

**A Correlation of
Pearson Mathematics
Algebra 1
Common Core, ©2015**



**To the
Georgia Standards of Excellence
Algebra 1**

Introduction

This document demonstrates how ***Pearson Algebra 1, Common Core Edition ©2015*** meets the standards of the Georgia Standards of Excellence, Algebra 1. Correlation references are to the pages of the Student and Teacher's Editions.

Pearson Algebra 1, Common Core Edition ©2015 balances conceptual understanding, procedural fluency, and the application of mathematics to solve problems and formulate models.

- Each lesson begins with Interactive Learning, the Solve It!, which immediately engages students in their daily learning according to the Standards for Mathematical Practice.
- The second step of the lesson, Guided Instruction, uses visual learning principles and a Thinking/Reasoning strand (seen in the Know/Need/Plan and Think/Plan/Write boxes) to introduce the Essential Understanding of the lesson by teaching THROUGH and FOR problem-solving.
- In the third step of the lesson, the Lesson Check, Do you know HOW? exercises measure students' procedural fluency, while Do you UNDERSTAND? problems measure students' conceptual understanding.
- In the fourth step of the lesson, Practice problems are designed to develop students' fluency in the Content Standards and proficiency with the Mathematical Practices. Real-world STEM problems as well as problems designed to elicit the use of one or more of the Standards for Mathematical Practice are clearly labeled in the Practice step of the lesson.
- The final phase of the lesson, Assess and Remediate, features a Lesson Quiz to measure students' understanding of lesson concepts. By utilizing the balanced and proven-effective approach of Pearson's 5-step lesson design, you can teach with confidence.

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Mathematical Practices	
<p>1 Make sense of problems and persevere in solving them. High school students start to examine problems by explaining to themselves the meaning of a problem and looking for entry points to its solution. They analyze givens, constraints, relationships, and goals. They make conjectures about the form and meaning of the solution and plan a solution pathway rather than simply jumping into a solution attempt. They consider analogous problems, and try special cases and simpler forms of the original problem in order to gain insight into its solution. They monitor and evaluate their progress and change course if necessary. Older students might, depending on the context of the problem, transform algebraic expressions or change the viewing window on their graphing calculator to get the information they need. By high school, students can explain correspondences between equations, verbal descriptions, tables, and graphs or draw diagrams of important features and relationships, graph data, and search for regularity or trends. They check their answers to problems using different methods and continually ask themselves, "Does this make sense?" They can understand the approaches of others to solving complex problems and identify correspondences between different approaches.</p>	<p>SE/TE: 13-15, 34-36, 42-44, CB 45, 52 (AWYL), 56-58, 91-93, 98-99, 105-107, 128, 135, 151 (PIAL), 169, 182, 266, 280, 282 (PIAL), 326-327, 437, 451, 521, 571, 593-594</p> <p>TE: 15A-15B, 36A-36B, 44A-44B, 58A-58B, 93A-93B, 100A-100B, 108A-108B, 129A-129B, 136A-136B, 170A-170B, 183A-183B, 267A-267B, 281A-281B, 328A-328B, 438A-438B, 452A-452B, 522A-522B, 572A-572B, 594A-594B</p>

