, limited to linear equations and exponential equations with integer exponents.
- **HS-D.2-8** Solve multi-step contextual word problems with degree of difficulty appropriate to the course, requiring application of course-level knowledge and skills articulated in F-BF.1a, F-BF.3, ACED.1, A-SSE.3, F-IF.B, F-IF.7, limited to linear functions and exponential functions with domains in the integers.
- **F-IF.6-6b** Estimate the rate of change from a graph of linear functions, quadratic functions, square root functions, cube root functions, piecewise-defined functions (including step functions and absolute value functions), and/or exponential functions with domains in the integers.

18. SEQUENCES

● SEQUENCES

- **F-LE.2-1** Construct linear and exponential functions, 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

- **F-LE.2-1** Construct linear and exponential functions, including arithmetic and geometric sequences, given a graph, a description of a relationship, or two input-output pairs (include reading these from a table).

19. POLYNOMIALS 1

● POLYNOMIAL BASICS

- **A-SSE.2-1** Use the structure of numerical expressions and polynomial expressions in one variable to identify ways to rewrite it.

20. POLYNOMIALS 2

• ADDITION AND SUBTRACTION OF POLYNOMIALS

- **A-APR.1-1** Add, subtract, and multiply polynomials.
- **HS-C.8.1** Construct, autonomously, chains of reasoning that will justify or refute algebraic propositions or conjectures.
Content scope: A-APR.1

• MULTIPLICATION OF POLYNOMIALS

- **A-APR.1-1** Add, subtract, and multiply polynomials.
- **HS-C.8.1** Construct, autonomously, chains of reasoning that will justify or refute algebraic propositions or conjectures.
Content scope: A-APR.1

21. FACTORING 1

• FACTORING QUADRATIC TRINOMIALS

- **A-SSE.3a** Choose and produce an equivalent form of an expression to reveal and explain properties of the quantity represented by the expression. a) Factor a quadratic expression to reveal the zeros of the function it defines.
- **HS-D.2-6** Solve multi-step contextual word problems with degree of difficulty appropriate to the course, requiring application of course-level knowledge and skills articulated in A-CED, N-Q.2, A-SSE.3, A-REI.6, A-REI.12, A-REI.11-1, limited to linear and quadratic equations.
- **HS-D.2-9** Solve multi-step contextual word problems with degree of difficulty appropriate to the course, requiring application of course-level knowledge and skills articulated in F-BF.1a, F-BF.3, ACED.1, A-SSE.3, F-IF.B, F-IF.7, limited to linear and quadratic functions.

• FACTORING SPECIAL CASES

- **A-APR.3-1** Identify zeros of quadratic and cubic polynomials in which linear and quadratic factors are available, and use the zeros to construct a rough graph of the function defined by the polynomial.
- **A-SSE.3a** Choose and produce an equivalent form of an expression to reveal and explain properties of the quantity represented by the expression. a) Factor a quadratic expression to reveal the zeros of the function it defines.
- **HS-D.2-6** Solve multi-step contextual word problems with degree of difficulty appropriate to the course, requiring application of course-level knowledge and skills articulated in A-CED, N-Q.2, A-SSE.3, A-REI.6, A-REI.12, A-REI.11-1, limited to linear and quadratic equations.
- **HS-D.2-9** Solve multi-step contextual word problems with degree of difficulty appropriate to the course, requiring application of course-level knowledge and skills articulated in F-BF.1a, F-BF.3, ACED.1, A-SSE.3, F-IF.B, F-IF.7, limited to linear and quadratic functions.

22. FACTORING 2

• FACTORING HIGHER-ORDER POLYNOMIALS

- **A-SSE.2-4** Use the structure of a numerical expression or polynomial expression in one variable to rewrite it, in a case where two or more rewriting steps are required.
- **A-APR.3-1** Identify zeros of quadratic and cubic polynomials in which linear and quadratic factors are available, and use the zeros to construct a rough graph of the function defined by the polynomial.

23. GRAPHS OF QUADRATIC FUNCTIONS

• QUADRATIC PARENT FUNCTION

- **HS-Int.3-2** Solve multi-step contextual word problems with degree of difficulty appropriate to the course, requiring application of course-level knowledge and skills articulated in F-LE, ACED.1, A-SSE.3, F-IF.B, F-IF.7, limited to linear, quadratic, and exponential functions.
- **HS-C.12.1** Construct, autonomously, chains of reasoning that will justify or refute propositions or conjectures about functions
Content scope: F-IF.8a
- **F-IF.7a-2** Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases. a) Graph quadratic functions and show intercepts, maxima, and minima.
- **F-IF.8a** Write a function defined by an expression in different but equivalent forms to reveal and explain different properties

of the function. a) Use the process of factoring and completing the square in a quadratic function to show zeros, extreme values, and symmetry of the graph, and interpret these in terms of a context.

