HOLT McDOUGAL

Algebra 1

COMMON CORE

State Standards Curriculum Companion

Teacher's Edition

Edward B. Burger

David J. Chard

Paul A. Kennedy

Steven J. Leinwand

Freddie L. Renfro

Tom W. Roby

Bert K. Waits

HOLT McDOUGAL

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COMMON CORE

Algebra 1 Common Core State Standards Curriculum Companion

Teachers Edition

Contents

Standards for Mathematical Content

Correlation for Holt McDougal Algebra 1

Standards	Descriptor	Algebra 1	Geometry	Algebra 2
STANDARDS FOR MATHEMATICAL CONTENT (+ = advanced; * = also a Modeling Standard)				
Number and Quantity				
CC.9-12.N.RN.1	Explain how the definition of the meaning of rational exponents follows from extending the properties of integer exponents to those values, allowing for a notation for radicals in terms of rational exponents. *For example, we define* $5^{1/3}$ *to be the cube root of 5 because we want* $(5^{1/3})^3 = 5^{(1/3)3}$ *to hold, so* $(5^{1/3})^3$ *must equal 5.*	SE: 460–461, 488–492		SE: 610–612, 643
CC.9-12.N.RN.2	Rewrite expressions involving radicals and rational exponents using the properties of exponents.	SE: 490–492	SE: 346	SE: 610–617, 640, 642, 646
CC.9-12.N.RN.3	Explain why the sum or product of two rational numbers is rational; that the sum of a rational number and an irrational number is irrational; and that the product of a nonzero rational number and an irrational number is irrational.	CCCC: CC19–CC20		

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Standards	Descriptor	Algebra 1	Geometry	Algebra 2
STANDARDS FOR MATHEMATICAL CONTENT (+ = advanced; * = also a Modeling Standard)				
Number and Quantity				
CC.9-12.N.Q.1	Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays.*	SE: 10, 16–18, 22–24, 30–31, 33, 36, 38, 39, 43–45, 50, 60, 61, 64, 71, 86–90, 103–105, 111, 114–116, 117, 119, 120–126, 128–132, 136, 138, 153, 155–156, 158, 163, 178, 180, 185, 188, 192–194, 214, 229, 246, 254–255, 259–261, 264, 272, 278–279, 282, 283, 293, 332–335, 341, 347–349, 355–357, 360, 576, 622, 624–625, 627–630, 637–638, 641, 644–646, 652–654, 660, 665–666, 678, 683, 800, 809–811	SE: 105, 108, 140, 186, 193–195, 197, 200, 211, 265, 433, 449, 512, 568, 577, 596–597, 607, 609–610, 615, 620, 625, 627, 639, 698, 701–704, 725, 740, 754, 819, 879, 895, S28–S30, S33, S36	SE: 18, 25, 27, 39–40, 56, 64, 91, 98, 104, 149, 210, 234, 238–239, 275, 285, 346, 378, 485, 521, 549–550, 581, 592, 597–600, 615–616, 625, 633, 635, 677, 818, 886, 949, 968
CC.9-12.N.Q.2	Define appropriate quantities for the purpose of descriptive modeling.*	SE: 120–126, 700–708, 79–715 CCCC: CC3–CC9		
CC.9-12.N.Q.3	Choose a level of accuracy appropriate to limitations on measurement when reporting quantities.*	CCCC: CC3–CC9		

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Standards	Descriptor	Algebra 1	Geometry	Algebra 2
STANDARDS FOR MATHEMATICAL CONTENT (+ = advanced; * = also a Modeling Standard)				
Number and Quantity				
CC.9-12.N.CN.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.			SE: 350–351, 394
CC.9-12.N.CN.2	Use the relation $i^2 = -1$ and the commutative, associative, and distributive properties to add, subtract, and multiply complex numbers.			SE: 384–387, 395, 397, 717
CC.9-12.N.CN.3	(+) Find the conjugate of a complex number; use conjugates to find moduli and quotients of complex numbers.			SE: 352–355, 382–389, 394, 401, 482
CC.9-12.N.CN.4	(+) Represent complex numbers on the complex plane in rectangular and polar form (including real and imaginary numbers), and explain why the rectangular and polar forms of a given complex number represent the same number.			*Opportunities to address this standard can be found on the following pages:* SE: 382–384, 395
CC.9-12.N.CN.5	(+) Represent addition, subtraction, multiplication, and conjugation of complex numbers geometrically on the complex plane; use properties of this representation for computation. *For example,* $(1 - \sqrt{3}i)^3 = 8$ *because* $(1 - \sqrt{3}i)$ *has modulus* 2 *and argument* 120°.			*Opportunities to address this standard can be found on the following pages:* SE: 382–389

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Standards	Descriptor	Algebra 1	Geometry	Algebra 2
STANDARDS FOR MATHEMATICAL CONTENT (+ = advanced; * = also a Modeling Standard)				
Number and Quantity				
CC.9-12.N.CN.6	(+) Calculate the distance between numbers in the complex plane as the modulus of the difference, and the midpoint of a segment as the average of the numbers at its endpoints.	*This standard is outside the scope of the Holt McDougal AGA series.*		
CC.9-12.N.CN.7	Solve quadratic equations with real coefficients that have complex solutions.			SE: 352–355, 357–363, 365, 394, 396, 446–451, 477
CC.9-12.N.CN.8	(+) Extend polynomial identities to the complex numbers. *For example, rewrite* $x^2 + 4$ as $(x + 2i)(x - 2i)$.			SE: 445–451, 477
CC.9-12.N.CN.9	(+) Know the Fundamental Theorem of Algebra; show that it is true for quadratic polynomials.			SE: 445–451, 477, 478
CC.9-12.N.VM.1	(+) Recognize vector quantities as having both magnitude and direction. Represent vector quantities by directed line segments, and use appropriate symbols for vectors and their magnitudes (e.g., $\boldsymbol{v}$, $\lvert\boldsymbol{v}\rvert$, $\lvert\lvert\boldsymbol{v}\rvert\rvert$, $\boldsymbol{v}$).		SE: 559–567	SE: AT8–AT11
CC.9-12.N.VM.2	(+) Find the components of a vector by subtracting the coordinates of an initial point from the coordinates of a terminal point.		SE: 559	SE: AT8–AT11
CC.9-12.N.VM.3	(+) Solve problems involving velocity and other quantities that can be represented by vectors.		SE: 559–567, 568, 569, 575, 576, 577, 579, S35	SE: AT10–AT11

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Standards	Descriptor	Algebra 1	Geometry	Algebra 2
STANDARDS FOR MATHEMATICAL CONTENT (+ = advanced; * = also a Modeling Standard)				
Number and Quantity				
CC.9-12.N.VM.4	(+) Add and subtract vectors. a. Add vectors end-to-end, component-wise, and by the parallelogram rule. Understand that the magnitude of a sum of two vectors is typically not the sum of the magnitudes. b. Given two vectors in magnitude and direction form, determine the magnitude and direction of their sum. c. Understand vector subtraction $\boldsymbol{v} - \boldsymbol{w}$ as $\boldsymbol{v} + (-\boldsymbol{w})$, where $-\boldsymbol{w}$ is the additive inverse of $\boldsymbol{w}$, with the same magnitude as $\boldsymbol{w}$ and pointing in the opposite direction. Represent vector subtraction graphically by connecting the tips in the appropriate order, and perform vector subtraction component-wise.		SE: 559–567, 568, 569, 575, 580, 739, S19, S35	SE: AT9–AT11
CC.9-12.N.VM.5	(+) Multiply a vector by a scalar. a. Represent scalar multiplication graphically by scaling vectors and possibly reversing their direction; perform scalar multiplication component-wise, e.g., as $c(v_x, v_y) = (cv_x, cv_y)$. b. Compute the magnitude of a scalar multiple $c\boldsymbol{v}$ using $\|c\boldsymbol{v}\| = \|c\|\boldsymbol{v}$. Compute the direction of $c\boldsymbol{v}$ knowing that when $\|c\|\boldsymbol{v} \neq 0$, the direction of $c\boldsymbol{v}$ is either along $\boldsymbol{v}$ (for $c > 0$) or against $\boldsymbol{v}$ (for $c < 0$).		SE: 559–567	
CC.9-12.N.VM.6	(+) Use matrices to represent and manipulate data, e.g., to represent payoffs or incidence relationships in a network.	SE: 770–773		SE: 246–252, 256, 280–281, 294, 296–297
CC.9-12.N.VM.7	(+) Multiply matrices by scalars to produce new matrices, e.g., as when all of the payoffs in a game are doubled.	SE: 770–773		SE: 248–252, 269

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Standards	Descriptor	Algebra 1	Geometry	Algebra 2
STANDARDS FOR MATHEMATICAL CONTENT (+ = advanced; * = also a Modeling Standard)				
Number and Quantity				
CC.9-12.N.VM.8	(+) Add, subtract, and multiply matrices of appropriate dimensions.	SE: 770–773	SE: 846–847	SE: 247–252, 253–260, 269, 298, 302, 303, 400
CC.9-12.N.VM.9	(+) Understand that, unlike multiplication of numbers, matrix multiplication for square matrices is not a commutative operation, but still satisfies the associative and distributive properties.			SE: 253–260, 269, 299
CC.9-12.N.VM.10	(+) Understand that the zero and identity matrices play a role in matrix addition and multiplication similar to the role of 0 and 1 in the real numbers. The determinant of a square matrix is nonzero if and only if the matrix has a multiplicative inverse.			SE: 255, 278–285
CC.9-12.N.VM.11	(+) Multiply a vector (regarded as a matrix with one column) by a matrix of suitable dimensions to produce another vector. Work with matrices as transformations of vectors.		SE: 846–847	
CC.9-12.N.VM.12	(+) Work with 2 × 2 matrices as a transformations of the plane, and interpret the absolute value of the determinant in terms of area.		SE: 846–847	SE: 262–267, 269, 299, 302, 305

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Standards	Descriptor	Algebra 1	Geometry	Algebra 2
STANDARDS FOR MATHEMATICAL CONTENT (+ = advanced; * = also a Modeling Standard)				
Algebra				
CC.9-12.A.SSE.1	Interpret 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.	SE: 10–11, 46–51, 600, 602	SE: 36–41, 300–306, 601, 680, 681, 689, 690, 699, 705, 707	SE: 27, 331, 490–496
CC.9-12.A.SSE.2	Use the structure of an expression to identify ways to rewrite it. 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: 46–51, 550, 551–557, 558–559, 560–567, 568–574, 575, 576, 577, 578–584, 586–591, 592, 593, 595–597, 598, 599, 602–603, 749, 845, 867	SE: 13–19	SE: 27–32, 331, 397, 430–435, 475

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Standards	Descriptor	Algebra 1	Geometry	Algebra 2
STANDARDS FOR MATHEMATICAL CONTENT (+ = advanced; * = also a Modeling Standard)				
Algebra				
CC.9-12.A.SSE.3	Choose and produce an equivalent form of an expression to reveal and explain properties of the quantity represented by the expression. a. Factor a quadratic expression to reveal the zeros of the function it defines. b. Complete the square in a quadratic expression to reveal the maximum or minimum value of the function it defines. c. Use the properties of exponents to transform expressions for exponential functions. For example the expression $1.15t$ can be rewritten as $(1.151/12)$ $12t \approx 1.01212t$ to reveal the approximate equivalent monthly interest rate if the annual rate is 15%.	SE: a. & b. 558–559, 560–567, 568–574, 575, 576, 577, 578–584, 587–591, 592, 593, 596–597, 598, 599, 602, 749, 845, 867 a. 650–651, 806–811		SE: a. & b. 331, 332, 333–340, 342–349, 393, 563 c. 495
CC.9-12.A.SSE.4	Derive the formula for the sum of a finite geometric series (when the common ratio is not 1), and use the formula to solve problems. For example, calculate mortgage payments.			SE: 894, 896–897, 914, 916
CC.9-12.A.APR.1	Understand that polynomials form a system analogous to the integers, namely, they are closed under the operations of addition, subtraction, and multiplication; add, subtract, and multiply polynomials.	SE: 504–509, 512–519, 521–527		SE: 406–412, 414–420, 437, 474, 475, 478, 479, 480, 483, 563, 565, 647, 651, 987 CCCC: CC1–CC4
CC.9-12.A.APR.2	Know and apply the Remainder Theorem: 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 $p(x)$.			SE: 422–428, 430–435, 445–451, 476, 478
CC.9-12.A.APR.3	Identify zeros of polynomials when suitable factorizations are available, and use the zeros to construct a rough graph of the function defined by the polynomial.	SE: 650–655, 680–681		SE: 432–435, 437, 438–444, 475, 476, 479, 786

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Standards	Descriptor	Algebra 1	Geometry	Algebra 2
STANDARDS FOR MATHEMATICAL CONTENT (+ = advanced; * = also a Modeling Standard)				
Algebra				
CC.9-12.A.APR.4	Prove polynomial identities and use them to describe numerical relationships. For example, the polynomial identity $(x^2 + y^2)^2 + (x^2 - y^2)^2 + (2xy)^2$ can be used to generate Pythagorean triples.	SE: 521–527, 578–584, 585		SE: 414–417, 430–435
CC.9-12.A.APR.5	(+) Know and apply the Binomial Theorem for the expansion of $(x + y)^n$ in powers of x and y for a positive integer n, where x and y are any numbers, with coefficients determined for example by Pascal's Triangle. (The Binomial Theorem can be proved by mathematical induction or by a combinatorial argument.)			SE: 413, 414–420, 837, 840, 851, 852, 920
CC.9-12.A.APR.6	Rewrite simple rational expressions in different forms; write $a(x)/b(x)$ in the form $q(x) + r(x)/b(x)$, where $a(x)$, $b(x)$, $q(x)$, and $r(x)$ 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.	SE: 913–919, 933, 934, 935	SE: 594, 597	SE: 422–428, 475, 478, 480, 857
CC.9-12.A.APR.7	(+) Understand that rational expressions form a system analogous to the rational numbers, closed under addition, subtraction, multiplication, and division by a nonzero rational expression; add, subtract, multiply, and divide rational expressions.	SE: 898–904, 905–911		SE: 577–582, 583–590, 609, 639, 642, 643, 787 CCCC: CC1–CC4

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Standards	Descriptor	Algebra 1	Geometry	Algebra 2
STANDARDS FOR MATHEMATICAL CONTENT (+ = advanced; * = also a Modeling Standard)				
Algebra				
CC.9-12.A.CED.1	Create equations and inequalities in one variable and use them to solve problems. Include equations arising from linear and quadratic functions, and simple rational and exponential functions.*	SE: 79–82, 86–89, 94–98, 102–106, 112–117, 133–138, 139–143, 144–149, 170–175, 177–181, 184–187, 188, 189, 192–195, 197–202, 214–217, 218, 219, 220–223, 224, 226–227, 228–229, 650–655, 656–661, 663–669, 670–677, 796–802, 920–925		SE: 94–96, 97–103, 150–156, 166, 170, 333–340, 341–348, 350–335, 356–363, 366–373, 400, 438–444, 445–451, 522–528, 600–607, 628–635, 714, 1021–1033
CC.9-12.A.CED.2	Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales.*	SE: 249–255, 256–262, 300–306, 307–312, 314–321, 324–329, 336–341, 344–350, 351–358, 361–367, 369–375, 397–402, 404–410, 411–417, 420–425, 626–631, 633–639, 642–647, 670–677, 805–812, 813–819, 871–877, 878–885	SE: 182–187, 190–197, 201, 205, 206, 501 Lesson: 3.5, 3.6	SE: 51–57, 67–73, 115–123, 124–131, 134–140, 142–149, 158–163, 168, 170, 182–189, 190–197, 214–218, 220–226, 229, 235, 270–227, 278–285, 287–293, 315–322, 323–330, 374–381, 406–412, 453–459, 460–465, 466–471, 482, 490–496, 498–504, 505–511, 531–536, 537–544, 545–551, 569–576, 592–599, 619–627, 662–669, 672–679, 682–688, 690–696, 698–705, 856, 985, 990–997, 1003

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Algebra				
CC.9-12.A.CED.3	Represent constraints by equations or inequalities, and by systems of equations and/or inequalities, and interpret solutions as viable or nonviable options in a modeling context. For example, represent inequalities describing nutritional and cost constraints on combinations of different foods.*	SE: 249–255, 300–306, 307–312, 336–341, 344–350, 351–358, 369–375, 399–402, 407–410, 414–417, 418–419, 422–424, 426, 427, 437–439, 442, 443, 444–446, 448, 449, 452–453, 539, 626–631, 642–647, 650–655, 656–661, 663–669, 670–677, 693, 805–812, 813–819, 822–827, 871–877, 878–885		SE: 51–57, 67–73, 105–112, 115–123, 124–131, 134–140, 142–149, 158–163, 182–189, 190–197, 199–204, 205–211, 212, 213, 214–218, 220–226, 234, 240, 241, 270–277, 278–285, 287–293, 315–322, 323–330, 366–373, 374–381, 406–412, 453–459, 460–465, 466–471, 490–496, 498–504, 505–511, 531–536, 537–544, 545–551, 569–576, 592–599, 619–627, 662–669, 672–679, 682–688, 690–696, 698–705, 985, 990–997, 998–1003
CC.9-12.A.CED.4	Rearrange 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.*	SE: 107–111, 117, 126, 155, 158, 231	SE: 41, 585, 586, 588, 597	SE: 689

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STANDARDS FOR MATHEMATICAL CONTENT (+ = advanced; * = also a Modeling Standard)				
Algebra				
CC.9-12.A.REI.1	Explain each step in solving a simple equation as following from the equality of numbers asserted at the previous step, starting from the assumption that the original equation has a solution. Construct a viable argument to justify a solution method.	SE: 77–82, 84–90, 92–98, 100–106, 112–117, 119, 154–155	SE: 104–109, 127, 132, 134	SE: 90–96, 150–156, 190–197, 220–226, 333–340, 341–348, 356–363, 438–444, 522–528, 600–607, 628–635
CC.9-12.A.REI.2	Solve simple rational and radical equations in one variable, and give examples showing how extraneous solutions may arise.	SE: 846–853, 855, 859, 860, 920–925, 927, 933, 934, 935	SE: 454–459, 462–467, 470–477, 479, 481–487, 504	SE: 600–607, 609, 628–635, 636, 637, 640, 641, 642, 643, 646, 647, 716, 1045
CC.9-12.A.REI.3	Solve linear equations and inequalities in one variable, including equations with coefficients represented by letters.	SE: 76, 77–82, 84–90, 91, 92–98, 99, 100–106, 111, 117, 118, 119, 126, 149, 154–155, 158, 159, 162–163, 167, 176–181, 182–187, 188, 189, 190–195, 196–202, 210, 217, 218, 219, 221–222, 224, 225, 228–229, 231, 239, 255, 262, 273, 281, 292, 293, 306, 335, 350, 367, 393, 402, 465, 487, 493, 509, 538, 557, 607, 692, 715, 731, 782, 795, 802, 865, 904		SE: 90–96, 167, 170, 171, 172
CC.9-12.A.REI.4	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. Derive the quadratic formula from this form. b. Solve quadratic equations 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. Recognize when the quadratic formula gives complex solutions and write them as $a \pm bi$ for real numbers a and b.	SE: 642–647, 648–649, 650–655, 656–661, 664–669, 670–671, 673–677, 678, 679, 686–687, 688, 689, 693, 819, 877, 911	SE: 27, 45, 47–48, 55, 59, 63, 235, 237, 277, 326, 349–355, 365, 369, 370, 388, 415, 430, 432–434, 494, 752, 794, 796–798	SE: 333–340, 341–348, 352–355, 356–363, 364, 365, 393, 396, 399, 401, 563, 565, 920, 985
CC.9-12.A.REI.5	Prove that, given a system of two equations in two variables, replacing one equation by the sum of that equation and a multiple of the other produces a system with the same solutions.	SE: 411–417		SE: 190–197, 233