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<p>2 Reason abstractly and quantitatively. High school students seek to make sense of quantities and their relationships in problem situations. They abstract a given situation and represent it symbolically, manipulate the representing symbols, and pause as needed during the manipulation process in order to probe into the referents for the symbols involved. Students use quantitative reasoning to create coherent representations of the problem at hand; consider the units involved; attend to the meaning of quantities, not just how to compute them; and know and flexibly use different properties of operations and objects.</p>	<p>SE/TE: 35-36, 44, 67 (PIAL), 120, 151 (PIAL), 191, 198-199, 250-251, 258-259, 280-281, 334-335, 352 (PIAL), 422, 508-509, 527-528, CB 573-574</p> <p>TE: 36A-36B, 44A-44B, 121A-121B, 192A-192B, 199A-199B, 251A-251B, 259A-259B, 281A-281B, 335A-335B, 423A-423B, 509A-509B, 528A-528B</p>
<p>3 Construct viable arguments and critique the reasoning of others. High school students understand and use stated assumptions, definitions, and previously established results in constructing arguments. They make conjectures and build a logical progression of statements to explore the truth of their conjectures. They are able to analyze situations by breaking them into cases, and can recognize and use counterexamples. They justify their conclusions, communicate them to others, and respond to the arguments of others. They reason inductively about data, making plausible arguments that take into account the context from which the data arose. High school students are also able to compare the effectiveness of two plausible arguments, distinguish correct logic or reasoning from that which is flawed, and—if there is a flaw in an argument—explain what it is. High school students learn to determine domains to which an argument applies, listen or read the arguments of others, decide whether they make sense, and ask useful questions to clarify or improve the arguments.</p>	<p>SE/TE: 27-28, 34-36, 51, 57, 99, 107-108, 119-120, 127-128, 174-177, 192, 204-205, 210-212, 244, 280-281, 326-327, 333, 368-369, 501-502, 556-558</p> <p>TE: 28A-28B, 36A-36B, 52A-52B, 58A-58B, 100A-100B, 108A-108B, 121A-121B, 129A-129B, 177A-177B, 193A-193B, 206A-206B, 213A-213B, 245A-245B, 281A-281B, 328A-328B, 335A-335B, 369A-369B, 503A-503B, 558A-558B</p>

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<p>4 Model with mathematics. High school students can apply the mathematics they know to solve problems arising in everyday life, society, and the workplace. By high school, a student might use geometry to solve a design problem or use a function to describe how one quantity of interest depends on another. High school students making assumptions and approximations to simplify a complicated situation, realizing that these may need revision later. They are able to identify important quantities in a practical situation and map their relationships using such tools as diagrams, two-way tables, graphs, flowcharts and formulas. They can analyze those relationships mathematically to draw conclusions. They routinely interpret their mathematical results in the context of the situation and reflect on whether the results make sense, possibly improving the model if it has not served its purpose.</p>	<p>SE/TE: CB 80, 91-93, 100 (AWYL), CB 101, 151 (PIAL), 169, 238, 282 (PIAL), 341-343, 349-350, CB 351, 398-399, 402-405, 407 (PIAL), 466 (AWYL), 473 (PIAL), CB 497, 592-593, CB 677, 750-751</p> <p>TE: 93A-93B, 170A-170B, 239A-239B, 343A-343B, 350A-350B, 399A-399B, 405A-405B, 594A-594B, 751A-751B</p>

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<p>5 Use appropriate tools strategically. High school students consider the available tools when solving a mathematical problem. These tools might include pencil and paper, concrete models, a ruler, a protractor, a calculator, a spreadsheet, a computer algebra system, a statistical package, or dynamic geometry software. High school students should be sufficiently familiar with tools appropriate for their grade or course to make sound decisions about when each of these tools might be helpful, recognizing both the insight to be gained and their limitations. For example, high school students analyze graphs of functions and solutions generated using a graphing calculator. They detect possible errors by strategically using estimation and other mathematical knowledge. When making mathematical models, they know that technology can enable them to visualize the results of varying assumptions, explore consequences, and compare predictions with data. They are able to identify relevant external mathematical resources, such as digital content located on a website, and use them to pose or solve problems. They are able to use technological tools to explore and deepen their understanding of concepts.</p>	<p>SE/TE: CB 59, CB 60, 120, CB 260-261, 304-305, CB 307, 312-314, 318-319, CB 344-345, CB 370, CB 371, 398-399, CB 406, CB 447, 551-552, CB 567, CB 595, 600, 675, 696</p> <p>TE: 121A-121B, 306A-306B, 314A-314B, 320A-320B, 399A-399B, 552A-552B, 601A-601B, 676A-676B, 697A-697B</p>
<p>6 Attend to precision. High school students try to communicate precisely to others by using clear definitions in discussion with others and in their own reasoning. They state the meaning of the symbols they choose, specifying units of measure, and labeling axes to clarify the correspondence with quantities in a problem. They calculate accurately and efficiently, express numerical answers with a degree of precision appropriate for the problem context. By the time they reach high school they have learned to examine claims and make explicit use of definitions.</p>	<p>SE/TE: 85-87, 112-114, 119-121, 382-383, CB 385-386, 490-491, 564-566, 649-651, 735-737, 742-744, CB 745, CB 760, 766-768</p> <p>TE: 87A-87B, 114A-114B, 121A-121B, 384A-384B, 491A-491B, 566A-566B, 651A-651B, 737A-737B, 744A-744B, 768A-768B</p>