- **HS-D.2-9** Solve multi-step contextual word problems with degree of difficulty appropriate to the course, requiring application of course-level knowledge and skills articulated in F-BF.1a, F-BF.3, ACED.1, A-SSE.3, F-IF.B, F-IF.7, limited to linear and quadratic functions.

● ANALYZING GRAPHS OF QUADRATIC FUNCTIONS

- **F-IF.5-2** Relate the domain of a function to a graph and, where applicable, to the quantitative relationship it describes, limiting to quadratic functions. For example, if the function $h(n)$ gives the number of person-hours it takes to assemble n engines in a factory, then the positive integers would be an appropriate domain for this function.
- **F-IF.4-1** For a linear or quadratic 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. Key features include: intercepts; intervals where the function is increasing, decreasing, positive, or negative; relative maximums and minimums; end behavior; and symmetries.
- **HS-C.12.1** Construct, autonomously, chains of reasoning that will justify or refute propositions or conjectures about functions
Content scope: F-IF.8a
- **HS-D.2-9** Solve multi-step contextual word problems with degree of difficulty appropriate to the course, requiring application of course-level knowledge and skills articulated in F-BF.1a, F-BF.3, ACED.1, A-SSE.3, F-IF.B, F-IF.7, limited to linear and quadratic functions.
- **F-IF.7a-2** Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases. a) Graph quadratic functions and show intercepts, maxima, and minima.
- **F-IF.8a** Write a function defined by an expression in different but equivalent forms to reveal and explain different properties of the function. a) Use the process of factoring and completing the square in a quadratic function to show zeros, extreme values, and symmetry of the graph, and interpret these in terms of a context.
- **HS-Int.3-2** Solve multi-step contextual word problems with degree of difficulty appropriate to the course, requiring application of course-level knowledge and skills articulated in F-LE, ACED.1, A-SSE.3, F-IF.B, F-IF.7, limited to linear, quadratic, and exponential functions.

● REPRESENTATIONS OF QUADRATIC FUNCTIONS

- **F-IF.5-2** Relate the domain of a function to a graph and, where applicable, to the quantitative relationship it describes, limiting to quadratic functions. For example, if the function $h(n)$ gives the number of person-hours it takes to assemble n engines in a factory, then the positive integers would be an appropriate domain for this function.
- **HS-Int.1** Solve multi-step contextual problems with degree of difficulty appropriate to the course by constructing quadratic function models and/or writing and solving quadratic equations.
- **A-SSE.1-2** Interpret quadratic expressions that represent a quantity in terms of its context. a) Interpret parts of an expression, such as terms, factors, and coefficients. b) Interpret complicated expressions by viewing one or more of their parts as a single entity.
- **F-IF.4-1** For a linear or quadratic 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. Key features include: intercepts; intervals where the function is increasing, decreasing, positive, or negative; relative maximums and minimums; end behavior; and symmetries.
- **F-IF.7a-2** Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases. a) Graph quadratic functions and show intercepts, maxima, and minima.
- **F-Int.1-1** Given a verbal description of a linear or quadratic functional dependence, write an expression for the function and demonstrate various knowledge and skills articulated in the Functions category in relation to this function.
- **S-ID.Int.2** Solve multi-step contextual word problems with degree of difficulty appropriate to the course, requiring application of course-level knowledge and skills articulated in S-ID, excluding normal distributions and limiting function fitting to quadratic, linear, and exponential (with domains in the integers) functions with an emphasis on quadratic functions.
- **HS-Int.2** Solve multi-step mathematical problems with degree of difficulty appropriate to the course that requires analyzing quadratic functions and/or writing and solving quadratic equations.
- **HS-C.16.2** Given an equation or system of equations, present the solution steps as a logical argument that concludes with the set of solutions (if any). Tasks are limited to quadratic equations. Content scope: A-REI.1, A-REI.4a, A-REI.4b, limited to real solutions only.
- **HS-D.2-9** Solve multi-step contextual word problems with degree of difficulty appropriate to the course, requiring application of course-level knowledge and skills articulated in F-BF.1a, F-BF.3, ACED.1, A-SSE.3, F-IF.B, F-IF.7, limited to linear and quadratic functions.