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Standards	Descriptor	Algebra 1	Geometry	Algebra 2
STANDARDS FOR MATHEMATICAL CONTENT (+ = advanced; * = also a Modeling Standard)				
Algebra				
CC.9-12.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: 397–402, 404–410, 411–417, 418–419, 420–425, 426, 427, 444–446, 448, 449, 451, 452	SE: 152–153, 158–160, 161, 176, 194, 195, 316, 317–318	SE: 182–189, 190–197, 213, 232–233, 236, 237, 238, 270–277, 278–285, 287–293, 920
CC.9-12.A.REI.7	Solve a simple system consisting of a linear equation and a quadratic equation in two variables algebraically and graphically. For example, find the points of intersection between the line $y = -3x$ and the circle $x^2 + y^2 = 3$.	CCCC: CC22–CC29	SE: 805	SE: 768–775, 777, 778, 782, 783, 1045
CC.9-12.A.REI.8	(+) Represent a system of linear equations as a single matrix equation in a vector variable.			SE: 287–293, 295, 301, 302, 306
CC.9-12.A.REI.9	(+) Find the inverse of a matrix if it exists and use it to solve systems of linear equations (using technology for matrices of dimension 3×3 or greater).			SE: 270–277, 278–285, 286, 294, 295, 300–301, 302
CC.9-12.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, often forming a curve (which could be a line).	SE: 256–262, 263, 286		SE: 105–112, 113, 133, 167, 170
CC.9-12.A.REI.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, e.g., using technology to graph the functions, make tables of values, or find successive approximations. Include cases where $f(x)$ and/or $g(x)$ are linear, polynomial, rational, absolute value, exponential, and logarithmic functions.*	SE: 642–647, 648–649, 800, 801, 853, AT9 CCCC: CC1–CC2		SE: 157, 335–336, 438–442, 447–448, 524–525, 603–604 CCCC: CC6–CC9
CC.9-12.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.	SE: 428–434, 436–440, 441, 442, 443, 447, 448, 449, 574		SE: 124–131, 168, 170, 171, 174, 199–204, 205–211, 212, 213, 233–234, 236, 237, 240, 306, 307, 563, 786

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Standards	Descriptor	Algebra 1	Geometry	Algebra 2
STANDARDS FOR MATHEMATICAL CONTENT (+ = advanced; * = also a Modeling Standard)				
Functions				
CC.9-12.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 $y = f(x)$.	SE: 240–246, 247, 249–256, 256–262, 263, 265, 285, 289, 292		SE: 44–50, 51–57, 78, 80, 81
CC.9-12.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: 250–255, 262, 265, 286, 288, 289, 293, 390, 465, 767, 801		SE: 51–57, 78, 80, 174
CC.9-12.F.IF.3	Recognize that sequences are functions, some-times defined recursively, whose domain is a subset of the integers. For example, the Fibonacci sequence is defined recursively by $f(0) = f(1) = 1$, $f(n + 1) = f(n) + f(n - 1)$ for $n \geq 1$.	SE: 276–281, 790–795, AT5–AT8		SE: 862–868
CC.9-12.F.IF.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. Key features include: intercepts; intervals where the function is increasing, decreasing, positive, or negative; relative maximums and minimums; symmetries; end behavior; and periodicity.*	SE: 235, 237–238, 265, 284, 300, 304–305, 307–308, 310–312, 342, 343, 347–349, 377, 378–381, 383, 386, 619–620, 623–625, 629–631, 633–639, 640, 641, 642–647, 680–681, 683, 684–685, 688, 693, 802, 811, 813–819, 825–826, 911, AT10–AT13, AT14–AT17, AT10–AT13		SE: 44–50, 51–57, 59–66, 106–112, 115–123, 133, 134–140, 158–163, 167, 315–322, 323–330, 333–340, 365, 393, 396, 409–412, 439–444, 453–459, 460–465, 474, 476, 477, 478, 479, 492–496, 507–511, 531–536, 537–544, 569–576, 592–599, 619–627, 647, 654–661, 662–669, 672–679, 697, 716, 990–997, 998–1003

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Standards	Descriptor	Algebra 1	Geometry	Algebra 2
STANDARDS FOR MATHEMATICAL CONTENT (+ = advanced; * = also a Modeling Standard)				
Functions				
CC.9-12.F.IF.5	Relate the domain of a function to its graph and, where applicable, to the quantitative relationship it describes. 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.*	SE: 240–246, 252–254, 256–262, 264, 265, 288, 293, 303–305, 311, 336–341, 378–379, 381, 382, 391, 574, 613–617, 630–631, 633–639, 641, 680–681, 683, 823, 825–827, 839, 853, 855, 858, 860, 861, 873, 875–876, 881, 883–885, 896, 897, 931, 939, AT3–AT4, AT8	SE: 389, 597	SE: 53, 55–56, 66, 71–73, 80, 162, 203, 321, 326, 328–329, 390, 428, 452, 482, 496, 497, 498, 501, 503, 509, 519, 536, 541–542, 544, 555, 558, 593, 597, 619–620, 623–624, 627, 636, 637, 640–641, 642, 661, 668–669, 679, 681, 693–694, 707, 710, 712, 757, 921, 949, 955, 985, 990–997, 1003, AT2–AT4, AT5–AT7, S12, S16–S17, S19, S21
CC.9-12.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: 314–315, 318–321, 324–329, 343, 344–350, 376, 383, 386, 391, 557, 749, 938, AT14–AT17 CCCC: CC34–CC41		SE: 105–112, 115–123, 133, 168, 466–471, 656–661, 708 CCCC: CC10–CC17
CC.9-12.F.IF.7	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 and quadratic functions and show intercepts, maxima, and minima. b. Graph square root, cube root, and piecewise-defined functions, including step functions and absolute value functions. c. Graph polynomial functions, identifying zeros when suitable factorizations are available, and showing end behavior. d. (+) Graph rational functions, identifying zeros and asymptotes when suitable factorizations are available, and showing end behavior. e. Graph exponential and logarithmic functions, showing intercepts and end behavior, and trigonometric functions, showing period, midline, and amplitude.	SE: a. 256–262, 263, 265, 286, 288, 289, 290, 300–306, 307–312, 336–341, 342, 343, 344–350, 351–358, 359, 369–375, 377, 382–385, 386, 388, 389, 610–617, 619–625, 626–631, 632, 633–639, 641, 642–647, 685, 688, 689, 813–819 b. 378–381, 823–826, 828, AT2–AT4, AT5–AT8 c. 632, 633–639, 680–683, 880–885 d. 878–885 e. 796–802		SE: a. 105–112, 113, 133, 134–140, 167, 170, 315–322, 323–330, 332, 333–340, 365, 393, 396, 400, 482, 716 b. 158–163, 169, 170, 619–627, 636, 637, 641, 642, 646, 662–669, 670–671, 681, 709, 921 c. 409–412, 438–444, 452, 453–459, 460–465, 474, 476, 477 d. 591, 592–599, 609, 640, 643, 647 e. 490–496, 507–511, 531–536, 553, 554, 558, 990–991, 888–1003, 1004, 1005, 1036, 1037, 1040, 1043

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STANDARDS FOR MATHEMATICAL CONTENT (+ = advanced; * = also a Modeling Standard)				
Functions				
CC.9-12.F.IF.8	Write a function defined by an expression in different but equivalent forms to reveal and explain different properties of the function. 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. b. Use the properties of exponents to interpret expressions for exponential functions. For example, identify percent rate of change in functions such as $y = (1.02)t$, $y = (0.97)t$, $y = (1.01)12t$, $y = (1.2)t/10$, and classify them as representing exponential growth or decay.	SE: 618, 621–622, 624–625, 629, 631, 641, 685, 688, 796–802		SE: a. 323–330, 333–340, 341–348, 365, 787 b. 490–496, 521, 558, 920
CC.9-12.F.IF.9	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.	SE: 300–306, 378–381, 619–625, 626–631, 680–681, 796–802, 822–827, 878–885 CCCC: CC34–CC41		SE: AT5–AT11 CCCC: CC10–CC17
CC.9-12.F.BF.1	Write a function that describes a relationship between two quantities.* a. Determine an explicit expression, a recursive process, or steps for calculation from a context. b. Combine standard function types using arithmetic operations. For example, build a function that models the temperature of a cooling body by adding a constant function to a decaying exponential, and relate these functions to the model. c. (+) Compose functions. For example, if $T(y)$ is the temperature in the atmosphere as a function of height, and $h(t)$ is the height of a weather balloon as a function of time, then $T(h(t))$ is the temperature at the location of the weather balloon as a function of time.	SE: 249–255, 300–306, 344–350, 351–358, 633–639, 656–661, 805–812, 813–819, AT10–AT13		SE: 142–149, 374–381, 415–419, 425–427, 436, 437, 462–465, 466–471, 475, 477, 478, 534, 545–551, 665–669, 674–678, 682–688, 690–696, 698–705, 710, 712, 715, 716, 787
CC.9-12.F.BF.2	Write arithmetic and geometric sequences both recursively and with an explicit formula, use them to model situations, and translate between the two forms.*	SE: 276–280, 794–795, AT10–AT13		SE: 862–868, 883–886, 889, 890–899, 912, 913, 914, 916, 917, 920, 921, 985

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Standards	Descriptor	Algebra 1	Geometry	Algebra 2
STANDARDS FOR MATHEMATICAL CONTENT (+ = advanced; * = also a Modeling Standard)				
Functions				
CC.9-12.F.BF.3	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. 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: 368, 369–375, 377, 378–381, 385, 386, 632, 633–639, 641, 647, 686, 688, 742, 757, 822–827, 828, 845, 878–885	SE: 101, 362, 660, 838, 860, 862	SE: 59–66, 67–73, 74, 75, 79, 80, 84, 134–140, 158–163, 168, 170, 175, 315–322, 365, 392, 460–465, 477, 478, 479, 481, 483, 537–544, 557, 558, 562, 620–627, 636, 637, 672–679, 709, 712, 713, 920, 984, 992–997, 998–1003
CC.9-12.F.BF.4	Find inverse functions. a. Solve an equation of the form $f(x) = c$ for a simple function f that has an inverse and write an expression for the inverse. For example, $f(x) = 2 \times 3$ for $x > 0$ or $f(x) = (x + 1)/(x - 1)$ for $x \neq 1$. b. (+) Verify by composition that one function is the inverse of another. c. (+) Read values of an inverse function from a graph or a table, given that the function has an inverse. d. (+) Produce an invertible function from a non-invertible function by restricting the domain.		SE: 533, 540	SE: a–c. 497, 498–504, 507–511, 521, 555, 558, 559, 562, 690–696, 710, 712, 713, 787, 920 c. 619
CC.9-12.F.BF.5	(+) Understand the inverse relationship between exponents and logarithms and use this relationship to solve problems involving logarithms and exponents.			SE: 505–511, 512–519, 520, 521, 522–528, 531–536, 553, 556, 558, 559, 562, 647, 787
CC.9-12.F.LE.1	Distinguish between situations that can be modeled with linear functions and with exponential functions.* a. Prove that linear functions grow by equal differences over equal intervals, and that exponential functions grow by equal factors over equal intervals. b. Recognize situations in which one quantity changes at a constant rate per unit interval relative to another. c. Recognize situations in which a quantity grows or decays by a constant percent rate per unit interval relative to another.	SE: 797–800, 813–819		SE: a. 466–471, 654–661, 698–705 b. 654–661, 681, 698–705, 711, 712 c. 490–496, 698–705, 711, 712

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Standards	Descriptor	Algebra 1	Geometry	Algebra 2
STANDARDS FOR MATHEMATICAL CONTENT (+ = advanced; * = also a Modeling Standard)				
Functions				
CC.9-12.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: 276–281, 283, 286–287, 288, 289, 290, 300–306, 307–312, 336–341, 344–350, 351–358, 377, 382–385, 386, 388, 389, 790–795, 805–812, 813–819, 821, AT10–AT13		SE: 106–112, 115–123, 124–131, 133, 168, 170, 490–496, 561, 646, 654–661, 681, 698–705, 708, 711, 712, 786, 857, 879–887, 890–989
CC.9-12.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: 802 CCCC: CC34–CC41		SE: 490–496, 698–705, AT6–AT7
CC.9-12.F.LE.4	For exponential models, express as *a* logarithm the solution to $abct = d$ where *a*, *c*, and *d* are numbers and the base *b* is 2, 10, or *e*; evaluate the logarithm using technology.*			SE: 505–511, 524–528, 530, 531–536
CC.9-12.F.LE.5	Interpret the parameters in a linear or exponential function in terms of a context.*	SE: 344–350, 805–812		SE: 490–496, 555
CC.9-12.F.TF.1	Understand radian measure of an angle as the length of the arc on the unit circle subtended by the angle.			SE: 943–949
CC.9-12.F.TF.2	Explain how the unit circle in the coordinate plane enables the extension of trigonometric functions to all real numbers, interpreted as radian measures of angles traversed counterclockwise around the unit circle.		SE: 570–571	SE: 936–938, 942–945
CC.9-12.F.TF.3	(+) Use special triangles to determine geometrically the values of sine, cosine, tangent for $\pi/3$, $\pi/4$ and $\pi/6$, and use the unit circle to express the values of sine, cosines, and tangent for *x*, $\pi + x$, and $2\pi - x$ in terms of their values for *x*, where *x* is any real number.			SE: 929–935, 942–949, 957, 977, 980, 981
CC.9-12.F.TF.4	(+) Use the unit circle to explain symmetry (odd and even) and periodicity of trigonometric functions.			*Opportunities to address this standard can be found on the following pages:* SE: 943–949, 990–997

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STANDARDS FOR MATHEMATICAL CONTENT (+ = advanced; * = also a Modeling Standard)				
Functions				
CC.9-12.F.TF.5	Choose trigonometric functions to model periodic phenomena with specified amplitude, frequency, and midline.*			SE: 992–996, 998–1003
CC.9-12.F.TF.6	(+) Understand that restricting a trigonometric function to a domain on which it is always increasing or always decreasing allows its inverse to be constructed.			SE: 950–955
CC.9-12.F.TF.7	(+) Use inverse functions to solve trigonometric equations that arise in modeling contexts; evaluate the solutions using technology, and interpret them in terms of the context.*		SE: 533, 534–541	SE: 952–955, 957, 978, 980, 981, 984, 1027–1033
CC.9-12.F.TF.8	Prove the Pythagorean identity $sin^2(\theta) + cos^2(\theta) = 1$ and use it to calculate trigonometric ratios.			SE: 1008–1013, 1037, 1040, 1043
CC.9-12.F.TF.9	(+) Prove the addition and subtraction formulas for sine, cosine, and tangent and use them to solve problems.			SE: 1014–1019, 1035, 1038, 1040, 1041, 1044

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Standards	Descriptor	Algebra 1	Geometry	Algebra 2
STANDARDS FOR MATHEMATICAL CONTENT (+ = advanced; * = also a Modeling Standard)				
Geometry				
CC.9-12.G.CO.1	Know precise definitions of angle, circle, perpendicular line, parallel line, and line segment, based on the undefined notions of point, line, distance along a line, and distance around a circular arc.		SE: 6–11, 20–27, 35, 64, 68, 69, 146–151, 600–605	SE: 115–123, 936–941, 943–949
CC.9-12.G.CO.2	Represent transformations in the plane using, e.g., transparencies and geometry software; describe transformations as functions that take points in the plane as inputs and give other points as outputs. Compare transformations that preserve distance and angle to those that do not (e.g., translation versus horizontal stretch).		SE: 50–55, 56–57, 495–500, 507, 513, 580, 739, 824–830, 831–837, 839–845, 848–853, 855, 872–879, 884–887, 888, 892, 893	
CC.9-12.G.CO.3	Given a rectangle, parallelogram, trapezoid, or regular polygon, describe the rotations and reflections that carry it onto itself.		SE: 824–830, 831–837, 839–845, 848–853, 855, 856–862, 884–887, 888, 889	
CC.9-12.G.CO.4	Develop definitions of rotations, reflections, and translations in terms of angles, circles, perpendicular lines, parallel lines, and line segments.		SE: 50–55, 824–830, 831–837, 839–845, 855, 884, 885, 888	

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Standards	Descriptor	Algebra 1	Geometry	Algebra 2
STANDARDS FOR MATHEMATICAL CONTENT (+ = advanced; * = also a Modeling Standard)				
Geometry				
CC.9-12.G.CO.5	Given a geometric figure and a rotation, reflection, or translation, draw the transformed figure using, e.g., graph paper, tracing paper, or geometry software. Specify a sequence of transformations that will carry a given figure onto another.		SE: 50–55, 56–57, 59, 63, 64, 739, 824–830, 831–837, 839–845, 848–853, 855, 884–887, 888, 889, 892, 893	SE: 262–267
CC.9-12.G.CO.6	Use geometric descriptions of rigid motions to transform figures and to predict the effect of a given rigid motion on a given figure; given two figures, use the definition of congruence in terms of rigid motions to decide if they are congruent.		SE: 250–259, 281, 286, 288, 824–830, 831–837, 839–845 CCCC: CC2–CC9	
CC.9-12.G.CO.7	Use the definition of congruence in terms of rigid motions to show that two triangles are congruent if and only if corresponding pairs of sides and corresponding pairs of angles are congruent.	SE: 127–132	SE: 260–265, 281, 282–283, 286, 288 CCCC: CC2–CC9	
CC.9-12.G.CO.8	Explain how the criteria for triangle congruence (ASA, SAS, and SSS) follow from the definition of congruence in terms of rigid motions.		SE: 240–241, 242–249, 252–259, 281, 285, 288, 290, 292, 375	
CC.9-12.G.CO.9	Prove geometric theorems about lines and angles. Theorems include: vertical angles are congruent; when a transversal crosses parallel lines, alternate interior angles are congruent and corresponding angles are congruent; points on a perpendicular bisector of a line segment are exactly those equidistant from the segment's endpoints.		SE: 118–125, 155–159, 162, 169, 181, 203–204, 206, 300–306	
CC.9-12.G.CO.10	Prove theorems about triangles. Theorems include: measures of interior angles of a triangle sum to 180°; base angles of isosceles triangles are congruent; the segment joining midpoints of two sides of a triangle is parallel to the third side and half the length; the medians of a triangle meet at a point.		SE: 223–230, 239, 273–279, 281, 284, 287, 288, 314–319, 322–327, 329, 367, 368	
CC.9-12.G.CO.11	Prove theorems about parallelograms. Theorems include: opposite sides are congruent, the diagonals of a parallelogram bisect each other, and conversely, rectangles are parallelograms with congruent diagonals.	SE: 57, 362, 365, 367	SE: 391–392, 407, 408–415, 439, 442	