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<p>7 Look for and make use of structure. By high school, students look closely to discern a pattern or structure. In the expression $x^2 + 9x + 14$, older students can see the 14 as 2×7 and the 9 as $2 + 7$. They recognize the significance of an existing line in a geometric figure and can use the strategy of drawing an auxiliary line for solving problems. They also can step back for an overview and shift perspective. They can see complicated things, such as some algebraic expressions, as single objects or as being composed of several objects. For example, they can see $5 - 3(x - y)^2$ as 5 minus a positive number times a square and use that to realize that its value cannot be more than 5 for any real numbers x and y. High school students use these patterns to create equivalent expressions, factor and solve equations, and compose functions, and transform figures.</p>	<p>SE/TE: 8-9, 43, 64-66, 67 (PIAL), 183, 243-245, 280, 305, CB 344-345, CB 351, CB 371, 422, CB 424, 430-431, CB 432, 437-438, CB 447, 473 (PIAL),</p> <p>TE: 9A-9B, 44A-44B, 66A-66B, 183A-183B, 245A-245B, 281A-281B, 306A-306B, 423A-423B, 431A-431B, 438A-438B, 517A-517B</p>
<p>8 Look for and express regularity in repeated reasoning. High school students notice if calculations are repeated, and look both for general methods and for shortcuts. Noticing the regularity in the way terms cancel when expanding $(x - 1)(x + 1)$, $(x - 1)(x^2 + x + 1)$, and $(x - 1)(x^3 + x^2 + x + 1)$ might lead them to the general formula for the sum of a geometric series. As they work to solve a problem, derive formulas or make generalizations, high school students maintain oversight of the process, while attending to the details. They continually evaluate the reasonableness of their intermediate results.</p>	<p>SE/TE: 50, 65, 278-281, 282 (PIAL), 300, CB 424, CB 432, CB 447, 452, 463, 466 (AWYL), 508, CB 559-560, 681-683</p> <p>TE: 52A-52B, 66A-66B, 281A-281B, 300A-300B, 452A-452B, 466A-466B, 509A-509B, 683A-683B</p>
The Real Number System N.RN	
Extend the properties of exponents to rational exponents.	
<p>MGSE9-12.N.RN.2 Rewrite expressions involving radicals and rational exponents using the properties of exponents. (i.e., simplify and/or use the operations of addition, subtraction, and multiplication, with radicals within expressions limited to square roots).</p>	<p>SE/TE: 17, 425-429, CB 432, 439-442, CB 447, 448-450, 619-622</p> <p>TE: 431A-431B, 445A-445B, 452A-452B, 625A-625B</p>