24. SOLVING QUADRATIC FUNCTIONS 1

• SOLVING QUADRATIC EQUATIONS BY FACTORING

- **A-REI.4b-1** Solve quadratic equations in one variable. b) Solve quadratic equations with rational number coefficients by inspection (e.g., for $x^2 = 49$), taking square roots, completing the square, the quadratic formula and factoring, as appropriate to the initial form of the equation.
- **A-SSE.1-2** Interpret quadratic expressions that represent a quantity in terms of its context. a) Interpret parts of an expression, such as terms, factors, and coefficients. b) Interpret complicated expressions by viewing one or more of their parts as a single entity.
- **HS-Int.1** Solve multi-step contextual problems with degree of difficulty appropriate to the course by constructing quadratic function models and/or writing and solving quadratic equations.
- **HS-Int.2** Solve multi-step mathematical problems with degree of difficulty appropriate to the course that requires analyzing quadratic functions and/or writing and solving quadratic equations.
- **HS-C.16.2** Given an equation or system of equations, present the solution steps as a logical argument that concludes with the set of solutions (if any). Tasks are limited to quadratic equations. Content scope: A-REI.1, A-REI.4a, A-REI.4b, limited to real solutions only.
- **HS-D.2-6** Solve multi-step contextual word problems with degree of difficulty appropriate to the course, requiring application of course-level knowledge and skills articulated in A-CED, N-Q.2, A-SSE.3, A-REI.6, A-REI.12, A-REI.11-1, limited to linear and quadratic equations.
- **HS-D.2-9** Solve multi-step contextual word problems with degree of difficulty appropriate to the course, requiring application of course-level knowledge and skills articulated in F-BF.1a, F-BF.3, ACED.1, A-SSE.3, F-IF.B, F-IF.7, limited to linear and quadratic functions.
- **A-APR.3-1** Identify zeros of quadratic and cubic polynomials in which linear and quadratic factors are available, and use the zeros to construct a rough graph of the function defined by the polynomial.
- **A-SSE.3a** Choose and produce an equivalent form of an expression to reveal and explain properties of the quantity represented by the expression. a) Factor a quadratic expression to reveal the zeros of the function it defines.
- **HS-C.5.5** Given an equation or system of equations, reason about the number or nature of the solutions. Content scope: A-REI.4a, A-REI.4b, limited to real solutions only.
- **HS-C.5.10-1** Given an equation or system of equations, reason about the number or nature of the solutions. Content scope: A-REI.11, limited to equations of the form $f(x) = g(x)$ where f and g are linear or quadratic.

• COMPLETING THE SQUARE

- **A-REI.4a-1** Solve quadratic equations in one variable. a) 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.
- **A-REI.4b-1** Solve quadratic equations in one variable. b) Solve quadratic equations with rational number coefficients by inspection (e.g., for $x^2 = 49$), taking square roots, completing the square, the quadratic formula and factoring, as appropriate to the initial form of the equation.
- **A-SSE.3b** Choose and produce an equivalent form of an expression to reveal and explain properties of the quantity represented by the expression. a) Complete the square in a quadratic expression to reveal the maximum or minimum value of the function it defines.
- **HS-Int.1** Solve multi-step contextual problems with degree of difficulty appropriate to the course by constructing quadratic function models and/or writing and solving quadratic equations.
- **HS-Int.2** Solve multi-step mathematical problems with degree of difficulty appropriate to the course that requires analyzing quadratic functions and/or writing and solving quadratic equations.
- **HS-C.5.5** Given an equation or system of equations, reason about the number or nature of the solutions. Content scope: A-REI.4a, A-REI.4b, limited to real solutions only.
- **HS-C.12.1** Construct, autonomously, chains of reasoning that will justify or refute propositions or conjectures about functions. Content scope: F-IF.8a
- **HS-C.16.2** Given an equation or system of equations, present the solution steps as a logical argument that concludes with the set of solutions (if any). Tasks are limited to quadratic equations. Content scope: A-REI.1, A-REI.4a, A-REI.4b, limited to real solutions only.
- **HS-D.2-6** Solve multi-step contextual word problems with degree of difficulty appropriate to the course, requiring application of course-level knowledge and skills articulated in A-CED, N-Q.2, A-SSE.3, A-REI.6, A-REI.12, A-REI.11-1, limited to linear and quadratic equations.
- **HS-D.2-9** Solve multi-step contextual word problems with degree of difficulty appropriate to the course, requiring application of course-level knowledge and skills articulated in F-BF.1a, F-BF.3, ACED.1, A-SSE.3, F-IF.B, F-IF.7, limited to linear and quadratic functions.
- **A-SSE.1-2** Interpret quadratic expressions that represent a quantity in terms of its context. a) Interpret parts of an