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STANDARDS FOR MATHEMATICAL CONTENT (+ = advanced; * = also a Modeling Standard)				
Geometry				
CC.9-12.G.CO.12	Make formal geometric constructions with a variety of tools and methods (compass and straightedge, string, reflective devices, paper folding, dynamic geometry software, etc.). Copying a segment; copying an angle; bisecting a segment; bisecting an angle; constructing perpendicular lines, including the perpendicular bisector of a line segment; and constructing a line parallel to a given line through a point not on the line.		SE: 14, 16, 17–18, 22–27, 35, 61, 170–171, 172, 177, 179	
CC.9-12.G.CO.13	Construct an equilateral triangle, a square, and a regular hexagon inscribed in a circle.		SE: 380–381, 778	
CC.9-12.G.SRT.1	Verify experimentally the properties of dilations given by a center and a scale factor: a. A dilation takes a line not passing through the center of the dilation to a parallel line, and leaves a line passing through the center unchanged. b. The dilation of a line segment is longer or shorter in the ratio given by the scale factor.		SE: 872–879, 881, 887, 888, 495–500 CCCC: CC14–CC21	
CC.9-12.G.SRT.2	Given two figures, use the definition of similarity in terms of similarity transformations to decide if they are similar; explain using similarity transformations the meaning of similarity for triangles as the equality of all corresponding angles and the proportionality of all corresponding pairs of sides.		SE: 462–467, 468–469, 470–477, 479, 481–487, 503, 505, 508, 509, 510, 511, 515, 581 CCCC: CC14–CC21	
CC.9-12.G.SRT.3	Use the properties of similarity transformations to establish the AA criterion for two triangles to be similar.		SE: 470–477, 505, 508	
CC.9-12.G.SRT.4	Prove theorems about triangles. Theorems include: a line parallel to one side of a triangle divides the other two proportionally, and conversely; the Pythagorean Theorem proved using triangle similarity.	SE: 127–128, 130–132, 153, 156, 158, 159, 255, 306, 391, 480	SE: 300–306, 329, 347, 348–355, 365, 366, 481, 487, 506, 608 CCCC: CC22–CC23	

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STANDARDS FOR MATHEMATICAL CONTENT (+ = advanced; * = also a Modeling Standard)				
Geometry				
CC.9-12.G.SRT.5	Use congruence and similarity criteria for triangles to solve problems and prove relationships in geometric figures.		SE: 242–249, 250–259, 260–265, 281, 285–286, 288, 290, 292, 470–477, 479, 481–487, 503, 505, 508	
CC.9-12.G.SRT.6	Understand that by similarity, side ratios in right triangles are properties of the angles in the triangle, leading to definitions of trigonometric ratios for acute angles.		SE: 518–523, 524, 525–532, 543, 572, 573, 576	SE: 929
CC.9-12.G.SRT.7	Explain and use the relationship between the sine and cosine of complementary angles.		CCCC: CC27–CC28	
CC.9-12.G.SRT.8	Use trigonometric ratios and the Pythagorean Theorem to solve right triangles in applied problems.	SE: 36, 38, 831–833, 928–929	SE: 348–359, 365, 369, 370, 371, 373, 534–541, 542, 543, 544–549, 550, 569, 573, 574, 576, 578, 580, 819,	SE: 925, 929–935, 957, 976, 980, 981, 985, 1045
CC.9-12.G.SRT.9	(+) Derive the formula $A = \frac{1}{2} ab \sin(C)$ for the area of a triangle by drawing an auxiliary line from a vertex perpendicular to the opposite side.		SE: 613	SE: 958
CC.9-12.G.SRT.10	(+) Prove the Laws of Sines and Cosines and use them to solve problems.		SE: 551–558, 569, 574, 576, 577	SE: 958–965, 966–973, 975, 978–979, 980, 981, 984
CC.9-12.G.SRT.11	(+) Understand and apply the Law of Sines and the Law of Cosines to find unknown measurements in right and non-right triangles (e.g., surveying problems, resultant forces).		SE: 551–558, 569, 574, 576, 577	SE: 961–965, 969–973, 975, 978–979, 980
CC.9-12.G.C.1	Prove that all circles are similar.		CCCC: CC14–CC21	
CC.9-12.G.C.2	Identify and describe relationships among inscribed angles, radii, and chords. Include the relationship between central, inscribed, and circumscribed angles; inscribed angles on a diameter are right angles; the radius of a circle is perpendicular to the tangent where the radius intersects the circle.		SE: 772–779, 782–789, 792–798, 807, 810, 814, 817, 818	

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Geometry				
CC.9-12.G.C.3	Construct the inscribed and circumscribed circles of a triangle, and prove properties of angles for a quadrilateral inscribed in a circle.		SE: 307, 313, 775–779, 807, 812, 819	
CC.9-12.G.C.4	(+) Construct a tangent line from a point outside a given circle to the circle.		SE: 779	
CC.9-12.G.C.5	Derive using similarity the fact that the length of the arc intercepted by an angle is proportional to the radius, and define the radian measure of the angle as the constant of proportionality; derive the formula for the area of a sector.		SE: 764–769 CCCC: CC30–CC31	SE: 943–949
CC.9-12.G.GPE.1	Derive the equation of a circle of given center and radius using the Pythagorean Theorem; complete the square to find the center and radius of a circle given by an equation.		SE: 799–805, 813, 814	SE: 729–734, 764–766, 776, 777
CC.9-12.G.GPE.2	Derive the equation of a parabola given a focus and directrix.			SE: 751–757, 759, 777, 780, 782, 786
CC.9-12.G.GPE.3	(+) Derive the equations of ellipses and hyperbolas given foci and directrices.			SE: 736–742, 743, 744–750, 758, 759, 777, 779–780, 782, 787, 984
CC.9-12.G.GPE.4	Use coordinates to prove simple geometric theorems algebraically. For example, prove or disprove that a figure defined by four given points in the coordinate plane is a rectangle; prove or disprove that the point $(1, \sqrt{3})$ lies on the circle centered at the origin and containing the point (0, 2).		SE: 267–272	SE: 122, 726, 727
CC.9-12.G.GPE.5	Prove the slope criteria for parallel and perpendicular lines and use them to solve geometric problems (e.g., find the equation of line parallel or perpendicular to a given line that passes through a given point).	SE: 361–367, 375, 377, 385, 386, 391, 452, 538, 661, 783, 925	SE: 190–197, 400–405, 407, 414–415, 440, 442, 893 CCCC: CC10–CC13	

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Geometry				
CC.9-12.G.GPE.6	Find the point on a directed line segment between two given points that partitions the segment in a given ratio.	SE: 330, 333–335, 343, 384	SE: 616–621 CCCC: CC25–CC26	
CC.9-12.G.GPE.7	Use coordinates to compute perimeters of polygons and areas of triangles and rectangles, e.g., using the distance formula.*	SE: 334	SE: 616–617, 618–621, 639, 642, 644, 649	
CC.9-12.G.GMD.1	Give an informal argument for the formulas for the circumference of a circle, area of a circle, volume of a cylinder, pyramid, and cone. Use dissection arguments, Cavalieri's principle, and informal limit arguments.		SE: 600–605, 697–699, 705	
CC.9-12.G.GMD.2	(+) Give an informal argument using Cavalieri's principle for the formulas for the volume of a sphere and other solid figures.		SE: 697–704, 705–711, 713–720	
CC.9-12.G.GMD.3	Use volume formulas for cylinders, pyramids, cones, and spheres to solve problems.*	SE: 50, 60, 479, 487, 492–493, 499, 519, 520, 591, 661, 803, 826, 889, 919, AT4	SE: 697–704, 705–712, 714–721, 725, 732–733, 735, 738, 739, 818, 892	SE: 428, 447–448, 581, 618, 722, 735
CC.9-12.G.GMD.4	Identify the shapes of two-dimensional cross-sections of three-dimensional objects, and identify three-dimensional objects generated by rotations of two-dimensional objects.		SE: 654–660, 661–668, 679, 730, 731	

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STANDARDS FOR MATHEMATICAL CONTENT (+ = advanced; * = also a Modeling Standard)				
Geometry				
CC.9-12.G.MG.1	Use geometric shapes, their measures, and their properties to describe objects (e.g., modeling a tree trunk or a human torso as a cylinder).*	SE: 30, 45, 433, 469, 500, 507, 518, 529, 565, 567, 573, 583, 665–666, 668, 831, 891	SE: 218–220, 227–229, 235–236, 245, 248, 258, 278, 279, 288, 304–305, 310–311, 324–325, 428, 432–434, 436, 437, 441, 528–531, 542, 683–687, 692–695, 698, 701–703, 706, 709–711, 751–753, 762, 767–768, 793, 795–797	
CC.9-12.G.MG.2	Apply concepts of density based on area and volume in modeling situations (e.g., persons per square mile, BTUs per cubic foot).*	SE: 126, 486	SE: 698, 701, 703, 725	
CC.9-12.G.MG.3	Apply geometric methods to solve design problems (e.g., designing an object or structure to satisfy physical constraints or minimize cost; working with typographic grid systems based on ratios).*		SE: 105, 256, 260, 271, 311, 313, 317–318, 336, 360, 403, 433, 448–449, 467, 498–499, 607, 636, 660, 685, 693, 695, 825, 849	

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Standards	Descriptor	Algebra 1	Geometry	Algebra 2
STANDARDS FOR MATHEMATICAL CONTENT (+ = advanced; * = also a Modeling Standard)				
Statistics and Probability				
CC.9-12.S.ID.1	Represent data with plots on the real number line (dot plots, histograms, and box plots).*	SE: 700–708, 709–715, 718–723, 774, 775, 778 CCCC: CC30–CC33		SE: 829–830, 833–834, 851, 852, 985
CC.9-12.S.ID.2	Use statistics appropriate to the shape of the data distribution to compare center (median, mean) and spread (interquartile range, standard deviation) of two or more different data sets.*	SE: 716–723		SE: 834, 844
CC.9-12.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: 716–723 CCCC: CC30–CC33		SE: 829–834, 845
CC.9-12.S.ID.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, spreadsheets, and tables to estimate areas under the normal curve.*			SE: 846–847 CCCC: CC60–CC65
CC.9-12.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: 813, 815–818, 827, 850, 856, S42 CCCC: CC19–CC26

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Standards	Descriptor	Algebra 1	Geometry	Algebra 2
STANDARDS FOR MATHEMATICAL CONTENT (+ = advanced; * = also a Modeling Standard)				
Statistics and Probability				
CC.9-12.S.ID.6	Represent data on two quantitative variables on a scatter plot, and describe how the variables are related.* a. Fit a function to the data; use functions fitted to data to solve problems in the context of the data. Use given functions or choose a function suggested by the context. Emphasize linear and exponential models. b. Informally assess the fit of a function by plotting and analyzing residuals. c. Fit a linear function for a scatter plot that suggests a linear association.	SE: 266–268, 270–273, 274, 275, 281, 282, 283, 287, 288, 360, 639, 813–819 CCCC: CC11–CC18		SE: 142–149, 169, 170, 376–381, 391, 396, 466–471, 545–551, 552, 553, 557, 563, 698–705
CC.9-12.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: 360 CCCC: CC11–CC18	SE: 183, 186, 193, 194, 195	SE: 105–112, 142–149, 169
CC.9-12.S.ID.8	Compute (using technology) and interpret the correlation coefficient of a linear fit.*	CCCC: CC11–CC18		SE: 142–149, 169, 170, 307, 562
CC.9-12.S.ID.9	Distinguish between correlation and causation.*	CCCC: CC11–CC18		
CC.9-12.S.IC.1	Understand statistics as a process for making inferences about population parameters based on a random sample from that population.*	SE: 726–731		CCCC: CC27–CC34

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Standards	Descriptor	Algebra 1	Geometry	Algebra 2
STANDARDS FOR MATHEMATICAL CONTENT (+ = advanced; * = also a Modeling Standard)				
Statistics and Probability				
CC.9-12.S.IC.2	Decide if a specified model is consistent with results from a given data-generating process, e.g., using simulation. For example, a model says a spinning coin falls heads up with probability 0.5. Would a result of 5 tails in a row cause you to question the model?*			SE: 817
CC.9-12.S.IC.3	Recognize the purposes of and differences among sample surveys, experiments, and observational studies; explain how randomization relates to each.*	SE: 732–733		CCCC: CC35–CC42
CC.9-12.S.IC.4	Use data from a sample survey to estimate a population mean or proportion; develop a margin of error through the use of simulation models for random sampling.*			CCCC: CC51–CC58
CC.9-12.S.IC.5	Use data from a randomized experiment to compare two treatments; use simulations to decide if differences between parameters are significant.*			CCCC: CC43–CC50
CC.9-12.S.IC.6	Evaluate reports based on data.*	SE: 726–731, 735, 776, 778		CCCC: CC51–CC58
CC.9-12.S.CP.1	Describe events as subsets of a sample space (the set of outcomes) using characteristics (or categories) of the outcomes, or as unions, intersections, or complements of other events ("or," "and," "not").*	SE: 737–742, 744–749, 750–757		SE: 802–809, 819–825, 827, 850, 853, 854

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Standards	Descriptor	Algebra 1	Geometry	Algebra 2
STANDARDS FOR MATHEMATICAL CONTENT (+ = advanced; * = also a Modeling Standard)				
Statistics and Probability				
CC.9-12.S.CP.2	Understand that two events *A* and *B* are independent if the probability of *A* and *B* occurring together is the product of their probabilities, and use this characterization to determine if they are independent.*	SE: 751–756, 777, 778	SE: 230	SE: 811–818, 827, 850, 852, 853
CC.9-12.S.CP.3	Understand the conditional probability of *A* given *B* as $P(A \text{ and } B)/P(B)$, and interpret independence of *A* and *B* as saying that the conditional probability of *A* given *B* is the same as the probability of *A*, and the conditional probability of *B* given *A* is the same as the probability of *B*.*	SE: 750–757	SE: 339, 565	SE: 811–818, 850, 921
CC.9-12.S.CP.4	Construct and interpret two-way frequency tables of data when two categories are associated with each object being classified. Use the two-way table as a sample space to decide if events are independent and to approximate conditional probabilities. For example, collect data from a random sample of students in your school on their favorite subject among math, science, and English. Estimate the probability that a randomly selected student from your school will favor science given that the student is in tenth grade. Do the same for other subjects and compare the results.*			SE: 805–812 CCCC: CC19–CC26
CC.9-12.S.CP.5	Recognize and explain the concepts of conditional probability and independence in everyday language and everyday situations. For example, compare the chance of having lung cancer if you are a smoker with the chance of being a smoker if you have lung cancer.*	SE: 750–751, 754–756		CCCC: CC19–CC26

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Standards	Descriptor	Algebra 1	Geometry	Algebra 2
STANDARDS FOR MATHEMATICAL CONTENT (+ = advanced; * = also a Modeling Standard)				
Statistics and Probability				
CC.9-12.S.CP.6	Find the conditional probability of *A* given *B* as the fraction of *B*'s outcomes that also belong to *A*, and interpret the answer in terms of the model.*	SE: 750–757		SE: 811–818, 850
CC.9-12.S.CP.7	Apply the Addition Rule, $P(A \text{ or } B) = P(A) + P(B) - P(A \text{ and } B)$, and interpret the answer in terms of the model.*	SE: 758–759		SE: 819–825, 827, 850, 855
CC.9-12.S.CP.8	(+) Apply the general Multiplication Rule in a uniform probability model, $P(A \text{ and } B) = P(A)P(B \mid A) = P(B)P(A \mid B)$, and interpret the answer in terms of the model.*	SE: 750–757		SE: 811–818, 827, 850, 853
CC.9-12.S.CP.9	(+) Use permutations and combinations to compute probabilities of compound events and solve problems.*	SE: 766		SE: 794–800, 802–809, 819–825, 827, 848, 852, 854, 856, 1045
CC.9-12.S.MD.1	(+) Define a random variable for a quantity of interest by assigning a numerical value to each event in a sample space; graph the corresponding probability distribution using the same graphical displays as for data distributions.*			SE: 842, 846
CC.9-12.S.MD.2	(+) Calculate the expected value of a random variable; interpret it as the mean of the probability distribution.*			SE: 831, 833, 845, 851, 852, 853
CC.9-12.S.MD.3	(+) Develop a probability distribution for a random variable defined for a sample space in which theoretical probabilities can be calculated; find the expected value. For example, find the theoretical probability distribution for the number of correct answers obtained by guessing on all five questions of a multiple-choice test where each question has four choices, and find the expected grade under various grading schemes.*			SE: 836

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Standards	Descriptor	Algebra 1	Geometry	Algebra 2
STANDARDS FOR MATHEMATICAL CONTENT (+ = advanced; * = also a Modeling Standard)				
Statistics and Probability				
CC.9-12.S.MD.4	(+) Develop a probability distribution for a random variable defined for a sample space in which probabilities are assigned empirically; find the expected value. For example, find a current data distribution on the number of TV sets per household in the United States, and calculate the expected number of sets per household. How many TV sets would you expect to find in 100 randomly selected households?*			SE: 838–843, 845, 851, 852
CC.9-12.S.MD.5	(+) Weigh the possible outcomes of a decision by assigning probabilities to payoff values and finding expected values.* a. Find the expected payoff for a game of chance. For example, find the expected winnings from a state lottery ticket or a game at a fast-food restaurant. b. Evaluate and compare strategies on the basis of expected values. For example, compare a high-deductible versus a low-deductible automobile insurance policy using various, but reasonable, chances of having a minor or a major accident.			SE: 822–827
CC.9-12.S.MD.6	(+) Use probabilities to make fair decisions (e.g., drawing by lots, using a random number generator).*			CCCC: CC27–CC34
CC.9-12.S.MD.7	(+) Analyze decisions and strategies using probability concepts (e.g., product testing, medical testing, pulling a hockey goalie at the end of a game).*	SE: 739, 741, 756, 758–759, 766, 768, 776, 778		SE: 807–808, 816, 824, 826 CCCC: CC66–CC73

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4-Year Scope and Sequence

Holt McDougal Algebra 1

	Pre-Algebra	Algebra 1	Geometry	Algebra 2
Problem Solving				
Skills				
Problem solving strategies	R	R	R	R
Identify relationships	R	R	R	R
Choose an operation	R	R	R	R
Choose a method of computation	T	R	R	R
Make generalizations	R	R	R	R
Use a formula	T	R	R	R
Estimate or give an exact answer	R	R	R	R
Prioritize and sequence information	R	R	R	R
Identify too much or too little information	R	R	R	R
Write an equation	T	TR	R	R
Write the problem in your own words/Restate the question	R	R	R	R
Eliminate answer choices	R	R	R	R
Check that your answer is reasonable	R	R	R	R
Write algebraic expressions	R	R	R	R
Analyze units	R	R	R	R
Use a simulation	T	R	R	R
Interpret unfamiliar words/Understand the words in the problem	R	R	R	R
Identify important details in the problem	R	R	R	R
Choose a problem-solving strategy	R	R	R	R
Check that the question is answered	R	R	R	R
Break into simpler parts	R	R	R	R
Translate between words and math	R	R	R	R
Identify missing information	R	R	R	R
Reasoning				
Make and test predictions	R	R	R	R
Explain and justify answers	R	R	R	R
Evaluate evidence and conclusions	T	R	R	R
Interpret charts, tables, and graphs	T	R	R	R
Classify and sort	R	R	R	R
Identify spatial relationships	R	R	R	R