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Use properties of rational and irrational numbers.	
MGSE9-12.N.RN.3 Explain why the sum or product of rational numbers is rational; why the sum of a rational number and an irrational number is irrational; and why the product of a nonzero rational number and an irrational number is irrational.	SE/TE: CB 45
Quantities N.Q	
Reason quantitatively and use units to solve problems.	
MGSE9-12.N.Q.1 Use units of measure (linear, area, capacity, rates, and time) as a way to understand problems:	SE/TE: 116-119, CB 122-123, 131-133, 151 (PIAT), 254-256, 337-338, 732-734, 808 TE: 121A-121B, 136A-136B, 259A-259B, 343A-343B, 737A-737B
a. Identify, use, and record appropriate units of measure within context, within data displays, and on graphs;	SE/TE: 116-119, CB 122-123, 131-133, 151 (PIAT), 254-256, 337-338, 732-734, 808 TE: 121A-121B, 136A-136B, 259A-259B, 343A-343B, 737A-737B
b. Convert units and rates using dimensional analysis (English-to-English and Metric-to-Metric without conversion factor provided and between English and Metric with conversion factor);	SE/TE: 116-119, CB 122-123 TE: 121A-121B
c. Use units within multi-step problems and formulas; interpret units of input and resulting units of output.	SE/TE: 111, 116-119, CB 122-123, 131-133, 808 TE: 114A-114B, 121A-121B, 136A-136B
MGSE9-12.N.Q.2 Define appropriate quantities for the purpose of descriptive modeling. Given a situation, context, or problem, students will determine, identify, and use appropriate quantities for representing the situation.	SE/TE: 116-119, CB 122-123, 131-133, 151 (PIAT), 180, 254-256, 262-264, 324-325, 337-338, 387-390, 728, 732-734, 738-742, 746-749, 785 (PIAT), 808 TE: 121A-121B, 136A-136B, 183A-183B, 259A-259B, 267A-267B, 328A-328B, 343A-343B, 392A-392B, 731A-731B, 737A-737B, 751A-751B

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MGSE9-12.N.Q.3 Choose a level of accuracy appropriate to limitations on measurement when reporting quantities. <i>For example, money situations are generally reported to the nearest cent (hundredth). Also, an answers' precision is limited to the precision of the data given.</i>	SE/TE: 139, 144-147, 387-390, 578, 584 TE: 143A-143B, 150A-150B, 392A-392B, 581A-581B, 588A-588B
Seeing Structure in Expressions A.SSE	
Interpret the structure of expressions	
MGSE9-12.A.SSE.1 Interpret expressions that represent a quantity in terms of its context.	SE/TE: 4-7, 10-13, 46-47, 262-264, 418-421, 460-463, 523-526, 529-531, 619-622, 626-629, 684-687 TE: 9A-9B, 15A-15B, 52A-52B, 267A-267B, 281A-281B, 314A-314B, 517A-517B, 522A-522B, 528A-528B
MGSE9-12.A.SSE.1a Interpret parts of an expression, such as terms, factors, and coefficients, in context.	SE/TE: 4-7, 10-13, 46-49, 262-264, 274-278, 308-311, 512-515, 518-520, 523-526, 529-531 TE: 9A-9B, 15A-15B, 52A-52B, 267A-267B, 281A-281B, 314A-314B, 517A-517B, 522A-522B, 528A-528B
MGSE9-12.A.SSE.1b Given situations which utilize formulas or expressions with multiple terms and/or factors, interpret the meaning (in context) of individual terms or factors.	SE/TE: 207-210, 460-463, 523-526, 529-531, 576-579 TE: 213A-213B, 466A-466B, 528A-528B, 533A-533B, 581A-581B
MGSE9-12.A.SSE.2 Use the structure of an expression to rewrite it in different equivalent forms. For example, see $x^4 - y^4$ as $(x^2)^2 - (y^2)^2$, thus recognizing it as a difference of squares that can be factored as $(x^2 - y^2)(x^2 + y^2)$.	SE/TE: 308-312, 315-318, 322-325, CB 511, 523-526, 529-531 TE: 314A-314B, 320A-320B, 328A-328B, 528A-528B, 533A-533B