expression, such as terms, factors, and coefficients. b) Interpret complicated expressions by viewing one or more of their parts as a single entity.

25. SOLVING QUADRATIC FUNCTIONS 2

● QUADRATIC FORMULA

- **A-REI.4b-1** Solve quadratic equations in one variable. b) Solve quadratic equations with rational number coefficients by inspection (e.g., for $x^2 = 49$), taking square roots, completing the square, the quadratic formula and factoring, as appropriate to the initial form of the equation.
- **A-REI.4b-2** Solve quadratic equations in one variable. b) Recognize when the quadratic formula gives complex solutions.
- **HS-Int.1** Solve multi-step contextual problems with degree of difficulty appropriate to the course by constructing quadratic function models and/or writing and solving quadratic equations.
- **HS-Int.2** Solve multi-step mathematical problems with degree of difficulty appropriate to the course that requires analyzing quadratic functions and/or writing and solving quadratic equations.
- **HS-C.5.5** Given an equation or system of equations, reason about the number or nature of the solutions. Content scope: A-REI.4a, A-REI.4b, limited to real solutions only.
- **HS-C.16.2** Given an equation or system of equations, present the solution steps as a logical argument that concludes with the set of solutions (if any). Tasks are limited to quadratic equations. Content scope: A-REI.1, A-REI.4a, A-REI.4b, limited to real solutions only.
- **HS-D.2-6** Solve multi-step contextual word problems with degree of difficulty appropriate to the course, requiring application of course-level knowledge and skills articulated in A-CED, N-Q.2, A-SSE.3, A-REI.6, A-REI.12, A-REI.11-1, limited to linear and quadratic equations.
- **A-SSE.1-2** Interpret quadratic expressions that represent a quantity in terms of its context. a) Interpret parts of an expression, such as terms, factors, and coefficients. b) Interpret complicated expressions by viewing one or more of their parts as a single entity.
- **HS-D.3-3a** Reasoned estimates: Use reasonable estimates of known quantities in a chain of reasoning that yields an estimate of an unknown quantity. Content Scope: Knowledge and skills articulated in the Algebra I Type I, Sub-Claim A Evidence Statements.
- **A-CED.4-2** Rearrange formulas that are quadratic in the quantity of interest to highlight the quantity of interest, using the same reasoning as in solving equations.

26. LINEAR AND EXPONENTIAL PARENT FUNCTIONS

● LINEAR AND EXPONENTIAL PARENT FUNCTIONS

- **A-REI.10** Understand that the graph of an equation in two variables is the set of all its solutions plotted in the coordinate plane, often forming a curve (which could be a line).
- **F-IF.5-1** Relate the domain of a function to a graph and, where applicable, to the quantitative relationship it describes, limiting to linear functions, square root functions, cube root functions, piecewise-defined functions (including step functions and absolute-value functions), and exponential functions with domains in the integers. For example, if the function $h(n)$ gives the number of person-hours it takes to assemble n engines in a factory, then the positive integers would be an appropriate domain for this function.

27. TRANSFORMATIONS OF PARENT FUNCTIONS

● TRANSFORMATIONS OF THE LINEAR AND EXPONENTIAL PARENT FUNCTIONS

- **HS-D.2-8** Solve multi-step contextual word problems with degree of difficulty appropriate to the course, requiring application of course-level knowledge and skills articulated in F-BF.1a, F-BF.3, ACED.1, A-SSE.3, F-IF.B, F-IF.7, limited to linear functions and exponential functions with domains in the integers.
- **HS-D.2-9** Solve multi-step contextual word problems with degree of difficulty appropriate to the course, requiring application of course-level knowledge and skills articulated in F-BF.1a, F-BF.3, ACED.1, A-SSE.3, F-IF.B, F-IF.7, limited to linear and quadratic functions.
- **F-BF.3-1** Identify the effect on the graph of replacing $f(x)$ by $f(x) + k$, $kf(x)$, $f(kx)$, and $f(x + k)$ for specific values of k (both positive and negative); find the value of k given the graphs limiting the function types to linear and quadratic functions.
- **HS-C.9.1** Express reasoning about transformations of functions. Content scope: F-BF.3, limited to linear and quadratic functions. Tasks will not involve ideas of even or odd functions.