I (Introduce) **T (Teach and Test)** **R (Reinforce)**

	Pre-Algebra	Algebra 1	Geometry	Algebra 2
Use visual representations to solve problems	R	R	R	R
Solve nonroutine problems	R	R	R	R
Compare and contrast	R	R	R	R
Draw conclusions	R	R	R	R
Inductive and deductive reasoning	I	I	T	R
Number and Quantity				
Read and write numbers				
Evaluate exponents	R	TR	R	R
Negative exponents	T	R		TR
Evaluate rational exponents		IT		TR
Properties of Exponents	I	T		R
Scientific notation	T	TR		R
Properties of Real Numbers	I	T		R
Integers	R	R	R	R
Square roots	T	R	R	R
Absolute value	T	R	R	R
Quantities				
Choose and interpret units	I	T	R	R
Precision and accuracy		IT	R	
Complex Numbers				
Operations with complex numbers				IT
Complex numbers in the complex plane				IT
Ratio				
Cross products	T	R	R	R
Proportion				
Indirect measurement	T	T	R	R
Solve proportions	T	R	R	R

I (Introduce) **T** (Teach and Test) **R** (Reinforce)

	Pre-Algebra	Algebra 1	Geometry	Algebra 2
Scale factor	T	T	R	
Scale drawings	TR	R	R	
Similar figures	TR	R	R	R
Percent				
Percents greater than 100% and less than 1%	T	TR		R
Percent of a number	TR	TR	R	R
Percent one number is of another	T	TR	R	R
Percent change (increase and decrease)	T	TR	R	R
Find number when percent is known	T	TR	R	R
Circle graph	T	R	R	R
Simple interest	T	TR		R
Compound interest	IT	TR		R
Operations				
Order of operations				
Order of operations	T	TR	R	R
Addition and subtraction				
Decimals	TR	R	R	R
Fractions	R	R	R	R
Mixed numbers	TR	R	R	R
Integers	TR	TR	R	R
Multiplication and division				
Of exponential expressions	IT	TR		R
Decimal by a whole number	R	R	R	R
Decimal by a decimal	TR	R	R	R
Fraction by a whole number	R	R	R	R
Fraction by a fraction	TR	R	R	R
Mixed numbers	TR	R	R	R
Integers	TR	TR	R	R
Algebra and Functions				
Equations and expressions				
Formulas	R	R	R	R
Variables	R	R	R	R
Write and evaluate algebraic expressions	R	TR	R	R
Identify and combine like terms	R	TR	R	R

I (Introduce) **T (Teach and Test)** **R (Reinforce)**

	Pre-Algebra	Algebra 1	Geometry	Algebra 2
Monomials: simplify, operations	IT	T	R	R
Polynomials	IT	T	R	R
Binomials and trinomials, definition	IT	T		R
Degree		T		R
Simplify polynomial expressions	IT	T	R	R
Add and subtract polynomials	IT	T	R	R
Multiply binomials	IT	T	R	R
FOIL method	IT	T		R
Difference of squares		IT		R
Perfect-square trinomial		IT		R
Multiply polynomials by monomials	IT	T	R	R
Divide polynomials by monomials		IT	R	TR
Divide polynomials by polynomials		IT		IT
Properties of polynomial and rational expressions		IT		R
Factor binomials		IT	R	R
Factor trinomials		IT	R	R
Factor difference of squares		IT		R
Factor perfect-square trinomials		IT		R
Factor Theorem				IT
Binomial expansion				IT
Binomial Theorem				IT
Rational expressions: simplify, graph		IT		TR
Radical expressions: simplify, evaluate		TR	R	R
Simplify expressions with complex numbers				IT
Write linear equations	T	TR	R	R
Solve equations				
1-step equations	T	TR	R	R
2-step equations	T	TR	R	R
Multistep equations	T	TR	R	R
Equations with variables on both sides	T	TR	R	R
Relate graphs and equations	T	TR	R	R
Solve equations by factoring	T	IT	R	TR
Linear equations	IT	TR	R	TR
Systems of equations		T	TR	TR
Absolute-value equations		IT		TR

I (Introduce) **T (Teach and Test)** **R (Reinforce)**

	Pre-Algebra	Algebra 1	Geometry	Algebra 2
Rational equations	IT	IT		TR
Quadratic equations		IT	TR	TR
Polynomial equations		IT		TR
Exponential equations	IT	IT		IT
Logarithmic equations				IT
Radical equations		IT	TR	TR
Inequalities				
Compare numbers	R	R	R	R
Algebraic inequality	T	TR	R	R
Write an inequality for a problem situation	T	TR	R	R
Solve inequalities				
1-step inequalities	T	TR	R	R
2-step inequalities	T	TR	R	R
Graph inequalities	T	TR		R
Graph compound inequalities	I	TR		TR
Graph inequalities in two variables		TR		TR
Absolute-value inequalities		IT		TR
Rational inequalities				TR
Radical inequalities				TR
Coordinate plane				
Ordered pairs	R	R	R	R
Origin	R	R	R	R
Axes	R	R	R	R
Graph in four quadrants	T	R	R	R
Find area by coordinates			T	TR
Relations		TR	R	R
Functions	T	TR	R	R
Transformations	T	TR	R	R
Linear equations	T	TR	R	R
Nonlinear equations	T	TR	R	R
Systems of equations	T	TR	R	R
Inequalities	T	TR	R	R
Systems of inequalities		IT		TR
Quadratic equations	T	IT	R	TR

I (Introduce) **T** (Teach and Test) **R** (Reinforce)

	Pre-Algebra	Algebra 1	Geometry	Algebra 2
Conics				
Conic sections				TR
Parabolas	T	IT		TR
Circles	T	T	TR	R
Ellipses				TR
Hyperbolas				TR
General equation for conics				TR
Identify conic from equation				TR
Transformations of conics				TR
Vectors				
Magnitude, direction			IT	R
Vector sum				
Patterns				
Arithmetic sequences	T	TR		R
Arithmetic series				IT
Geometric sequences		TR		TR
Geometric series				IT
Infinite sequence				IT
Infinite geometric series				IT
Sigma notation				IT
Fibonacci sequence	IT	R	R	R
Pascal's triangle		I	R	R
Fractals	IT		I	TR
Binomial expansion				IT
Recursion		I		IT
Functions and relations				
Evaluate functions	T	TR		R
Operations with functions				IT
Composite functions		IT		TR
Relations		IT	R	R
Inverse of function or relation			I	IT
Linear functions	T	TR		R
Rational functions		IT		TR
Quadratic functions	IT	TR		TR
Exponential functions	IT	TR		TR

I (Introduce) **T** (Teach and Test) **R** (Reinforce)

	Pre-Algebra	Algebra 1	Geometry	Algebra 2
Logarithmic functions				IT
Polynomial functions		IT		TR
Radical functions		IT		TR
Trigonometric functions		IT	TR	TR
Modeling				
Linear models		IT		R
Exponential models		IT		R
Quadratic models		I		TR
Matrices				
Matrix operations		I		T
Determinants				IT
Identity and inverse matrices				T
Solve systems of equations				IT
Transformation matrices			I	IT
Probability				
Probability as ratio, proportion, decimal, percent	T	TR	R	R
Making predictions	T	R	R	R
Finding outcomes				
Tree diagrams	T	R		R
Combinations	T	T		T
Permutations	T	T		T
Fundamental Counting Principle	T	T		T
Factorial	IT	T		T
Theoretical probability				
Mutually exclusive	T	T		T
Independent/dependent events	T	T		T
Conditional Probability		IT		TR
Complementary events	T	T		T
Experimental probability				
Simulations	T	R		R
Random numbers	I	R		R

I (Introduce) **T (Teach and Test)** **R (Reinforce)**

	Pre-Algebra	Algebra 1	Geometry	Algebra 2
Odds				
Odds	T	T		
Data Analysis and Statistics				
Organizing and Displaying Data				
Frequency table/chart	R	R		R
Stem-and-leaf plot	T	R		
Two-way tables				IT
Dot plot	IT	TR		
Venn diagram	T	R	R	R
Histogram	T	R		
Box-and-whisker plot	T	TR		R
Scatter plot	R	R		R
Analyzing data				
Surveys, experiments, and observational studies		I		TR
Identify correlation		T		R
Quartiles	T	T		T
Interquartile range	T	IT		T
Line of best fit	T		I	T
Make predictions	R	T		T
Mean, median, mode	T	TR		TR
Determine best measure of central tendency	T	T		T
Standard deviation				TR
Variance				TR
Frequency distribution				IT
Normal distribution (bell curve)				IT
Binomial distribution				IT
Shape of distribution		IT		TR
Standard normal curve				IT
Geometry				
Points, lines, planes	R	IT	T	T
Angles				
Ray	R		R	
Vertex	R		R	

I (Introduce) **T** (Teach and Test) **R** (Reinforce)

	Pre-Algebra	Algebra 1	Geometry	Algebra 2
Classify	R		R	
Vertical, adjacent, complementary, supplementary	R		R	
Congruent	R		R	
Relationships of angles formed by parallel lines and a transversal	IT		TR	
Angle relationship theorems			IT	
Sum of angle measures		R	R	R
Identify unknown angle measures		R	R	R
Lines and line segments				
Properties of intersecting lines and segments	T		R	
Properties of parallel lines and segments	T	R	R	R
Properties of perpendicular lines and segments	T	R	R	R
Triangles				
Classify	T		R	
Sum of the measures of the angles is 180 degrees	T	R	R	R
Right triangle relationships	T	R	R	R
Pythagorean Theorem	T	R	R	R
Prove triangles congruent			IT	R
Isosceles triangle properties and proofs			IT	
Triangle inequality			IT	
Similar triangles, identify	T		IT	
Exterior Angle Theorem			IT	
Quadrilaterals				
Classify	T		R	
Angles	T		IT	
Sum of the measures of the angles is 360 degrees	T		R	
Congruent quadrilaterals			R	
Diagonals	T	TR	TR	
Circles				
Meaning of π	R		R	R
Radius	R	R	R	R
Diameter	R	R	R	R
Chord			TR	R
Arc			TR	R
Central angle			TR	R

I (Introduce) **T (Teach and Test)** **R (Reinforce)**

	Pre-Algebra	Algebra 1	Geometry	Algebra 2
Inscribed angles and arcs			IT	
Chords, secants and tangents			IT	R
Area of sector				IT
Area	R	R	R	R
Circumference	R	R	R	R
Equation of a circle			R	R
Other plane figures				
Classify	R		R	
Polygons	R	R	R	R
Similar figures				
Similarity	R		R	
Corresponding parts	T		R	R
Transformations				
Translations, reflections	T	R	R	R
Rotations	T	R	R	R
Dilations			TR	R
Isometry			IT	
Transformation, definition	T	T	R	R
Mapping, image, preimage			IT	T
Transformation matrices			I	T
Congruence and transformations			IT	
Similarity and transformations			IT	
Tessellation	T		R	R
Symmetry	T	R	R	R
Perimeter				
Perimeter	R	R	R	R
Area				
Regular polygons			IT	
Composite figures	T		R	R
Parallelograms and triangles	T		R	R
Squares	T	R	R	R
Trapezoids	T	R	R	
Circles	T	R	R	R

I (Introduce) **T (Teach and Test)** **R (Reinforce)**

	Pre-Algebra	Algebra 1	Geometry	Algebra 2
Solid figures				
Vertices, edges, faces	R	R	R	
Hemisphere, great circle			R	
Sphere		R	R	
Pyramid, cube, prism	T	R	R	
Cone, cylinder	T	R	R	R
Polyhedron			R	
Solids of Revolution			IT	
Surface area				
Prism	T		TR	
Pyramid	T		TR	R
Cylinder	T		TR	
Cone	T		TR	R
Sphere	I	R	TR	
Volume				
Prism	T	R	TR	R
Pyramid	T	R	TR	R
Cylinder	T	R	TR	R
Cone	T	R	TR	R
Sphere	I	R	TR	R
Coordinate geometry				
Transformations in the coordinate plane	T	R	R	R
Distance in the coordinate plane		TR	TR	R
Coordinates in space			IT	T
Reasoning and proof				
Logical reasoning in problem solving			IT	
Theorem and postulate			IT	
Inductive reasoning	I	IT	T	R
Conjecturing	I	IT	T	R
If-then statements		I	T	
Venn diagrams	T	T	T	T
Truth tables		I	IT	
Deductive reasoning	I		IT	R

I (Introduce) **T** (Teach and Test) **R** (Reinforce)

	Pre-Algebra	Algebra 1	Geometry	Algebra 2
Proofs				
Line segment proofs			IT	
Angle relationship proofs			IT	
Parallel lines proofs			IT	
Triangle Sum Theorem proof			IT	
Prove triangles congruent			IT	
Isosceles triangle proofs			IT	
Segments in triangles proofs			IT	
Right triangle proofs			IT	
Parallelogram proofs			IT	
Rhombus proofs			IT	
Trapezoid proofs			IT	
Similar triangle proofs			IT	
Prove lines parallel			IT	
Pythagorean Theorem proof			IT	
Circle Theorem proofs			IT	
Tangent proofs			IT	
Trigonometry				
Trigonometric ratios	T	I	T	T
Inverse trigonometric ratios	I		T	T
Applications of right triangle trigonometry		I	T	T
Law of sines			IT	T
Law of cosines			IT	T
Area of triangles			I	T
Solving right triangles		I	T	T
Special right triangles			IT	T
Unit circle			I	T
Radian measure			IT	TR
Trigonometric functions, general angles				IT
Trigonometric functions, special angles				IT
Period				IT
Graphs of trigonometric functions			T	T
Trigonometric equations				IT

I (Introduce) **T (Teach and Test)** **R (Reinforce)**

Essential Course of Study

Holt McDougal Algebra 1

Chapter	Lesson	Pacing (Days)	Content Standards
Chapter 1 – Operations and Properties	**1-1** Variables and Expressions	1	CC.9-12.N.Q.1; CC.9-12.A.SSE.1
	1-1 **Technology Lab:** Create a Table to Evaluate Expressions	1	CC.9-12.N.Q.1
Chapter 2 – Equations	**2-1** **Lab:** Model One-Step Equations	$\frac{1}{2}$	CC.9-12.A.REI.4
	2-1 Solving Equations by Adding or Subtracting	1	CC.9-12.A.CED.1; CC.9-12.A.REI.4; CC.9-12.A.REI.1
	2-2 Solving Equations by Multiplying or Dividing	1	CC.9-12.N.Q.1; CC.9-12.A.CED.1; CC.9-12.A.REI.3; CC.9-12.F.LE.2; CC.9-12.A.REI.1
	2-3 **Technology Lab:** Solve Equations by Graphing	1	CC.9-12.A.CED.1; CC.9-12.A.REI.3
	2-3 Solving Two-Step and Multi-Step Equations	1	CC.9-12.A.CED.1; CC.9-12.A.REI.3; CC.9-12.A.REI.1
	2-4 **Lab:** Model Equations with Variables on Both Sides	1	CC.9-12.A.CED.1; CC.9-12.A.REI.3
	2-4 Solving Equations with Variables on Both Sides	1	CC.9-12.A.CED.1; CC.9-12.A.REI.3; CC.9-12.A.REI.1
	2-4A **Lab:** Solve Equations Graphically	1	CC.9-12.A.REI.11
	2-5 Solving for a Variable	2	CC.9-12.N.Q.1; CC.9-12.A.REI.3; CC.9-12.A.CED.4
	2-6 Solving Absolute-Value Equations	1	CC.9-12.A.REI.3
	2-7 Rates, Ratios, and Proportions	1	CC.9-12.N.Q.1; CC.9-12.A.REI.3
	2-8 Applications of Proportions	1	CC.9-12.N.Q.1
	2-8A Precision and Accuracy	2	CC.9-12.N.Q.2; CC.9-12.N.Q.3

See pp. 2–33 for the full text of the Common Core Standards for Mathematical Content.

Chapter	Lesson	Pacing (Days)	Common Core Content Standards
Chapter 3 – Inequalities	**3-1** Graphing and Writing Inequalities	1	CC.9-12.A.REI.3
	3-2 Solving Inequalities by Adding and Subtracting	1	CC.9-12.A.REI.3
	3-3 Solving Inequalities by Multiplying and Dividing	1	CC.9-12.A.REI.3; CC.9-12.A.CED.1
	3-4 Solving Two-Step and Multi-Step Inequalities	1	CC.9-12.A.REI.3; CC.9-12.A.CED.1
	3-5 Solving Inequalities with Variables on Both Sides	1	CC.9-12.A.REI.3; CC.9-12.A.CED.1
	3-6 **Lab:** Truth Tables and Compound Statements	$\frac{1}{2}$	CC.9-12.A.REI.3
	3-6 Solving Compound Inequalities	2	CC.9-12.A.REI.3
	3-7 Solving Absolute-Value Inequalities	2	CC.9-12.N.Q.1; CC.9-12.A.REI.3; CC.9-12.A.CED.1
Chapter 4 – Functions	**4-1** Graphing Relationships	1	CC.9-12.F.IF.1
	4-2 Relations and Functions	1	CC.9-12.F.IF.1; CC.9-12.F.IF.5
	4-2 **Algebra Lab:** The Vertical Line Test	$\frac{1}{2}$	CC.9-12.F.IF.1
	4-3 **Algebra Lab:** Model Variable Relationships	1	CC.9-12.F.IF.1
	4-3 Writing Functions	2	CC.9-12.A.CED.3; CC.9-12.F.FI.1; CC.9-12.F.IF.2; CC.9-12.F.IF.5; CC.9-12.F.BF.1
	4-4 Graphing Functions	1	CC.9-12.A.REI.10; CC.9-12.F.IF.1; CC.9-12.F.IF.2; CC.9-12.F.IF.5; CC.9-12.F.IF.7
	4-4 **Technology Lab:** Connect Function Rules, Tables, and Graphs	$\frac{1}{2}$	CC.9-12.F.IF.9; CC.9-12.F.IF.1; CC.9-12.A.REI.10
	4-5 Scatter Plots and Trend Lines	1	CC.9-12.NQ.1; CC.9-12.S.ID.6
	4-5 **Technology Lab:** Interpret Scatter Plots and Trend Lines	1	CC.9-12.S.ID.6
	4-6 Arithmetic Sequences	1	CC.9-12.F.IF.3; CC.9-12.F.BF.2; CC.9-12.F.LE.2

See pp. 2–33 for the full text of the Common Core Standards for Mathematical Content.