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Write expressions in equivalent forms to solve problems	
MGSE9-12.A.SSE.3 Choose and produce an equivalent form of an expression to reveal and explain properties of the quantity represented by the expression.	SE/TE: 568-570, CB 573, 576-579 TE: 572A-572B, 581A-581B
MGSE9-12.A.SSE.3a Factor any quadratic expression to reveal the zeros of the function defined by the expression.	SE/TE: 568-570, CB 573 TE: 572A-572B
MGSE9-12.A.SSE.3b Complete the square in a quadratic expression to reveal the maximum or minimum value of the function defined by the expression.	SE/TE: 576-579 TE: 581A-581B
Arithmetic with Polynomials and Rational Expressions A.APR	
Perform arithmetic operations on polynomials	
MGSE9-12.A.APR.1 Add, subtract, and multiply polynomials; understand that polynomials form a system analogous to the integers in that they are closed under these operations.	SE/TE: 486-489, 492-494, CB 497, 498-501, 504-507 TE: 491A-491B, 496A-496B, 503A-503B, 509A-509B
Creating Equations A.CED	
Create equations that describe numbers or relationships	
MGSE9-12.A.CED.1 Create equations and inequalities in one variable and use them to solve problems. Include equations arising from linear, quadratic, simple rational, and exponential functions (integer inputs only).	SE/TE: 53-56, CB 80, 81-85, 88-91, 94-97, CB 101, 102-105, 109-112, 124-127, 130-133, 171-174, 178-181, CB 185, 186-189, 200-204, 207-210, 214-218, 561-563, 568-570, 576-579, 582-586, 691-695 TE: 58A-58B, 87A-87B, 93A-93B, 100A-100B, 108A-108B, 114A-114B, 129A-129B, 136A-136B, 177A-177B, 183A-183B, 192A-192B, 206A-206B, 213A-213B, 220A-220B, 566A-566B, 572A-572B, 581A-581B, 588A-588B, 697A-697B

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MGSE9-12.A.CED.2 Create linear, quadratic, and exponential equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales. (The phrase “in two or more variables” refers to formulas like the compound interest formula, in which $A = P(1 + r/n)^{nt}$ has multiple variables.)	SE/TE: CB 59, 61-64, 262-264, 301-304, CB 307, 308-311, 315-318, 322-325, 453-456, 546-549, 553-556, CB 573-574, 639-641, 698-702, 705-710, CB 713 TE: 66A-66B, 267A-267B, 306A-306B, 314A-314B, 320A-320B, 328A-328B, 459A-469B, 466A-466B, 552A-552B, 644A-644B, 704A-704B, 712A-712B
MGSE9-12.A.CED.3 Represent constraints by equations or inequalities, and by systems of equations and/or inequalities, and interpret data points as possible (i.e. a solution) or not possible (i.e. a non-solution) under the established constraints.	SE/TE: 387-390, 394-397, 596-599 TE: 392A-392B, 399AA-399B, 601A-601B
MGSE9-12.A.CED.4 Rearrange formulas to highlight a quantity of interest using the same reasoning as in solving equations. <i>Examples: Rearrange Ohm’s law $V = IR$ to highlight resistance R; Rearrange area of a circle formula $A = \pi r^2$ to highlight the radius r.</i>	SE/TE: 109-112, 561-563 TE: 114A-114B, 566A-566B
Reasoning with Equations and Inequalities A.REI	
Understand solving equations as a process of reasoning and explain the reasoning	
MGSE9-12.A.REI.1 Using algebraic properties and the properties of real numbers, justify the steps of a simple, one-solution equation. Students should justify their own steps, or if given two or more steps of an equation, explain the progression from one step to the next using properties.	SE/TE: CB 59, CB 80, 88-91, 94-97, CB 101, 102-105, 109-112, 576-579 TE: 93A-93B, 100A-100B, 108A-108B, 114A-114B, 581A-581B
Solve equations and inequalities in one variable	
MGSE9-12.A.REI.3 Solve linear equations and inequalities in one variable including equations with coefficients represented by letters. <i>For example, given $ax + 3 = 7$, solve for x.</i>	SE/TE: CB 80, 81-85, 88-91, 84-87, CB 101, 102-105, 109-112, 124-127, 130-133, 166-167, 171-174, 178-183, CB 184, CB 185, 186-189, 194-197, 200-204 TE: 87A-87B, 93A-93B, 100A-100B, 108A-108B, 114A-114B, 129A-129B, 136A-136B, 170A-170B, 177A-177B, 183A-183B, 192A-192B, 199A-199B, 206A-206B