● TRANSFORMATIONS OF THE QUADRATIC PARENT FUNCTION

- **HS-D.2-9** Solve multi-step contextual word problems with degree of difficulty appropriate to the course, requiring application of course-level knowledge and skills articulated in F-BF.1a, F-BF.3, ACED.1, A-SSE.3, F-IF.B, F-IF.7, limited to linear and quadratic functions.
- **F-BF.3-1** Identify the effect on the graph of replacing $f(x)$ by $f(x) + k$, $kf(x)$, $f(kx)$, and $f(x + k)$ for specific values of k (both positive and negative); find the value of k given the graphs limiting the function types to linear and quadratic functions.
- **F-BF.3-4** Identify the effect on the graph of a quadratic function of replacing $f(x)$ by $f(x) + k$, $kf(x)$, $f(kx)$, and $f(x + k)$ for specific values of k (both positive and negative); find the value of k given the graphs. Experiment with cases using technology.
- **HS-C.9.1** Express reasoning about transformations of functions. Content scope: F-BF.3, limited to linear and quadratic functions. Tasks will not involve ideas of even or odd functions.

28. WORKING WITH FUNCTIONS 1

• LINEAR VERSUS NONLINEAR FUNCTIONS

- **HS-C.10.1** Express reasoning about linear and exponential growth. Content scope: F-LE.1a
- **A-REI.10** Understand that the graph of an equation in two variables is the set of all its solutions plotted in the coordinate plane, often forming a curve (which could be a line).

29. WORKING WITH FUNCTIONS 2

• ABSOLUTE VALUE FUNCTIONS

- **F-IF.5-1** Relate the domain of a function to a graph and, where applicable, to the quantitative relationship it describes, limiting to linear functions, square root functions, cube root functions, piecewise-defined functions (including step functions and absolute-value functions), and exponential functions with domains in the integers. For example, if the function $h(n)$ gives the number of person-hours it takes to assemble n engines in a factory, then the positive integers would be an appropriate domain for this function.
- **F-IF.7b** Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases. b) Graph square root, cube root, and piecewise-defined functions, including step functions and absolute value functions.
- **F-IF.6-1b** Calculate and interpret the average rate of change of a function (presented symbolically or as a table) over a specified interval with functions limited to square root, cube root, and piecewise-defined (including step and absolute value functions) functions.

30. WORKING WITH FUNCTIONS 3

• MULTIPLE REPRESENTATIONS OF FUNCTIONS

- **F-IF.9-1** Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions). For example, given a graph of one quadratic function and an algebraic expression for another, say which has the larger maximum. Function types should be limited to linear functions, quadratic functions, square root functions, cube root functions, piecewise-defined functions (including step functions and absolute value functions), and exponential functions with domains in the integers.

31. STATISTICS 1

• DATA ANALYSIS

- **S-ID.Int.1** Solve multi-step contextual word problems with degree of difficulty appropriate to the course, requiring application of course-level knowledge and skills articulated in S-ID, excluding normal distributions and limiting function fitting to linear functions and exponential functions with domains in the integers.
- **S-ID.Int.2** Solve multi-step contextual word problems with degree of difficulty appropriate to the course, requiring application of course-level knowledge and skills articulated in S-ID, excluding normal distributions and limiting function fitting to quadratic, linear, and exponential (with domains in the integers) functions with an emphasis on quadratic functions.

32. STATISTICS 2

• FREQUENCY TABLES

- **S-ID.5** Summarize categorical data for two categories in two-way frequency tables. Interpret relative frequencies in the

context of the data (including joint, marginal, and conditional relative frequencies). Recognize possible associations and trends in the data.

33. TEST-TAKING STRATEGIES

- **STUDY HABITS**
- **BEING PREPARED AND GETTING STARTED**
- **WORDING IN TEST QUESTIONS**
- **WORDING IN ANSWER CHOICES**
- **QUESTIONS WITH PASSAGES AND VISUAL DATA**
- **ESSAY AND SHORT ANSWER QUESTIONS**
- **WORD PROBLEMS**