Chapter	Lesson	Pacing (Days)	COMMON CORE Content Standards
Chapter 5 – Linear Functions	**5-1** Identifying Linear Functions	1	CC.9-12.A.CED.2; CC.9-12.A.CED.3; CC.9-12.F.IF.4; CC.9-12.F.IF.5; CC.9-12.F.IF.7; CC.9-12. F.LE.2; CC.9-12.F.IF.9; CC.9-12.F.BF.1
	5-2 Using Intercepts	1	CC.9-12.A.CED.2; CC.9-12.A.CED.3; CC.9-12.F.IF.2; CC.9-12.F.IF.4; CC.9-12.F.IF.6; CC.9-12.F.IF.7; CC.9-12.F.BF.1
	5-3 Rate of Change and Slope	1	CC.9-12.A.CED.2; CC.9-12.F.IF.6
	5-3 Algebra Lab: Explore Constant Changes	1	CC.9-12.A.CED.2; CC.9-12.F.IF.6
	5-4 The Slope Formula	1	CC.9-12.A.CED.2; CC.9-12.F.IF.6
	5-6 Direct Variation	1	CC.9-12.A.CED.2; CC.9-12.A.CED.3; CC.9-12.F.IF.5; CC.9-12.F.IF.7; CC.9-12.F.LE.2
	5-7 Slope-Intercept Form	1	CC.9-12.A.CED.2; CC.9-12.A.CED.3; CC.9-12.F.IF.2; CC.9-12.F.IF.4; CC.9-12.F.IF.6; CC.9-12.F.IF.7; CC.9-12.F.BF.1; CC.9-12.F.BF.2; CC.9-12.F.LE.2
	5-8 Point-Slope Form	1	CC.9-12.A.CED.2; CC.9-12.A.CED.3; CC.9-12.F.BF.1; CC.9-12.F.LE.2; CC.9-12.F.IF.7; CC.9-12.F.LE.2
	5-8 Technology Lab: Graph Linear Functions	1	CC.9-12.A.CED.2; CC.9-12.F.IF.7
	5-9A Line of Best Fit	2	CC.9-12.S.ID.6; CC.9-12.S.ID.7; CC.9-12.S.ID.8; CC.9-12.S.ID.9
	5-9 Slopes of Parallel and Perpendicular Lines	1	CC.9-12.G.GPE.5; CC.9-12.F.IF.7
	5-10 Technology Lab: The Family of Linear Functions	1	CC.9-12.A.CED.2; CC.9-12.F.BF.3
	5-10 Transforming Linear Functions	1	CC.9-12.A.CED.2; CC.9-12.A.CED.3; CC.9-12.F.IF.7; CC.9-12.F.BF.3
	Extension: Absolute-Value Functions	1	CC.9-12.F.IF.7; CC.9-12.F.BF.5
Chapter 6 – Systems of Equations and Inequalities	**6-1 Technology:** Solve Linear Equations by Using a Spreadsheet	$\frac{1}{2}$	CC.9-12.A.CED.2; CC.9-12.A.CED.3
	6-1 Solving Systems by Graphing	1	CC.9-12.A.CED.2; CC.9-12.A.CED.3; CC.9-12.A.REI.6
	6-2 Lab: Model Systems of Linear Equations	$\frac{1}{2}$	CC.9-12.A.CED.2; CC.9-12.A.CED.3; CC.9-12.A.REI.6
	6-2 Solving Systems by Substitution	1	CC.9-12.A.CED.2; CC.9-12.A.CED.3; CC.9-12.A.REI.6
	6-3 Solving Systems by Elimination	1	CC.9-12.A.CED.2; CC.9-12.A.CED.3; CC.9-12.A.REI.5; CC.9-12.A.REI.6
	6-4 Solving Special Systems	2	CC.9-12.A.CED.2; CC.9-12.A.CED.3; CC.9-12.A.REI.6
	6-5 Solving Linear Inequalities	1	CC.9-12.A.CED.3; CC.9-12.A.REI.12
	6-6 Solving Systems of Linear Inequalities	2	CC.9-12.A.CED.3; CC.9-12.A.REI.12
	6-6 Technology Lab: Solve Systems of Linear Inequalities	1	CC.9-12.A.CED.3

See pp. 2–33 for the full text of the Common Core Standards for Mathematical Content.

Chapter	Lesson	Pacing (Days)	Common Core Content Standards
Chapter 7 – Exponents and Polynomials	**7-1** Integer Exponents	1	CC.9-12.N.RN.1
	7-5 Rational Exponents	1	CC.9-12.N.RN.1; CC.9-12.NRN.2
	7-6 Polynomials	1	CC.9-12.A.APR.1
	7-7 **Algebra Lab:** Model Polynomial Addition and Subtraction	$\frac{1}{2}$	CC.9-12.A.APR.1
	7-7 Adding and Subtracting Polynomials	1	CC.9-12.A.APR.1
	7-8 **Algebra Lab:** Model Polynomial Multiplication	$\frac{1}{2}$	CC.9-12.A.APR.1
	7-8 Multiplying Polynomials	1	CC.9-12.A.APR.1
	7-8A **Extension:** Closure	2	CC.9-12.N.RN.3; CC.9-12.A.APR.1
	7-9 Special Products of Binomials	1	CC.9-12.A.APR.1
Chapter 8 – Factoring Polynomials	**8-1** Factors and Greatest Common Factors	1	CC.9-12.A.APR.1
	8-2 **Algebra Lab:** Model Factoring	$\frac{1}{2}$	CC.9-12.A.APR.1
	8-2 Factoring by GCF	1	CC.9-12.A.APR.1; CC.9-12.A.SSE.2
	8-3 **Algebra Lab:** Model Factorization of Trinomials	1	CC.9-12.A.APR.1
	8-3 Factoring $x^2 + bx + c$	1	CC.9-12.A.SSE.2; CC.9-12.A.SSE.3
	8-4 Factoring $ax^2 + bx + c$	$1\frac{1}{2}$	CC.9-12.A.SSE.2; CC.9-12.A.SSE.3
	8-4 **Technology Lab:** Use a Graph to Factor Polynomials	1	CC.9-12.A.SSE.2; CC.9-12.A.SSE.3
	8-5 Factoring Special Products	1	CC.9-12.A.SSE.2; CC.9-12.A.SSE.3
	8-6 Choosing a Factoring Method	1	CC.9-12.A.SSE.2; CC.9-12.A.SSE.3

See pp. 2–33 for the full text of the Common Core Standards for Mathematical Content.

Chapter	Lesson	Pacing (Days)	COMMON CORE Content Standards
Chapter 9 – Quadratic Functions and Equations	**9-1** Identifying Quadratic Functions	1	CC.9-12.F.IF.4; CC.9-12.F.IF.7
	9-2 **Algebra Lab:** Explore the Axis of Symmetry	$\frac{1}{2}$	CC.9-12.F.IF.4; CC.9-12.F.IF.7
	9-2 Characteristics of Quadratic Functions	$1\frac{1}{2}$	CC.9-12.F.IF.4; CC.9-12.F.IF.7; CC.9-12.F.IF.8
	9-3 Graphing Quadratic Functions	1	CC.9-12.A.CED.2; CC.9-12.A.CED.3; CC.9-12.F.IF.4; CC.9-12.F.IF.7; CC.9-12.F.IF.8
	9-4 **Technology Lab:** The Family of Quadratic Functions	$\frac{1}{2}$	CC.9-12.A.CED.3; CC.9-12.F.IF.4; CC.9-12.F.IF.7
	9-4 Transforming Quadratic Functions	1	CC.9-12.A.CED.2; CC.9-12.A.CED.3; CC.9-12.F.IF.4; CC.9-12.F.IF.5; CC.9-12.F.IF.7; CC.9-12.F.BF.1; CC.9-12.F.BF.3
	9-5 Solving Quadratic Equations by Graphing	1	CC.9-12.A.CED.2; CC.9-12.A.CED.3; CC.9-12.A.REI.4; CC.9-12.A.REI.11; CC.9-12.F.IF.7; CC.9-12.F.IF.4
	9-5 **Technology Lab:** Explore Roots, Zeros, and *x*-intercepts	$\frac{1}{2}$	CC.9-12.A.CED.2; CC.9-12.A.CED.3; CC.9-12.A.REI.4; CC.9-12.A.REI.11
	9-6 Solving Quadratic Equations by Factoring	1	CC.9-12.A.SSE.3; CC.9-12.A.CED.3; CC.9-12.A.REI.4; CC.9-12.A.APR.3; CC.9-12.A.CED.1
	9-7 Solving Quadratic Equations by Using Square Roots	1	CC.9-12.A.CED.3; CC.9-12.A.REI.4; CC.9-12.F.BF.1; CC.9-12.A.CED.1
	9-8 Algebra Lab: Model Completing the Square	1	CC.9-12.A.CED.3; CC.9-12.A.REI.4
	9-8 Completing the Square	1	CC.9-12.A.CED.3; CC.9-12.A.REI.4; CC.9-12.A.CED.1
	9-9 The Quadratic Formula and the Discriminant	1	CC.9-12.A.CED.2; CC.9-12.A.CED.3; CC.9-12.A.REI.4; CC.9-12.A.CED.1
	9-9A Nonlinear Systems	2	CC.9-12.A.REI.7
	Extension: Cubic Functions and Equations	1	CC.9-12.F.IF.7

See pp. 2–33 for the full text of the Common Core Standards for Mathematical Content.

Chapter	Lesson	Pacing (Days)	Common Core Content Standards
Chapter 10 – Data Analysis and Probability	**10-1** Organizing and Describing Data	1	
	10-2 Frequency and Histograms	1	CC.9-12.S.ID.1
	10-3 Data Distributions	2	CC.9-12.S.ID.1; CC.9-12.S.ID.2; CC.9-12.S.ID.3
	10-3A Extension: Dot Plots	1	CC.9-12.S.ID.1; CC.9-12.S.ID.3
	10-3 Technology Lab: Use Technology to Make Graphs	$\frac{1}{2}$	CC.9-12.S.ID.1
	10-4 Misleading Graphs and Statistics	1	CC.9-12.S.IC.1; CC.9-12.S.IC.6
	10-5 Algebra Lab: Simulations	$\frac{1}{2}$	CC.9-12.S.CP.1
	10-5 Experimental Probability	$1\frac{1}{2}$	CC.9-12.S.CP.1
	10-5 Technology Lab: Use Random Numbers	$\frac{1}{2}$	CC.9-12.S.CP.1
	10-6 Theoretical Probability	1	CC.9-12.S.CP.1
	10-7 Independent and Dependent Events	1	CC.9-12.S.CP.1; CC.9-12.S.CP.2; CC.9-12.S.CP.3; CC.9-12.S.CP.5; CC.9-12.S.CP.6; CC.9-12.S.CP.8
	10-7 Lab: Compound Events	1	CC.9-12.S.CP.1
Chapter 11 – Exponential and Radical Functions	**11-1** Geometric Sequences	1	CC.9-12.F.IF.3; CC.9-12.F.LE.2; CC.9-12.F.BF.2
	11-2 Exponential Functions	1	CC.9-12.A.REI.11; CC.9-12.F.IF.4; CC.9-12.F.IF.7; CC.9-12.F.LE.1; CC.9-12.F.LE.3; CC.9-12.F.IF.9
	11-3 Algebra Lab: Model Growth and Decay	1	CC.9-12.F.LE.2; CC.9-12.F.LE.3
	11-3 Exponential Growth and Decay	2	CC.9-12.A.CED.2; CC.9-12.A.CED.3; CC.9-12.F.BF.1; CC.9-12.F.LE.2; CC.9-12.F.LE.5; CC.9-12.F.IF.9; CC.9-12.F.BF.7
	A-4 Patterns and Recursion	1	CC.9-12.F.IF.3; CC.9-12.F.IF.4; CC.9-12.F.BF.2; CC.9-12.F.LE.2
	11-4 Linear, Quadratic, and Exponential Models	2	CC.9-12.A.CED.2; CC.9-12.A.CED.3; CC.9-12.F.IF.4; CC.9-12.F.IF.7; CC.9-12.F.BF.1; CC.9-12.F.LE.1; CC.9-12.F.BF.7
	A-5 Linear and Nonlinear Rates of Change	1	CC.9-12.F.IF.6
	11-4A Comparing Functions	2	CC.9-12.F.IF.6; CC.9-12.F.IF.9; CC.9-12.F.LE.3

See pp. 2–33 for the full text of the Common Core Standards for Mathematical Content.

Pacing Guide for 45-Minute Classes

Holt McDougal Algebra 1

This sequence was created as a guide to assist you in covering the Common Core Standards for Mathematical Content for Algebra 1. This 170-day schedule includes time for Review and assessment. The schedule leaves room for you to customize the pacing to your students' needs.

Chapter 1

DAY 1	DAY 2	DAY 3	DAY 4	DAY 5
1-1 Lesson	1-1 Technology Lab	Connecting Algebra to Geometry Multi-Step Test Prep Ready to Go On?	Chapter 1 Review	Chapter 1 Test

Chapter 2

DAY 1	DAY 2	DAY 3	DAY 4	DAY 5
2-1 Hands-On Lab 2-1 Lesson	2-1 Lesson Connecting Algebra to Geometry	2-2 Lesson	2-3 Technology Lab	2-3 Lesson
DAY 6	**DAY 7**	**DAY 8**	**DAY 9**	**DAY 10**
2-4 Hands-On Lab	2-4 Lesson	2-4A Hands-On Lab	2-5 Lesson	2-5 Lesson
DAY 11	**DAY 12**	**DAY 13**	**DAY 14**	**DAY 15**
2-6 Lesson	Multi-Step Test Prep Ready to Go On?	2-7 Lesson	2-8 Lesson	2-8A Lesson
DAY 16	**DAY 17**	**DAY 18**	**DAY 19**	
2-8A Lesson	Multi-Step Test Prep Ready to Go On?	Chapter 2 Review	Chapter 2 Test	

Chapter 3

DAY 1	DAY 2	DAY 3	DAY 4	DAY 5
3-1 Lesson	3-2 Lesson	3-3 Lesson	Multi-Step Test Prep Ready to Go On?	3-4 Lesson
DAY 6	**DAY 7**	**DAY 8**	**DAY 9**	**DAY 10**
3-5 Lesson	3-6 Hands-On Lab 3-6 Lesson	3-6 Lesson	3-6 Lesson Connecting Algebra to Geometry	3-7 Lesson
DAY 11	**DAY 12**	**DAY 13**	**DAY 14**	
3-7 Lesson	Multi-Step Test Prep Ready to Go On?	Chapter 3 Review	Chapter 3 Test	

Chapter 4

DAY 1	DAY 2	DAY 3	DAY 4	DAY 5
4-1 Lesson	4-2 Lesson	4-2 Hands-On Lab 4-3 Hands-On Lab	4-3 Hands-On Lab 4-3 Lesson	4-3 Lesson
DAY 6	**DAY 7**	**DAY 8**	**DAY 9**	**DAY 10**
4-3 Lesson 4-4 Lesson	4-4 Lesson 4-4 Technology Lab	Multi-Step Test Prep Ready to Go On?	4-5 Lesson	4-5 Technology Lab
DAY 11	**DAY 12**	**DAY 13**	**DAY 14**	**DAY 15**
Connecting Algebra to Data Analysis	4-6 Lesson	Multi-Step Test Prep Ready to Go On?	Chapter 4 Review	Chapter 4 Test

Chapter 5

DAY 1	DAY 2	DAY 3	DAY 4	DAY 5
5-1 Lesson	5-2 Lesson	Connecting Algebra to Geometry	5-3 Lesson	5-3 Hands-On Lab
DAY 6	**DAY 7**	**DAY 8**	**DAY 9**	**DAY 10**
5-4 Lesson	5-5 Lesson	Multi-Step Test Prep Ready to Go On?	5-7 Lesson	5-8 Lesson
DAY 11	**DAY 12**	**DAY 13**	**DAY 14**	**DAY 15**
5-8 Technology Lab	Connecting Algebra to Data Analysis	5-9A Lesson	5-9A Lesson	5-9 Lesson
DAY 16	**DAY 17**	**DAY 18**	**DAY 19**	**DAY 20**
5-10 Technology Lab	5-10 Lesson	Multi-Step Test Prep Ready to Go On?	Extension	Chapter 5 Review
DAY 21				
Chapter 5 Test				

Chapter 6

DAY 1	DAY 2	DAY 3	DAY 4	DAY 5
6-1 Technology Lab 6-1 Lesson	6-1 Lesson 6-2 Hands-On Lab	6-2 Lesson	6-3 Lesson	Connecting Algebra to Number Theory
DAY 6	**DAY 7**	**DAY 8**	**DAY 9**	**DAY 10**
6-4 Lesson	6-4 Lesson	Multi-Step Test Prep Ready to Go On?	6-5 Lesson	6-6 Lesson
DAY 11	**DAY 12**	**DAY 13**	**DAY 14**	**DAY 15**
6-6 Lesson	6-6 Technology Lab	Multi-Step Test Prep Ready to Go On?	Chapter 6 Review	Chapter 6 Test

Chapter 7

DAY 1	DAY 2	DAY 3	DAY 4	DAY 5
7-1 Lesson	7-5 Lesson	Multi-Step Test Prep Ready to Go On?	7-6 Lesson	7-7 Hands-On Lab 7-7 Lesson
DAY 6	**DAY 7**	**DAY 8**	**DAY 9**	**DAY 10**
7-7 Lesson 7-8 Algebra Lab	7-8 Lesson	7-8A Lesson	7-8A Lesson	Connecting Algebra to Geometry
DAY 11	**DAY 12**	**DAY 13**	**DAY 14**	
7-9 Lesson	Multi-Step Test Prep Ready to Go On?	Chapter 7 Review	Chapter 7 Test	

Chapter 8

DAY 1	DAY 2	DAY 3	DAY 4	DAY 5
8-1 Lesson	8-2 Hands-On Lab 8-2 Lesson	8-2 Lesson 8-3 Algebra Lab	8-3 Algebra Lab 8-3 Lesson	8-3 Lesson 8-4 Lesson
DAY 6	**DAY 7**	**DAY 8**	**DAY 9**	**DAY 10**
8-4 Lesson	8-4 Technology Lab	Multi-Step Test Prep Ready to Go On?	8-5 Lesson	Connecting Algebra to Number Theory
DAY 11	**DAY 12**	**DAY 13**	**DAY 14**	
8-6 Lesson	Multi-Step Test Prep Ready to Go On?	Chapter 8 Review	Chapter 8 Test	

Chapter 9

DAY 1	DAY 2	DAY 3	DAY 4	DAY 5
9-1 Lesson	9-2 Algebra Lab 9-2 Lesson	9-2 Lesson	9-3 Lesson	9-4 Technology Lab 9-4 Lesson
DAY 6	**DAY 7**	**DAY 8**	**DAY 9**	**DAY 10**
9-4 Lesson Ready to Go On?	Focus on Problem Solving 9-5 Lesson	9-5 Lesson 9-5 Technology Lab	9-6 Lesson	9-7 Lesson
DAY 11	**DAY 12**	**DAY 13**	**DAY 14**	**DAY 15**
9-8 Algebra Lab	9-8 Lesson	9-9 Lesson	9-9A Lesson	9-9A Lesson
DAY 16	**DAY 17**	**DAY 18**	**DAY 19**	
Multi-Step Test Prep Ready to Go On?	Extension	Chapter 9 Review	Chapter 9 Test	

Chapter 10

DAY 1	DAY 2	DAY 3	DAY 4	DAY 5
Connecting Algebra to Data Analysis	10-1 Lesson	10-2 Lesson	10-3 Lesson	10-3 Lesson
DAY 6	**DAY 7**	**DAY 8**	**DAY 9**	**DAY 10**
10-3A Extension	10-3 Technology Lab 10-4 Lesson	10-4 Lesson Connecting Algebra to Number Theory	Connecting Algebra to Number Theory Ready to Go On?	Focus on Problem Solving 10-5 Algebra Lab
DAY 11	**DAY 12**	**DAY 13**	**DAY 14**	**DAY 15**
10-5 Lesson	10-5 Lesson 10-5 Technology Lab	10-6 Lesson	10-7 Lesson	10-7 Hands-On Lab
DAY 16	**DAY 17**	**DAY 18**	**DAY 19**	
Multi-Step Test Prep Ready to Go On?	Extension	Chapter 10 Review	Chapter 10 Test	

Chapter 11

DAY 1	DAY 2	DAY 3	DAY 4	DAY 5
11-1 Lesson	11-2 Lesson	Connecting Algebra to Geometry	11-3 Hands-On Lab	11-3 Lesson
DAY 6	**DAY 7**	**DAY 8**	**DAY 9**	**DAY 10**
11-3 Lesson	A-4 Lesson	11-4 Lesson	11-4 Lesson	A-5 Lesson
DAY 11	**DAY 12**	**DAY 13**	**DAY 14**	**DAY 15**
11-4A Lesson	11-4A Lesson	Multi-Step Test Prep Ready to Go On?	Chapter 11 Review	Chapter 11 Test

Pacing Guide for 90-Minute Classes

Holt McDougal Algebra 1

This sequence was created as a guide to assist you in covering the Common Core Standards for Mathematical Content for Algebra 1. This 85-day schedule includes time for Review and assessment. The schedule leaves room for you to customize the pacing to your students' needs.