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MGSE9-12.A.REI.4 Solve quadratic equations in one variable.	SE/TE: 561-563, CB 567, 568-570, 576-579, 582-586 TE: 566A-566B, 577A-577B, 581A-581B, 588A-588B
MGSE9-12.A.REI.4a 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. Derive the quadratic formula from $ax^2 + bx + c = 0$.	SE/TE: 576-579, 582-586 TE: 581A-581B, 588A-588B
MGSE9-12.A.REI.4b Solve quadratic equations by inspection (e.g., for $x^2 = 49$), taking square roots, factoring, completing the square, and the quadratic formula, as appropriate to the initial form of the equation (limit to real number solutions).	SE/TE: 561-563, 568-570, 576-579, 582-586 TE: 566A-566B, 572A-572B, 581A-581B, 588A-588B
Solve systems of equations	
MGSE9-12.A.REI.5 Show and explain why the elimination method works to solve a system of two-variable equations.	SE/TE: 378-381 TE: 384A-384B
MGSE9-12.A.REI.6 Solve systems of linear equations exactly and approximately (e.g., with graphs), focusing on pairs of linear equations in two variables.	SE/TE: 364-367, CB 571, 372-375, 378-381, CB 385-386, 387-390 TE: 369A-369B, 377A-377B, 384A-384B, 392A-392B
Represent and solve equations and inequalities graphically	
MGSE9-12.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.	SE/TE: 61-64, 240-243, 246-249, 253-257 TE: 66A-66B, 245A-245B, 251A-251B, 259A-259B
MGSE9-12.A.REI.11 Using graphs, tables, or successive approximations, show that the solution to the equation $f(x) = g(x)$ is the x -value where the y -values of $f(x)$ and $g(x)$ are the same.	SE/TE: CB 260-261, CB 370, 596-599 TE: 601A-601B
MGSE9-12.A.REI.12 Graph the solution set to a linear inequality in two variables.	SE/TE: 394-397, 400-402, CB 406 TE: 399A-399B, 405A-405B

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Interpreting Functions F.IF	
Understand the concept of a function and use function notation	
MGSE9-12.F.IF.1 Understand that a function from one set (the input, called the domain) to another set (the output, called the range) assigns to each element of the domain exactly one element of the range, i.e. each input value maps to exactly one output value. If f is a function, x is the input (an element of the domain), and $f(x)$ is the output (an element of the range). Graphically, the graph is $y = f(x)$.	SE/TE: 268-271 TE: 273A-273B
MGSE9-12.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.	SE/TE: 268-271 TE: 273A-273B
MGSE9-12.F.IF.3 Recognize that sequences are functions, sometimes defined recursively, whose domain is a subset of the integers. (Generally, the scope of high school math defines this subset as the set of natural numbers 1,2,3,4...) By graphing or calculating terms, students should be able to show how the recursive sequence $a_1=7, a_n=a_{n-1}+2$; the sequence $s_n = 2(n-1) + 7$; and the function $f(x) = 2x + 5$ (when x is a natural number) all define the same sequence.	SE/TE: 274-278, 467-470 TE: 281A-281B, 472A-472B
Interpret functions that arise in applications in terms of the context	
MGSE9-12.F.IF.4 Using tables, graphs, and verbal descriptions, interpret the key characteristics of a function which models the relationship between two quantities. Sketch a graph showing key features including: intercepts; interval where the function is increasing, decreasing, positive, or negative; relative maximums and minimums; symmetries; end behavior; and periodicity.	SE/TE: 240-243, 246-249, 308-311, 315-318, 322-325, 453-456, 546-549, 553-556, 589-592, 705-710, CB 713 TE: 245A-245B, 251A-251B, 314A-314B, 320A-320B, 328A-328B, 459A-459B, 552A-552B, 558A-558B, 594A-594B, 712A-712B