Chapter 1

DAY 1	DAY 2	DAY 3	DAY 4
1-1 Lesson 1-1 Technology Lab	Connecting Algebra to Geometry	Multi-Step Test Prep Ready to Go On? Chapter 1 Review	Chapter 1 Test

Chapter 2

DAY 1	DAY 2	DAY 3	DAY 4	DAY 5
2-1 Hands-On Lab 2-1 Lesson Connecting Algebra to Geometry	2-2 Lesson 2-3 Technology Lab	2-3 Lesson 2-4 Hands-On Lab	2-4 Lesson 2-4A Hands-On Lab	2-5 Lesson
DAY 6	**DAY 7**	**DAY 8**	**DAY 9**	
2-6 Lesson Multi-Step Test Prep Ready to Go On?	2-7 Lesson 2-8 Lesson	2-8A Lesson Multi-Step Test Prep Ready to Go On?	Chapter 2 Review Chapter 2 Test	

Chapter 3

DAY 1	DAY 2	DAY 3	DAY 4	DAY 5
3-1 Lesson 3-2 Lesson	3-3 Lesson Multi-Step Test Prep Ready to Go On?	3-4 Lesson 3-5 Lesson	3-6 Hands-On Lab 3-6 Lesson	3-6 Lesson Connecting Algebra to Geometry
DAY 6	**DAY 7**			
3-7 Lesson Multi-Step Test Prep Ready to Go On?	Chapter 3 Review Chapter 3 Test			

Chapter 4

DAY 1	DAY 2	DAY 3	DAY 4	DAY 5
4-1 Lesson 4-2 Lesson	4-2 Hands-On Lab 4-3 Hands-On Lab 4-3 Lesson	4-3 Lesson 4-4 Lesson	4-4 Lesson 4-4 Technology Lab Multi-Step Test Prep Ready to Go On?	4-5 Lesson 4-5 Technology Lab
DAY 6	**DAY 7**			
Connecting Algebra to Data Analysis 4-6 Lesson Multi-Step Test Prep Ready to Go On?	Chapter 4 Review Chapter 4 Test			

Chapter 5

DAY 1	DAY 2	DAY 3	DAY 4	DAY 5
5-1 Lesson 5-2 Lesson	Connecting Algebra to Geometry 5-3 Lesson	5-3 Hands-On Lab 5-4 Lesson	5-5 Lesson Multi-Step Test Prep Ready to Go On?	5-7 Lesson 5-8 Lesson
DAY 6	**DAY 7**	**DAY 8**	**DAY 9**	**DAY 10**
5-8 Technology Lab Connecting Algebra to Data Analysis	5-9A Lesson 5-9 Lesson	5-10 Technology Lab 5-10 Lesson	Multi-Step Test Prep Ready to Go On? Extension	Chapter 5 Review Chapter 5 Test

Chapter 6

DAY 1	DAY 2	DAY 3	DAY 4	DAY 5
6-1 Technology Lab 6-1 Lesson 6-2 Hands-On Lab	6-2 Lesson 6-3 Lesson	Connecting Algebra to Number Theory 6-4 Lesson	6-4 Lesson Multi-Step Test Prep Ready to Go On?	6-5 Lesson 6-6 Lesson
DAY 6	**DAY 7**	**DAY 8**		
6-6 Lesson 6-6 Technology Lab	Multi-Step Test Prep Ready to Go On? Chapter 6 Review	Chapter 6 Test		

Chapter 7

DAY 1	DAY 2	DAY 3	DAY 4	DAY 5
7-1 Lesson 7-5 Lesson	Multi-Step Test Prep Ready to Go On? 7-6 Lesson	7-7 Hands-On Lab 7-7 Lesson 7-8 Algebra Lab	7-8 Lesson 7-8A Lesson	7-8A Lesson Connecting Algebra to Geometry
DAY 6	**DAY 7**			
7-9 Lesson Multi-Step Test Prep Ready to Go On?	Chapter 7 Review Chapter 7 Test			

Chapter 8

DAY 1	DAY 2	DAY 3	DAY 4	DAY 5
8-1 Lesson 8-2 Hands-On Lab 8-2 Lesson	8-2 Lesson 8-3 Algebra Lab 8-3 Lesson	8-3 Lesson 8-4 Lesson	8-4 Technology Lab Multi-Step Test Prep Ready to Go On?	8-5 Lesson Connecting Algebra to Number Theory
DAY 6	**DAY 7**			
8-6 Lesson Multi-Step Test Prep Ready to Go On?	Chapter 8 Review Chapter 8 Test			

Chapter 9

DAY 1	DAY 2	DAY 3	DAY 4	DAY 5
9-1 Lesson 9-2 Algebra Lab 9-2 Lesson	9-2 Lesson 9-3 Lesson	9-4 Technology Lab 9-4 Lesson	Multi-Step Test Prep Ready to Go On? 9-5 Lesson	9-5 Technology Lab 9-6 Lesson 9-7 Lesson
DAY 6	**DAY 7**	**DAY 8**	**DAY 9**	
9-8 Algebra Lab 9-8 Lesson	9-9 Lesson 9-9A Lesson	Multi-Step Test Prep Ready to Go On? Extension	Chapter 9 Review Chapter 9 Test	

Chapter 10

DAY 1	DAY 2	DAY 3	DAY 4	DAY 5
Connecting Algebra to Data Analysis 10-1 Lesson	10-2 Lesson 10-3 Lesson	10-3 Lesson 10-3A Extension	10-3 Technology Lab 10-4 Lesson Connecting Algebra to Number Theory	Connecting Algebra to Number Theory Multi-Step Test Prep Ready to Go On? 10-5 Algebra Lab
DAY 6	**DAY 7**	**DAY 8**	**DAY 9**	**DAY 10**
10-5 Lesson 10-5 Technology Lab	10-6 Lesson 10-7 Lesson	10-7 Hands-On Lab Multi-Step Test Prep Ready to Go On?	Extension Chapter 10 Review	Chapter 10 Test

Chapter 11

DAY 1	DAY 2	DAY 3	DAY 4	DAY 5
11-1 Lesson 11-2 Lesson	Connecting Algebra to Geometry 11-3 Hands-On Lab	11-3 Lesson	A-4 Lesson 11-4 Lesson	11-4 Lesson A-5 Lesson
DAY 6	**DAY 7**			
11-4A Lesson Multi-Step Test Prep Ready to Go On?	Chapter 11 Review Chapter 11 Test			

Chapter Prerequisites

Holt McDougal Algebra 1

Chapter	Key Skills and Concepts	Content Standards	Prerequisites
Chapter 1 – Foundations for Algebra	Evaluate and simplify expressions. Properties of the real number system. The order of operations. Patterns formed by points in the coordinate plane.	CC.9-12.N.Q.1, CC.9-12.A.SSE.1, CC.9-12.A.SSE.2	
Chapter 2 – Equations	Properties of equality. Use inverse operations to solve equations containing variables. Write equations to represent situations. Simplify equations before solving. Solve equations graphically. Solve absolute-value equations. Proportions and percents. Precision and accuracy.	CC.9-12.N.Q.1, CC.9-12.N.Q.2, CC.9-12.N.Q.3, CC.9-12.A.CED.1, CC.9-12.A.CED.4, CC.9-12.A.REI.1, CC.9-12.A.REI.3, CC.9-12.A.REI.4, CC.9-12.A.REI.11, CC.9-12.F.LE.2	**Lessons** – 1-1, 1-2, 1-3, 1-6, 1-7
Chapter 3 – Inequalities	Properties of inequality. Use inverse operations to solve inequalities. Write inequalities to represent situations. Simplify inequalities before solving. Solve compound and absolute-value inequalities.	CC.9-12.N.Q.1, CC.9-12.A.CED.1, CC.9-12.A.REI.3	**Lessons** – 1-1, 1-2, 1-3, 1-6, 1-7, 2-1, 2-2
Chapter 4 – Functions	Relationships between variables. Determine whether a relation is a function. Use function notation. Use trend lines on scatter plots to make predictions. Arithmetic sequences.	CC.9-12.NQ.1, CC.9-12.A.CED.3, CC.9-12.A.REI.10, CC.9-12.F.IF.1, CC.9-12.F.IF.2, CC.9-12.F.IF.3, CC.9-12.F.IF.5, CC.9-12.F.IF.7, CC.9-12.F.IF.9, CC.9-12.F.FI.1, CC.9-12.F.BF.1, CC.9-12.F.BF.2, CC.9-12.F.LE.2, CC.9-12.S.ID.6	**Lessons** – 1-1, 1-8, 2-5
Chapter 5 – Linear Functions	Write and graph linear functions. Identify and interpret the components of linear graphs, including slope and intercepts. Slope-intercept and point-slope forms. Parallel and perpendicular lines. Transform linear functions. Line of best fit.	CC.9-12.ACED.2, CC.9-12.A.CED.3, CC.9-12.F.IF.2, CC.9-12.F.IF.4, CC.9-12.F.IF.5, CC.9-12.F.IF.6, CC.9-12.F.IF.7, CC.9-12.F.IF.9, CC.9-12.F.BF.1, CC.9-12.F.BF.2, CC.9-12.F.BF.3, CC.9-12.F.BF.5, CC.9-12.F.LE.2, CC.9-12.S.ID.6, CC.9-12.S.ID.7, CC.9-12.S.ID.8, CC.9-12.S.ID.9	**Lessons** – 1-1, 1-8, 2-5, 2-7, 4-4, 4-5
Chapter 6 – Systems of Equations and Inequalities	Find a solution that satisfies two linear equations. Graph one or more linear inequalities in the coordinate plane. Find solutions that satisfy two linear inequalities.	CC.9-12.A.CED.2, CC.9-12.A.CED.3, CC.9-12.A.REI.5, CC.9-12.A.REI.6, CC.9-12.A.REI.12	**Lessons** – 1-1, 2-5, 3-1, 3-2, 3-3, 5-1, 5-7, 5-9
Chapter 7 – Exponents and Polynomials	Properties of exponents. Powers of 10 and scientific notation. Add, subtract, and multiply polynomials by using properties of exponents and combining like terms. Closure of polynomials.	CC.9-12.N.RN.1, CC.9-12.N.RN.2, CC.9-12.N.RN.3, CC.9-12.A.APR.1	**Lessons** – 1-4, 1-5, 1-7

Chapter	Key Skills and Concepts	COMMON CORE Content Standards	Prerequisites
Chapter 8 – Factoring Polynomials	Greatest common factors. Factor polynomials. Factor perfect-square trinomials and differences of squares. Choose a factoring method.	CC.9-12.A.SSE.2, CC.9-12.A.SSE.3, CC.9-12.A.APR.1	**Lessons** – 7-6, 7-8
Chapter 9 – Quadratic Functions and Equations	Identify and graph quadratic functions. Transform quadratic functions. Use various methods to solve quadratic equations. Systems with one linear and one quadratic equation.	CC.9-12.A.SSE.3, CC.9-12.A.APR.3, CC.9-12.A.CED.1, CC.9-12.A.CED.2, CC.9-12.A.CED.3, CC.9-12.A.REI.4, CC.9-12.A.REI.7, CC.9-12.A.REI.11, CC.9-12.F.IF.4, CC.9-12.F.IF.5, CC.9-12.F.IF.7, CC.9-12.F.IF.8, CC.9-12.F.BF.1, CC.9-12.F.BF.3	**Lessons** – 1-5, 2-3, 4-4, 6-1, 6-2, 6-3, 7-8, 8-3, 8-4
Chapter 10 – Data Analysis and Probability	Organize data in tables and graphs. Calculate mean, median, and mode. Shapes of distributions. Experimental and theoretical probability. Factorials, permutations, and combinations.	CC.9-12.S.ID.1, CC.9-12.S.ID.2, CC.9-12.S.ID.3, CC.9-12.S.IC.1, CC.9-12.S.IC.6, CC.9-12.S.CP.1, CC.9-12.S.CP.2, CC.9-12.S.CP.3, CC.9-12.S.CP.5, CC.9-12.S.CP.6, CC.9-12.S.CP.8	**Lessons** – 1-3, 2-7, 2-9
Chapter 11 – Exponential and Radical Functions	Geometric sequences. Exponential functions and square root functions. Compare functions. Simplify radical expressions. Solve radical equations.	CC.9-12.A.SSE.2, CC.9-12.A.SSE.3, CC.9-12.A.CED.2, CC.9-12.A.CED.3, CC.9-12.A.REI.2, CC.9-12.A.REI.11, CC.9-12.F.IF.3, CC.9-12.F.IF.4, CC.9-12.F.IF.6, CC.9-12.F.IF.7, CC.9-12.F.IF.9, CC.9-12.F.BF.1, CC.9-12.F.BF.2, CC.9-12.F.BF.3, CC.9-12.F.BF.7, CC.9-12.F.LE.1, CC.9-12.F.LE.2, CC.9-12.F.LE.3, CC.9-12.F.LE.5	**Lessons** – 1-3, 1-4, 1-5, 2-9, 4-4, 5-5, 5-7, 7-8, 9-3
Chapter 12 – Rational Functions and Equations	Identify and graph inverse variation and rational functions. Simplify rational expressions. Solve rational equations.	CC.9-12.A.CED.2, CC.9-12.A.CED.3, CC.9-12.A.REI.2, CC.9-12.F.IF.5, CC.9-12.F.IF.7, CC.9-12.F.BF.1, CC.9-12.F.BF.1a, CC.9-12.F.BF.3	**Lessons** – 1-2, 1-4, 1-7, 7-1, 7-3, 7-4, 7-5, 8-2, 8-3, 8-4

Course Planner – Section 1A

Foundations for Algebra

Lesson	Content Standards	On-Level Learners [RTI Tier 1]	Special Needs Learners
1-1 Variables and Expressions *(1 day)*	CC.9-12.N.Q.1; CC.9-12.A.SSE.1	❑ Problem Solving 1-1, CR ❑ *Know-It Notebook* 1-1 ❑ Questioning Strategies, TE ❑ *Lesson Tutorial Videos,* 1-1	❑ Are You Ready?, SE ❑ *IDEA Works!* Practice 1-1 ❑ Reading Strategies 1-1, CR ❑ Reteach 1-1, CR ❑ *Ready to Go On? Intervention,* 1-1 ❑ *Lesson Tutorial Videos,* 1-1
Technology Lab: Create a Table to Evaluate Expressions *(1 day)*	CC.9-12.N.Q.1	❑ *Lab Resources Online,* Ch. 1	❑ *Lab Resources Online,* Ch. 1
1-2 Adding and Subtracting Real Numbers		❑ Problem Solving 1-2, CR ❑ *Know-It Notebook* 1-2 ❑ Questioning Strategies, TE ❑ *Lesson Tutorial Videos,* 1-2	❑ *IDEA Works!* Practice 1-2 ❑ Reading Strategies 1-2, CR ❑ Reteach 1-2, CR ❑ *Ready to Go On? Intervention,* 1-2 ❑ *Lesson Tutorial Videos,* 1-2
1-3 Multiplying and Dividing Real Numbers		❑ Problem Solving 1-3, CR ❑ *Know-It Notebook* 1-3 ❑ Questioning Strategies, TE ❑ *Lesson Tutorial Videos,* 1-3	❑ *IDEA Works!* Practice 1-3 ❑ Reading Strategies 1-3, CR ❑ Reteach 1-3, CR ❑ *Ready to Go On? Intervention,* 1-3 ❑ *Lesson Tutorial Videos,* 1-3
1-4 Powers and Exponents		❑ Problem Solving 1-4, CR ❑ *Know-It Notebook* 1-4 ❑ Questioning Strategies, TE ❑ *Lesson Tutorial Videos,* 1-4	❑ *IDEA Works!* Practice 1-4 ❑ Reading Strategies 1-4, CR ❑ Reteach 1-4, CR ❑ *Ready to Go On? Intervention,* 1-4 ❑ *Lesson Tutorial Videos,* 1-4
1-5 Roots and Real Numbers		❑ Problem Solving 1-5, CR ❑ *Know-It Notebook* 1-5 ❑ Questioning Strategies, TE ❑ *Lesson Tutorial Videos,* 1-5	❑ *IDEA Works!* Practice 1-5 ❑ Reading Strategies 1-5, CR ❑ Reteach 1-5, CR ❑ *Ready to Go On? Intervention,* 1-5 ❑ *Lesson Tutorial Videos,* 1-5
Assessment Options		❑ Ready to Go On? Quiz, SE ❑ *Ready to Go On? Intervention* ❑ Section 1A Quiz, AR ❑ *Test and Practice Generator*	❑ Ready to Go On? Quiz, SE ❑ *Ready to Go On? Intervention* ❑ *IDEA Works!* Quiz 1A

See pages 2–33 for the full text of the Common Core Standards for Mathematical Content.

KEY

Red Type	Minimum Course of Study	CC	Curriculum Companion
CR	Chapter Resources	SE	Student Edition
AR	Assessment Resources	TE	Teacher's Edition

Developing Learners [RTI Tier 1 and 2]	Advanced Learners [RTI Tier 2]	English Language Learners
❑ Are You Ready?, SE ❑ *Know-It Notebook* 1-1 ❑ Reading Strategies 1-1, CR ❑ Questioning Strategies, TE ❑ *Ready to Go On? Intervention,* 1-1 ❑ *Lesson Tutorial Videos,* 1-1	❑ Practice C 1-1, CR ❑ Challenge 1-1, CR ❑ Problem Solving 1-1, CR	❑ *Success for Every Learner,* 1-1 ❑ Reading Strategies 1-1, CR ❑ *Multi-Language Visual Glossary* ❑ *Lesson Tutorial Videos,* 1-1
❑ *Lab Resources Online,* Ch. 1	❑ *Lab Resources Online,* Ch. 1	❑ *Lab Resources Online,* Ch. 1
❑ *Know-It Notebook* 1-2 ❑ Reading Strategies 1-2, CR ❑ Questioning Strategies, TE ❑ *Ready to Go On? Intervention,* 1-2 ❑ *Lesson Tutorial Videos,* 1-2	❑ Practice C 1-2, CR ❑ Challenge 1-2, CR ❑ Problem Solving 1-2, CR	❑ *Success for Every Learner,* 1-2 ❑ Reading Strategies 1-2, CR ❑ *Multi-Language Visual Glossary* ❑ *Lesson Tutorial Videos,* 1-2
❑ *Know-It Notebook* 1-3 ❑ Reading Strategies 1-3, CR ❑ Questioning Strategies, TE ❑ *Ready to Go On? Intervention,* 1-3 ❑ *Lesson Tutorial Videos,* 1-3	❑ Practice C 1-3, CR ❑ Challenge 1-3, CR ❑ Problem Solving 1-3, CR	❑ *Success for Every Learner,* 1-3 ❑ Reading Strategies 1-3, CR ❑ *Multi-Language Visual Glossary* ❑ *Lesson Tutorial Videos*, 1-3
❑ *Know-It Notebook* 1-4 ❑ Reading Strategies 1-4, CR ❑ Questioning Strategies, TE ❑ *Ready to Go On? Intervention,* 1-4 ❑ *Lesson Tutorial Videos,* 1-4	❑ Practice C 1-4, CR ❑ Challenge 1-4, CR ❑ Problem Solving 1-4, CR	❑ *Success for Every Learner,* 1-4 ❑ Reading Strategies 1-4, CR ❑ *Multi-Language Visual Glossary* ❑ *Lesson Tutorial Videos,* 1-4
❑ *Know-It Notebook* 1-5 ❑ Reading Strategies 1-5, CR ❑ Questioning Strategies, TE ❑ *Ready to Go On? Intervention,* 1-5 ❑ *Lesson Tutorial Videos,* 1-5	❑ Practice C 1-5, CR ❑ Challenge 1-5, CR ❑ Problem Solving 1-5, CR	❑ *Success for Every Learner,* 1-5 ❑ Reading Strategies 1-5, CR ❑ *Multi-Language Visual Glossary* ❑ *Lesson Tutorial Videos,* 1-5
❑ Ready to Go On? Quiz, SE ❑ *Ready to Go On? Intervention* ❑ *Test and Practice Generator*	❑ Ready to Go On? Quiz, SE ❑ *Ready to Go On? Enrichment* ❑ Section 1A Quiz, AR ❑ *Test and Practice Generator*	❑ Ready to Go On? Quiz, SE ❑ *Ready to Go On? Intervention* ❑ *Test and Practice Generator*

Course Planner – Section 1B

Foundations for Algebra

Lesson	Content Standards	On-Level Learners [RTI Tier 1]	Special Needs Learners
1-6 Order of Operations		❑ Problem Solving 1-6, CR ❑ *Know-It Notebook* 1-6 ❑ Questioning Strategies, TE ❑ *Lesson Tutorial Videos,* 1-6	❑ *IDEA Works!* Practice 1-6 ❑ Reading Strategies 1-6, CR ❑ Reteach 1-6, CR ❑ *Ready to Go On? Intervention,* 1-6 ❑ *Lesson Tutorial Videos,* 1-6
1-7 Simplifying Expressions		❑ Problem Solving 1-7, CR ❑ *Know-It Notebook* 1-7 ❑ Questioning Strategies, TE ❑ *Lesson Tutorial Videos,* 1-7	❑ *IDEA Works!* Practice 1-7 ❑ Reading Strategies 1-7, CR ❑ Reteach 1-7, CR ❑ *Ready to Go On? Intervention,* 1-7 ❑ *Lesson Tutorial Videos,* 1-7
1-8 Introduction to Functions		❑ Problem Solving 1-8, CR ❑ *Know-It Notebook* 1-8 ❑ Questioning Strategies, TE ❑ *Lesson Tutorial Videos,* 1-8	❑ *IDEA Works!* Practice 1-8 ❑ Reading Strategies 1-8, CR ❑ Reteach 1-8, CR ❑ *Ready to Go On? Intervention,* 1-8 ❑ *Lesson Tutorial Videos,* 1-8
Assessment Options		❑ Ready to Go On? Quiz, SE ❑ *Ready to Go On? Intervention* ❑ Section 1B Quiz, AR ❑ Chapter Test, SE ❑ Multiple-Choice or Free-Response Chapter Test B, AR ❑ Performance Assessment, AR ❑ Cumulative Test, AR ❑ *Test and Practice Generator*	❑ Ready to Go On? Quiz, SE ❑ *Ready to Go On? Intervention* ❑ *IDEA Works!* Quiz 1B ❑ Multiple-Choice or Free-Response Chapter Test A, AR ❑ Performance Assessment, AR ❑ *IDEA Works!* Test Ch. 1

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KEY

Red Type	Minimum Course of Study	CC	Curriculum Companion
CR	Chapter Resources	SE	Student Edition
AR	Assessment Resources	TE	Teacher's Edition

Developing Learners [RTI Tier 1 and 2]	Advanced Learners [RTI Tier 2]	English Language Learners
❑ *Know-It Notebook* 1-6 ❑ Reading Strategies 1-6, CR ❑ Questioning Strategies, TE ❑ *Ready to Go On? Intervention,* 1-6 ❑ *Lesson Tutorial Videos,* 1-6	❑ Practice C 1-6, CR ❑ Challenge 1-6, CR ❑ Problem Solving 1-6, CR	❑ *Success for Every Learner,* 1-6 ❑ Reading Strategies 1-6, CR ❑ *Multi-Language Visual Glossary* ❑ *Lesson Tutorial Videos,* 1-6
❑ *Know-It Notebook* 1-7 ❑ Reading Strategies 1-7, CR ❑ Questioning Strategies, TE ❑ *Ready to Go On? Intervention,* 1-7 ❑ *Lesson Tutorial Videos,* 1-7	❑ Practice C 1-7, CR ❑ Challenge 1-7, CR ❑ Problem Solving 1-7, CR	❑ *Success for Every Learner,* 1-7 ❑ Reading Strategies 1-7, CR ❑ *Multi-Language Visual Glossary* ❑ *Lesson Tutorial Videos,* 1-7
❑ *Know-It Notebook* 1-8 ❑ Reading Strategies 1-8, CR ❑ Questioning Strategies, TE ❑ *Ready to Go On? Intervention,* 1-8 ❑ *Lesson Tutorial Videos,* 1-8	❑ Practice C 1-8, CR ❑ Challenge 1-8, CR ❑ Problem Solving 1-8, CR	❑ *Success for Every Learner,* 1-8 ❑ Reading Strategies 1-8, CR ❑ *Multi-Language Visual Glossary* ❑ *Lesson Tutorial Videos,* 1-8
❑ Ready to Go On? Quiz, SE ❑ *Ready to Go On? Intervention* ❑ Multiple-Choice or Free-Response Chapter Test A, AR ❑ Performance Assessment, AR ❑ *Test and Practice Generator*	❑ Ready to Go On? Quiz, SE ❑ *Ready to Go On? Enrichment* ❑ Section 1B Quiz, AR ❑ Chapter Test, SE ❑ Multiple-Choice or Free-Response Chapter Test C, AR ❑ Cumulative Test, AR ❑ *Test and Practice Generator*	❑ Ready to Go On? Quiz, SE ❑ *Ready to Go On? Intervention* ❑ Performance Assessment, AR ❑ *Test and Practice Generator*

Course Planner – Section 2A

Equations

Lesson	Content Standards	On-Level Learners [RTI Tier 1]	Special Needs Learners
Algebra Lab: Model One-Step Equations *(1/2 day)*	CC.9-12.A.REI.4	❑ *Lab Resources Online,* Ch. 2	❑ *Lab Resources Online,* Ch. 2
2-1 Solving Equations by Adding or Subtracting *(1 day)*	CC.9-12.A.CED.1; CC.9-12.A.REI.4; CC.9-12.A.REI.1	❑ Problem Solving 2-1, CR ❑ *Know-It Notebook* 2-1 ❑ Questioning Strategies, TE ❑ *Lesson Tutorial Videos,* 2-1	❑ Are You Ready?, SE ❑ *IDEA Works!* Practice 2-1 ❑ Reading Strategies 2-1, CR ❑ Reteach 2-1, CR ❑ *Ready to Go On? Intervention,* 2-1 ❑ *Lesson Tutorial Videos,* 2-1
2-2 Solving Equations by Multiplying or Dividing *(1 day)*	CC.9-12.N.Q.1; CC.9-12.A.CED.1; CC.9-12.A.REI.3; CC.9-12.F.LE.2; CC.9-12.A.REI.1	❑ Problem Solving 2-2, CR ❑ *Know-It Notebook* 2-2 ❑ Questioning Strategies, TE ❑ *Lesson Tutorial Videos,* 2-2	❑ *IDEA Works!* Practice 2-2 ❑ Reading Strategies 2-2, CR ❑ Reteach 2-2, CR ❑ *Ready to Go On? Intervention,* 2-2 ❑ *Lesson Tutorial Videos,* 2-2
Technology Lab: Solve Equations by Graphing *(1 day)*	CC.9-12.A.CED.1; CC.9-12.A.REI.3	❑ *Lab Resources Online,* Ch. 2	❑ *Lab Resources Online,* Ch. 2
2-3 Solving Two-Step and Multi-Step Equations *(1 day)*	CC.9-12.A.CED.1; CC.9-12.A.REI.3; CC.9-12.A.REI.1	❑ Problem Solving 2-3, CR ❑ *Know-It Notebook* 2-3 ❑ Questioning Strategies, TE ❑ *Lesson Tutorial Videos,* 2-3	❑ *IDEA Works!* Practice 2-3 ❑ Reading Strategies 2-3, CR ❑ Reteach 2-3, CR ❑ *Ready to Go On? Intervention,* 2-3 ❑ *Lesson Tutorial Videos,* 2-3
Algebra Lab: Model Equations with Variables on Both Sides *(1 day)*	CC.9-12.A.CED.1; CC.9-12.A.REI.3	❑ *Lab Resources Online,* Ch. 2	❑ *Lab Resources Online,* Ch. 2
2-4 Solving Equations with Variables on Both Sides *(1 day)*	CC.9-12.A.CED.1; CC.9-12.A.REI.3; CC.9-12.A.REI.1	❑ Problem Solving 2-4, CR ❑ *Know-It Notebook* 2-4 ❑ Questioning Strategies, TE ❑ *Lesson Tutorial Videos,* 2-4	❑ *IDEA Works!* Practice 2-4 ❑ Reading Strategies 2-4, CR ❑ Reteach 2-4, CR ❑ *Ready to Go On? Intervention,* 2-4 ❑ *Lesson Tutorial Videos,* 2-4

See pages 2–33 for the full text of the Common Core Standards for Mathematical Content.

KEY				
Red Type	**Minimum Course of Study**	CC	Curriculum Companion
CR	Chapter Resources	SE	Student Edition
AR	Assessment Resources	TE	Teacher's Edition

Developing Learners [RTI Tier 1 and 2]	Advanced Learners [RTI Tier 2]	English Language Learners
❑ *Lab Resources Online,* Ch. 2	❑ *Lab Resources Online,* Ch. 2	❑ *Lab Resources Online,* Ch. 2
❑ Are You Ready?, SE ❑ *Know-It Notebook* 2-1 ❑ Reading Strategies 2-1, CR ❑ Questioning Strategies, TE ❑ *Ready to Go On? Intervention,* 2-1 ❑ *Lesson Tutorial Videos,* 2-1	❑ Practice C 2-1, CR ❑ Challenge 2-1, CR ❑ Problem Solving 2-1, CR	❑ *Success for Every Learner,* 2-1 ❑ Reading Strategies 2-1, CR ❑ *Multi-Language Visual Glossary* ❑ *Lesson Tutorial Videos,* 2-1
❑ *Know-It Notebook* 2-2 ❑ Reading Strategies 2-2, CR ❑ Questioning Strategies, TE ❑ *Ready to Go On? Intervention,* 2-2 ❑ *Lesson Tutorial Videos,* 2-2	❑ Practice C 2-2, CR ❑ Challenge 2-2, CR ❑ Problem Solving 2-2, CR	❑ *Success for Every Learner,* 2-2 ❑ Reading Strategies 2-2, CR ❑ *Multi-Language Visual Glossary* ❑ *Lesson Tutorial Videos,* 2-2
❑ *Lab Resources Online,* Ch. 2	❑ *Lab Resources Online,* Ch. 2	❑ *Lab Resources Online,* Ch. 2
❑ *Know-It Notebook* 2-3 ❑ Reading Strategies 2-3, CR ❑ Questioning Strategies, TE ❑ *Ready to Go On? Intervention,* 2-3 ❑ *Lesson Tutorial Videos,* 2-3	❑ Practice C 2-3, CR ❑ Challenge 2-3, CR ❑ Problem Solving 2-3, CR	❑ *Success for Every Learner,* 2-3 ❑ Reading Strategies 2-3, CR ❑ *Multi-Language Visual Glossary* ❑ *Lesson Tutorial Videos,* 2-3
❑ *Lab Resources Online,* Ch. 2	❑ *Lab Resources Online,* Ch. 2	❑ *Lab Resources Online,* Ch. 2
❑ *Know-It Notebook* 2-4 ❑ Reading Strategies 2-4, CR ❑ Questioning Strategies, TE ❑ *Ready to Go On? Intervention,* 2-4 ❑ *Lesson Tutorial Videos,* 2-4	❑ Practice C 2-4, CR ❑ Challenge 2-4, CR ❑ Problem Solving 2-4, CR	❑ *Success for Every Learner,* 2-4 ❑ Reading Strategies 2-4, CR ❑ *Multi-Language Visual Glossary* ❑ *Lesson Tutorial Videos,* 2-4

Course Planner – Section 2A

Equations

Lesson	Content Standards	On-Level Learners [RTI Tier 1]	Special Needs Learners
Hands-On Lab: Solve Equations Graphically (CC) *(1 day)*	**CC.9-12.A.REI.11**	❑ Lab Resources Online, Ch. 2	❑ *Lab Resources Online,* Ch. 2
2-5 Solving for a Variable *(2 days)*	**CC.9-12.N.Q.1; CC.9-12.A.REI.3; CC.9-12.A.CED.4**	❑ Problem Solving 2-5, CR ❑ *Know-It Notebook* 2-5 ❑ Questioning Strategies, TE ❑ *Lesson Tutorial Videos,* 2-5	❑ *IDEA Works!* Practice 2-5 ❑ Reading Strategies 2-5, CR ❑ Reteach 2-5, CR ❑ *Ready to Go On? Intervention,* 2-5 ❑ *Lesson Tutorial Videos,* 2-5
2-6 Solving Absolute-Value Equations *(1 day)*	**CC.9-12.A.REI.3**	❑ Problem Solving 2-6, CR ❑ *Know-It Notebook* 2-6 ❑ Questioning Strategies, TE ❑ *Lesson Tutorial Videos,* 2-6	❑ *IDEA Works!* Practice 2-6 ❑ Reading Strategies 2-6, CR ❑ Reteach 2-6, CR ❑ *Ready to Go On? Intervention,* 2-6 ❑ *Lesson Tutorial Videos,* 2-6
Assessment Options		❑ Ready to Go On? Quiz, SE ❑ *Ready to Go On? Intervention* ❑ Section 2A Quiz, AR ❑ *Test and Practice Generator*	❑ Ready to Go On? Quiz, SE ❑ *Ready to Go On? Intervention* ❑ *IDEA Works!* Quiz 2A

See pages 2–33 for the full text of the Common Core Standards for Mathematical Content.

KEY				
	Red Type	**Minimum Course of Study**	CC	Curriculum Companion
	CR	Chapter Resources	SE	Student Edition
	AR	Assessment Resources	TE	Teacher's Edition

	Developing Learners [RTI Tier 1 and 2]	Advanced Learners [RTI Tier 2]	English Language Learners
	❑ *Lab Resources Online,* Ch. 2	❑ *Lab Resources Online,* Ch. 2	❑ *Lab Resources Online,* Ch. 2
	❑ *Know-It Notebook* 2-5 ❑ Reading Strategies 2-5, CR ❑ Questioning Strategies, TE ❑ *Ready to Go On? Intervention,* 2-5 ❑ *Lesson Tutorial Videos,* 2-5	❑ Practice C 2-5, CR ❑ Challenge 2-5, CR ❑ Problem Solving 2-5, CR	❑ *Success for Every Learner,* 2-5 ❑ Reading Strategies 2-5, CR ❑ *Multi-Language Visual Glossary* ❑ *Lesson Tutorial Videos,* 2-5
	❑ *Know-It Notebook* 2-6 ❑ Reading Strategies 2-6, CR ❑ Questioning Strategies, TE ❑ *Ready to Go On? Intervention,* 2-6 ❑ *Lesson Tutorial Videos,* 2-6	❑ Practice C 2-6, CR ❑ Challenge 2-6, CR ❑ Problem Solving 2-6, CR	❑ *Success for Every Learner,* 2-6 ❑ Reading Strategies 2-6, CR ❑ *Multi-Language Visual Glossary* ❑ *Lesson Tutorial Videos,* 2-6
	❑ Ready to Go On? Quiz, SE ❑ *Ready to Go On? Intervention* ❑ *Test and Practice Generator*	❑ Ready to Go On? Quiz, SE ❑ *Ready to Go On? Enrichment* ❑ Section 2A Quiz, AR ❑ *Test and Practice Generator*	❑ Ready to Go On? Quiz, SE ❑ *Ready to Go On? Intervention* ❑ *Test and Practice Generator*

Course Planner – Section 2B

Equations

Lesson	Content Standards	On-Level Learners [RTI Tier 1]	Special Needs Learners
2-7 Rates, Ratios, and Proportions *(1 day)*	CC.9-12.N.Q.1; CC.9-12.A.REI.3	❑ Problem Solving 2-7, CR ❑ *Know-It Notebook* 2-7 ❑ Questioning Strategies, TE ❑ *Lesson Tutorial Videos,* 2-7	❑ *IDEA Works!* Practice 2-7 ❑ Reading Strategies 2-7, CR ❑ Reteach 2-7, CR ❑ *Ready to Go On? Intervention,* 2-7 ❑ *Lesson Tutorial Videos,* 2-7
2-8 Applications of Proportions *(1 day)*	CC.9-12.N.Q.1	❑ Problem Solving 2-8, CR ❑ *Know-It Notebook* 2-8 ❑ Questioning Strategies, TE ❑ *Lesson Tutorial Videos,* 2-8	❑ *IDEA Works!* Practice 2-8 ❑ Reading Strategies 2-8, CR ❑ Reteach 2-8, CR ❑ *Ready to Go On? Intervention,* 2-8 ❑ *Lesson Tutorial Videos,* 2-8
2-8A Precision and Accuracy (CC) *(2 days)*	CC.9-12.N.Q.2; CC.9-12.N.Q.3	❑ Problem Solving 2-8A, CR ❑ Questioning Strategies, TE	❑ Are You Ready?, SE ❑ Reading Strategies 2-8A, CR ❑ Reteach 2-8A, CR
2-9 Percents		❑ Problem Solving 2-9, CR ❑ *Know-It Notebook* 2-9 ❑ Questioning Strategies, TE ❑ *Lesson Tutorial Videos,* 2-9	❑ *IDEA Works!* Practice 2-9 ❑ Reading Strategies 2-9, CR ❑ Reteach 2-9, CR ❑ *Ready to Go On? Intervention,* 2-9 ❑ *Lesson Tutorial Videos,* 2-9
2-10 Applications of Percents		❑ Problem Solving 2-10, CR ❑ *Know-It Notebook* 2-10 ❑ Questioning Strategies, TE ❑ *Lesson Tutorial Videos,* 2-10	❑ *IDEA Works!* Practice 2-10 ❑ Reading Strategies 2-10, CR ❑ Reteach 2-10, CR ❑ *Ready to Go On? Intervention,* 2-10 ❑ *Lesson Tutorial Videos,* 2-10
2-11 Percent Increase and Decrease		❑ Problem Solving 2-11, CR ❑ *Know-It Notebook* 2-11 ❑ Questioning Strategies, TE ❑ *Lesson Tutorial Videos,* 2-11	❑ *IDEA Works!* Practice 2-11 ❑ Reading Strategies 2-11, CR ❑ Reteach 2-11, CR ❑ *Ready to Go On? Intervention,* 2-11 ❑ *Lesson Tutorial Videos,* 2-11
Algebra Lab: Explore Changes in Population		❑ *Lab Resources Online,* Ch. 2	❑ *Lab Resources Online,* Ch. 2
Assessment Options		❑ Ready to Go On? Quiz, SE ❑ *Ready to Go On? Intervention* ❑ Section 2B Quiz, AR ❑ Chapter Test, SE ❑ Multiple-Choice or Free-Response Chapter Test B, AR ❑ Performance Assessment, AR ❑ Cumulative Test, AR ❑ *Test and Practice Generator*	❑ Ready to Go On? Quiz, SE ❑ *Ready to Go On? Intervention* ❑ *IDEA Works!* Quiz 2B ❑ Multiple-Choice or Free-Response Chapter Test A, AR ❑ Performance Assessment, AR ❑ *IDEA Works!* Test Ch. 2

See pages 2–33 for the full text of the Common Core Standards for Mathematical Content.