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MGSE9-12.F.IF.5 Relate the domain of a function to its graph and, where applicable, to the quantitative relationship it describes. <i>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 the function.</i>	SE/TE: 253-257, 453-456, 546-549, 689-702 TE: 259A-259B, 459A-459B, 552A-552B, 704A-704B
MGSE9-12.F.IF.6 Calculate and interpret the average rate of change of a function (presented symbolically or as a table) over a specified interval. Estimate the rate of change from a graph.	SE/TE: 294-297, CB 559-560 TE: 300A-300B
Analyze functions using different representations	
MGSE9-12.F.IF.7 Graph functions expressed algebraically and show key features of the graph both by hand and by using technology.	SE/TE: 308-311, 315-318, 322-325, 453-456, 460-463, 546-549, 553-556 TE: 314A-314B, 320A-320B, 328A-328B, 459A-459B, 466A-466B, 552A-552B, 558A-558B
MGSE9-12.F.IF.7a Graph linear and quadratic functions and show intercepts, maxima, and minima (as determined by the function or by context).	SE/TE: 308-311, 315-318, 322-325, 453-456, 460-463, 546-549, 553-55 TE: 314A-314B, 320A-320B, 328A-328B, 459A-459B, 466A-466B, 552A-552B, 558A-558B
MGSE9-12.F.IF.7e Graph exponential and logarithmic functions, showing intercepts and end behavior, and trigonometric functions, showing period, midline, and amplitude.	SE/TE: 453-456 TE: 459A-459B
MGSE9-12.F.IF.8 Write a function defined by an expression in different but equivalent forms to reveal and explain different properties of the function.	SE/TE: 460-463, 553-556, 568-570, 576-579 TE: 466A-466B, 558A-558B, 572A-572B, 581A-581B

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MGSE9-12.F.IF.8a 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. <i>For example, compare and contrast quadratic functions in standard, vertex, and intercept forms.</i>	SE/TE: 553-556, 568-570, 576-579 TE: 558A-558B, 572A-572B, 581A-581B
MGSE9-12.F.IF.9 Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions). <i>For example, given a graph of one function and an algebraic expression for another, say which has the larger maximum.</i>	SE/TE: 322-325, 453-456, 553-556 TE: 328A-328B, 459A-459B, 558A-558B
Building Functions F.BF	
Build a function that models a relationship between two quantities	
MGSE9-12.F.BF.1 Write a function that describes a relationship between two quantities.	SE/TE: 274-278, 308-311, 315-318, 322-325, 460-463, 553-556 TE: 281A-281B, 314A-314B, 320A-320B, 328A-328B, 466A-466B, 558A-558B
MGSE9-12.F.BF.1a Determine an explicit expression and the recursive process (steps for calculation) from context. <i>For example, if Jimmy starts out with \$15 and earns \$2 a day, the explicit expression “$2x+15$” can be described recursively (either in writing or verbally) as “to find out how much money Jimmy will have tomorrow, you add \$2 to his total today.” $J_n = J_{n-1} + 2, J_0 = 15$</i>	SE/TE: 274-278, 308-311, 315-318, 322-325, 467-470 TE: 281A-281B, 314A-314B, 320A-320B, 328A-328B, 472A-472B
MGSE9-12.F.BF.2 Write arithmetic and geometric sequences recursively and explicitly, use them to model situations, and translate between the two forms. Connect arithmetic sequences to linear functions and geometric sequences to exponential functions.	SE/TE: 274-278, 467-470 TE: 281A-281B, 472A-472B

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Build new functions from existing functions	
MGSE9-12.F.BF.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. Experiment with cases and illustrate an explanation of the effects on the graph using technology. Include recognizing even and odd functions from their graphs and algebraic expressions for them.	SE/TE: CB 307, 308-311, 315-318, 346-348, 460-463, 546-548, 553-556 TE: 314A-314B, 320A-320B, 350A-350B, 466A-466B, 552A-552B, 558A-558B
Linear, Quadratic, and Exponential Models F.LE	
Construct and compare linear, quadratic, and exponential models and solve problems	
MGSE9-12.F.LE.1 Distinguish between situations that can be modeled with linear functions and with exponential functions.	SE/TE: 294-297, 460-463, 589-592 TE: 300A-300B, 466A-466B, 594A-594B
MGSE9-12.F.LE.1a Show that linear functions grow by equal differences over equal intervals and that exponential functions grow by equal factors over equal intervals. (This can be shown by algebraic proof, with a table showing differences, or by calculating average rates of change over equal intervals).	SE/TE: 589-592 TE: 594A-594B
MGSE9-12.F.LE.1b. Recognize situations in which one quantity changes at a constant rate per unit interval relative to another.	SE/TE: 294-297 TE: 300A-300B
MGSE9-12.F.LE.1c Recognize situations in which a quantity grows or decays by a constant percent rate per unit interval relative to another.	SE/TE: 460-463 TE: 466A-466B
MGSE9-12.F.LE.2 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).	SE/TE: 274-278, 308-311, 315-318, 322-325, 453-456, 467-470, 589-592 TE: 281A-281B, 314A-314B, 320A-320B, 328A-328B, 459A-459B, 472A-472B, 594A-594B

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MGSE9-12.F.LE.3 Observe using graphs and tables that a quantity increasing exponentially eventually exceeds a quantity increasing linearly, quadratically, or (more generally) as a polynomial function.	SE/TE: CB 559-560, 589-592 TE: 594A-594B
Interpret expressions for functions in terms of the situation they model	
MGSE9-12.F.LE.5 Interpret the parameters in a linear ($f(x) = mx + b$) and exponential ($f(x) = a \cdot d^x$) function in terms of context. (In the functions above, “m” and “b” are the parameters of the linear function, and “a” and “d” are the parameters of the exponential function.) In context, students should describe what these parameters mean in terms of change and starting value.	SE/TE: 308-311, 315-318, 322-325, 336-340, 460-463 TE: 314A-314B, 320A-320B, 328A-328B, 343A-343B, 466A-466B
Interpreting Categorical and Quantitative Data S.ID	
Summarize, represent, and interpret data on a single count or measurement variable	
MGSE9-12.S.ID.1 Represent data with plots on the real number line (dot plots, histograms, and box plots).	SE/TE: 732-735, 746-749 TE: 737A-737B, 751A-751B
MGSE9-12.S.ID.2 Use statistics appropriate to the shape of the data distribution to compare center (median, mean) and spread (interquartile range, mean absolute deviation, standard deviation) of two or more different data sets.	SE/TE: 738-742, CB 745, 746-749 TE: 744A-744B, 751A-751B
MGSE9-12.S.ID.3 Interpret differences in shape, center, and spread in the context of the data sets, accounting for possible effects of extreme data points (outliers).	SE/TE: 738-742 TE: 744A-744B
Summarize, represent, and interpret data on two categorical and quantitative variables	
MGSE9-12.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.	SE/TE: CB 752

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MGSE9-12.S.ID.6 Represent data on two quantitative variables on a scatter plot, and describe how the variables are related.	SE/TE: 336-340, 589-592 TE: 343A-343B, 594A-594B
MGSE9-12.S.ID.6a Decide which type of function is most appropriate by observing graphed data, charted data, or by analysis of context to generate a viable (rough) function of best fit. Use this function to solve problems in context. Emphasize linear, quadratic and exponential models.	SE/TE: 336-340, 589-592 TE: 343A-343B, 594A-594B
MGSE9-12.S.ID.6c Using given or collected bivariate data, fit a linear function for a scatter plot that suggests a linear association.	SE/TE: 336-340 TE: 343A-343B
Interpret linear models	
MGSE9-12.S.ID.7 Interpret the slope (rate of change) and the intercept (constant term) of a linear model in the context of the data.	SE/TE: 336-340 TE: 343A-343B
MGSE9-12.S.ID.8 Compute (using technology) and interpret the correlation coefficient “r” of a linear fit. (For instance, by looking at a scatterplot, students should be able to tell if the correlation coefficient is positive or negative and give a reasonable estimate of the “r” value.) After calculating the line of best fit using technology, students should be able to describe how strong the goodness of fit of the regression is, using “r”.	SE/TE: 336-340 TE: 343A-343B
MGSE9-12.S.ID.9 Distinguish between correlation and causation.	SE/TE: 336-340 TE: 343A-343B