KEY				
Red Type	**Minimum Course of Study**	CC	Curriculum Companion
CR	Chapter Resources	SE	Student Edition
AR	Assessment Resources	TE	Teacher's Edition

Developing Learners [RTI Tier 1 and 2]	Advanced Learners [RTI Tier 2]	English Language Learners
❑ *Know-It Notebook* 2-7 ❑ Reading Strategies 2-7, CR ❑ Questioning Strategies, TE ❑ *Ready to Go On? Intervention,* 2-7 ❑ *Lesson Tutorial Videos,* 2-7	❑ Practice C 2-7, CR ❑ Challenge 2-7, CR ❑ Problem Solving 2-7, CR	❑ *Success for Every Learner,* 2-7 ❑ Reading Strategies 2-7, CR ❑ *Multi-Language Visual Glossary* ❑ *Lesson Tutorial Videos,* 2-7
❑ *Know-It Notebook* 2-8 ❑ Reading Strategies 2-8, CR ❑ Questioning Strategies, TE ❑ *Ready to Go On? Intervention,* 2-8 ❑ *Lesson Tutorial Videos,* 2-8	❑ Practice C 2-8, CR ❑ Challenge 2-8, CR ❑ Problem Solving 2-8, CR	❑ *Success for Every Learner,* 2-8 ❑ Reading Strategies 2-8, CR ❑ *Multi-Language Visual Glossary* ❑ *Lesson Tutorial Videos,* 2-8
❑ Are You Ready?, SE ❑ Reading Strategies 2-8A, CR ❑ Questioning Strategies, TE	❑ Challenge 2-8A, CR ❑ Problem Solving 2-8A, CR	❑ *Success for Every Learner,* 2-8A ❑ Reading Strategies 2-8A, CR
❑ *Know-It Notebook* 2-9 ❑ Reading Strategies 2-9, CR ❑ Questioning Strategies, TE ❑ *Ready to Go On? Intervention,* 2-9 ❑ *Lesson Tutorial Videos,* 2-9	❑ Practice C 2-9, CR ❑ Challenge 2-9, CR ❑ Problem Solving 2-9, CR	❑ *Success for Every Learner,* 2-9 ❑ Reading Strategies 2-9, CR ❑ *Multi-Language Visual Glossary* ❑ Lesson Tutorial Videos, 2-9
❑ *Know-It Notebook* 2-10 ❑ Reading Strategies 2-10, CR ❑ Questioning Strategies, TE ❑ *Ready to Go On? Intervention,* 2-10 ❑ *Lesson Tutorial Videos,* 2-10	❑ Practice C 2-10, CR ❑ Challenge 2-10, CR ❑ Problem Solving 2-10, CR	❑ *Success for Every Learner,* 2-10 ❑ Reading Strategies 2-10, CR ❑ *Multi-Language Visual Glossary* ❑ *Lesson Tutorial Videos,* 2-10
❑ *Know-It Notebook* 2-11 ❑ Reading Strategies 2-11, CR ❑ Questioning Strategies, TE ❑ *Ready to Go On? Intervention,* 2-11 ❑ *Lesson Tutorial Videos,* 2-11	❑ Practice C 2-11, CR ❑ Challenge 2-11, CR ❑ Problem Solving 2-11, CR	❑ *Success for Every Learner,* 2-11 ❑ Reading Strategies 2-11, CR ❑ *Multi-Language Visual Glossary* ❑ *Lesson Tutorial Videos,* 2-11
❑ *Lab Resources Online,* Ch. 2	❑ *Lab Resources Online,* Ch. 2	❑ *Lab Resources Online,* Ch. 2
❑ Ready to Go On? Quiz, SE ❑ *Ready to Go On? Intervention* ❑ Multiple-Choice or Free-Response Chapter Test A, AR ❑ Performance Assessment, AR ❑ *Test and Practice Generator*	❑ Ready to Go On? Quiz, SE ❑ *Ready to Go On? Enrichment* ❑ Section 2B Quiz, AR ❑ Chapter Test, SE ❑ Multiple-Choice or Free-Response Chapter Test C, AR ❑ Cumulative Test, AR ❑ *Test and Practice Generator*	❑ Ready to Go On? Quiz, SE ❑ *Ready to Go On? Intervention* ❑ Performance Assessment, AR ❑ *Test and Practice Generator*

Course Planner – Section 3A

Inequalities

Lesson	Content Standards	On-Level Learners [RTI Tier 1]	Special Needs Learners
3-1 Graphing and Writing Inequalities *(1 day)*	CC.9-12.A.REI.3	❑ Problem Solving 3-1, CR ❑ *Know-It Notebook* 3-1 ❑ Questioning Strategies, TE ❑ *Lesson Tutorial Videos,* 3-1	❑ Are You Ready?, SE ❑ *IDEA Works!* Practice 3-1 ❑ Reading Strategies 3-1, CR ❑ Reteach 3-1, CR ❑ *Ready to Go On? Intervention,* 3-1 ❑ *Lesson Tutorial Videos,* 3-1
3-2 Solving Inequalities by Adding or Subtracting *(1 day)*	CC.9-12.A.REI.3	❑ Problem Solving 3-2, CR ❑ *Know-It Notebook* 3-2 ❑ Questioning Strategies, TE ❑ *Lesson Tutorial Videos,* 3-2	❑ *IDEA Works!* Practice 3-2 ❑ Reading Strategies 3-2, CR ❑ Reteach 3-2, CR ❑ *Ready to Go On? Intervention,* 3-2 ❑ *Lesson Tutorial Videos,* 3-2
3-3 Solving Inequalities by Multiplying or Dividing *(1 day)*	CC.9-12.A.REI.3; CC.9-12.A.CED.1	❑ Problem Solving 3-3, CR ❑ *Know-It Notebook* 3-3 ❑ Questioning Strategies, TE ❑ *Lesson Tutorial Videos,* 3-3	❑ *IDEA Works!* Practice 3-3 ❑ Reading Strategies 3-3, CR ❑ Reteach 3-3, CR ❑ *Ready to Go On? Intervention,* 3-3 ❑ *Lesson Tutorial Videos,* 3-3
Assessment Options		❑ Ready to Go On? Quiz, SE ❑ *Ready to Go On? Intervention* ❑ Section 3A Quiz, AR ❑ *Test and Practice Generator*	❑ Ready to Go On? Quiz, SE ❑ *Ready to Go On? Intervention* ❑ *IDEA Works!* Quiz 3A

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KEY				
	Red Type	**Minimum Course of Study**	CC	Curriculum Companion
	CR	Chapter Resources	SE	Student Edition
	AR	Assessment Resources	TE	Teacher's Edition

	Developing Learners [RTI Tier 1 and 2]	Advanced Learners [RTI Tier 2]	English Language Learners
	❑ Are You Ready?, SE ❑ *Know-It Notebook* 3-1 ❑ Reading Strategies 3-1, CR ❑ Questioning Strategies, TE ❑ *Ready to Go On? Intervention,* 3-1 ❑ *Lesson Tutorial Videos,* 3-1	❑ Practice C 3-1, CR ❑ Challenge 3-1, CR ❑ Problem Solving 3-1, CR	❑ *Success for Every Learner,* 3-1 ❑ Reading Strategies 3-1, CR ❑ *Multi-Language Visual Glossary* ❑ *Lesson Tutorial Videos,* 3-1
	❑ *Know-It Notebook* 3-2 ❑ Reading Strategies 3-2, CR ❑ Questioning Strategies, TE ❑ *Ready to Go On? Intervention,* 3-2 ❑ *Lesson Tutorial Videos,* 3-2	❑ Practice C 3-2, CR ❑ Challenge 3-2, CR ❑ Problem Solving 3-2, CR	❑ *Success for Every Learner,* 3-2 ❑ Reading Strategies 3-2, CR ❑ *Multi-Language Visual Glossary* ❑ *Lesson Tutorial Videos,* 3-2
	❑ *Know-It Notebook* 3-3 ❑ Reading Strategies 3-3, CR ❑ Questioning Strategies, TE ❑ *Ready to Go On? Intervention,* 3-3 ❑ *Lesson Tutorial Videos,* 3-3	❑ Practice C 3-3, CR ❑ Challenge 3-3, CR ❑ Problem Solving 3-3, CR	❑ *Success for Every Learner,* 3-3 ❑ Reading Strategies 3-3, CR ❑ *Multi-Language Visual Glossary* ❑ *Lesson Tutorial Videos,* 3-3
	❑ Ready to Go On? Quiz, SE ❑ *Ready to Go On? Intervention* ❑ *Test and Practice Generator*	❑ Ready to Go On? Quiz, SE ❑ *Ready to Go On? Enrichment* ❑ Section 3A Quiz, AR ❑ *Test and Practice Generator*	❑ Ready to Go On? Quiz, SE ❑ *Ready to Go On? Intervention* ❑ *Test and Practice Generator*

Course Planner – Section 3B

Inequalities

Lesson	Content Standards	On-Level Learners [RTI Tier 1]	Special Needs Learners
3-4 Solving Two-Step and Multi-Step Inequalities *(1 day)*	CC.9-12.A.REI.3; CC.9-12.A.CED.1	❑ Problem Solving 3-4, CR ❑ *Know-It Notebook* 3-4 ❑ Questioning Strategies, TE ❑ *Lesson Tutorial Videos,* 3-4	❑ *IDEA Works!* Practice 3-4 ❑ Reading Strategies 3-4, CR ❑ Reteach 3-4, CR ❑ *Ready to Go On? Intervention,* 3-4 ❑ *Lesson Tutorial Videos,* 3-4
3-5 Solving Inequalities with Variables on Both Sides *(1 day)*	CC.9-12.A.REI.3; CC.9-12.A.CED.1	❑ Problem Solving 3-5, CR ❑ *Know-It Notebook* 3-5 ❑ Questioning Strategies, TE ❑ *Lesson Tutorial Videos,* 3-5	❑ *IDEA Works!* Practice 3-5 ❑ Reading Strategies 3-5, CR ❑ Reteach 3-5, CR ❑ *Ready to Go On? Intervention,* 3-5 ❑ *Lesson Tutorial Videos,* 3-5
Algebra Lab: Truth Tables and Compound Statements *(1/2 day)*	CC.9-12.A.REI.3	❑ *Lab Resources Online,* Ch. 3	❑ *Lab Resources Online,* Ch. 3
3-6 Solving Compound Inequalities *(2 days)*	CC.9-12.A.REI.3	❑ Problem Solving 3-6, CR ❑ *Know-It Notebook* 3-6 ❑ Questioning Strategies, TE ❑ *Lesson Tutorial Videos,* 3-6	❑ *IDEA Works!* Practice 3-6 ❑ Reading Strategies 3-6, CR ❑ Reteach 3-6, CR ❑ *Ready to Go On? Intervention,* 3-6 ❑ *Lesson Tutorial Videos,* 3-6
3-7 Solving Absolute-Value Inequalities *(2 days)*	CC.9-12.N.Q.1; CC.9-12.A.REI.3; CC.9-12.A.CED.1	❑ Problem Solving 3-7, CR ❑ *Know-It Notebook* 3-7 ❑ Questioning Strategies, TE ❑ *Lesson Tutorial Videos,* 3-7	❑ *IDEA Works!* Practice 3-7 ❑ Reading Strategies 3-7, CR ❑ Reteach 3-7, CR ❑ *Ready to Go On? Intervention,* 3-7 ❑ *Lesson Tutorial Videos,* 3-7
Assessment Options		❑ Ready to Go On? Quiz, SE ❑ *Ready to Go On? Intervention* ❑ Section 3B Quiz, AR ❑ Chapter Test, SE ❑ Multiple-Choice or Free-Response Chapter Test B, AR ❑ Performance Assessment, AR ❑ Cumulative Test, AR ❑ *Test and Practice Generator*	❑ Ready to Go On? Quiz, SE ❑ *Ready to Go On? Intervention* ❑ *IDEA Works!* Quiz 3B ❑ Multiple-Choice or Free-Response Chapter Test A, AR ❑ Performance Assessment, AR ❑ *IDEA Works!* Test Ch. 3

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	AR	Assessment Resources	TE	Teacher's Edition

	Developing Learners [RTI Tier 1 and 2]	Advanced Learners [RTI Tier 2]	English Language Learners
	❑ *Know-It Notebook* 3-4 ❑ Reading Strategies 3-4, CR ❑ Questioning Strategies, TE ❑ *Ready to Go On? Intervention,* 3-4 ❑ *Lesson Tutorial Videos,* 3-4	❑ Practice C 3-4, CR ❑ Challenge 3-4, CR ❑ Problem Solving 3-4, CR	❑ *Success for Every Learner,* 3-4 ❑ Reading Strategies 3-4, CR ❑ *Multi-Language Visual Glossary* ❑ *Lesson Tutorial Videos,* 3-4
	❑ *Know-It Notebook* 3-5 ❑ Reading Strategies 3-5, CR ❑ Questioning Strategies, TE ❑ *Ready to Go On? Intervention,* 3-5 ❑ *Lesson Tutorial Videos,* 3-5	❑ Practice C 3-5, CR ❑ Challenge 3-5, CR ❑ Problem Solving 3-5, CR	❑ *Success for Every Learner,* 3-5 ❑ Reading Strategies 3-5, CR ❑ *Multi-Language Visual Glossary* ❑ *Lesson Tutorial Videos,* 3-5
	❑ *Lab Resources Online,* Ch. 3	❑ *Lab Resources Online,* Ch. 3	❑ *Lab Resources Online,* Ch. 3
	❑ *Know-It Notebook* 3-6 ❑ Reading Strategies 3-6, CR ❑ Questioning Strategies, TE ❑ *Ready to Go On? Intervention,* 3-6 ❑ *Lesson Tutorial Videos,* 3-6	❑ Practice C 3-6, CR ❑ Challenge 3-6, CR ❑ Problem Solving 3-6, CR	❑ *Success for Every Learner,* 3-6 ❑ Reading Strategies 3-6, CR ❑ *Multi-Language Visual Glossary* ❑ *Lesson Tutorial Videos,* 3-6
	❑ *Know-It Notebook* 3-7 ❑ Reading Strategies 3-7, CR ❑ Questioning Strategies, TE ❑ *Ready to Go On? Intervention,* 3-7 ❑ *Lesson Tutorial Videos,* 3-7	❑ Practice C 3-7, CR ❑ Challenge 3-7, CR ❑ Problem Solving 3-7, CR	❑ *Success for Every Learner,* 3-7 ❑ Reading Strategies 3-7, CR ❑ *Multi-Language Visual Glossary* ❑ *Lesson Tutorial Videos,* 3-7
	❑ Ready to Go On? Quiz, SE ❑ *Ready to Go On? Intervention* ❑ Multiple-Choice or Free-Response Chapter Test A, AR ❑ Performance Assessment, AR ❑ *Test and Practice Generator*	❑ Ready to Go On? Quiz, SE ❑ *Ready to Go On? Enrichment* ❑ Section 3B Quiz, AR ❑ Chapter Test, SE ❑ Multiple-Choice or Free-Response Chapter Test C, AR ❑ Cumulative Test, AR ❑ *Test and Practice Generator*	❑ Ready to Go On? Quiz, SE ❑ *Ready to Go On? Intervention* ❑ Performance Assessment, AR ❑ *Test and Practice Generator*

Course Planner – Section 4A

Functions

Lesson	Content Standards	On-Level Learners [RTI Tier 1]	Special Needs Learners
4-1 Graphing Relationships *(1 day)*	**CC.9-12.F.IF.1**	❑ Problem Solving 4-1, CR ❑ *Know-It Notebook* 4-1 ❑ Questioning Strategies, TE ❑ *Lesson Tutorial Videos,* 4-1	❑ Are You Ready?, SE ❑ *IDEA Works!* Practice 4-1 ❑ Reading Strategies 4-1, CR ❑ Reteach 4-1, CR ❑ *Ready to Go On? Intervention,* 4-1 ❑ *Lesson Tutorial Videos,* 4-1
4-2 Relations and Functions *(1 day)*	**CC.9-12.F.IF.1; CC.9-12.F.IF.5**	❑ Problem Solving 4-2, CR ❑ *Know-It Notebook* 4-2 ❑ Questioning Strategies, TE ❑ *Lesson Tutorial Videos,* 4-2	❑ *IDEA Works!* Practice 4-2 ❑ Reading Strategies 4-2, CR ❑ Reteach 4-2, CR ❑ *Ready to Go On? Intervention,* 4-2 ❑ *Lesson Tutorial Videos,* 4-2
Algebra Lab: The Vertical Line Test *(1/2 day)*	**CC.9-12.F.IF.1**	❑ *Lab Resources Online,* Ch. 4	❑ *Lab Resources Online,* Ch. 4
Algebra Lab: Model Variable Relationships *(1 day)*	**CC.9-12.F.IF.1**	❑ *Lab Resources Online,* Ch. 4	❑ *Lab Resources Online,* Ch. 4
4-3 Writing Functions *(2 days)*	**CC.9-12.A.CED.3; CC.9-12.F.FI.1; CC.9-12.F.IF.2; CC.9-12.F.IF.5; CC.9-12.F.BF.1**	❑ Problem Solving 4-3, CR ❑ *Know-It Notebook* 4-3 ❑ Questioning Strategies, TE ❑ *Lesson Tutorial Videos,* 4-3	❑ *IDEA Works!* Practice 4-3 ❑ Reading Strategies 4-3, CR ❑ Reteach 4-3, CR ❑ *Ready to Go On? Intervention,* 4-3 ❑ *Lesson Tutorial Videos,* 4-3
4-4 Graphing Functions *(1 day)*	**CC.9-12.A.REI.10; CC.9-12.F.IF.1; CC.9-12.F.IF.2; CC.9-12.F.IF.5; CC.9-12.F.IF.7**	❑ Problem Solving 4-4, CR ❑ *Know-It Notebook* 4-4 ❑ Questioning Strategies, TE ❑ *Lesson Tutorial Videos,* 4-4	❑ *IDEA Works!* Practice 4-4 ❑ Reading Strategies 4-4, CR ❑ Reteach 4-4, CR ❑ *Ready to Go On? Intervention,* 4-4 ❑ *Lesson Tutorial Videos,* 4-4
Technology Lab: Connect Function Rules, Tables, and Graphs *(1/2 day)*	**CC.9-12.F.IF.9; CC.9-12.F.IF.1; CC.9-12.A.REI.10**	❑ *Lab Resources Online,* Ch. 4	❑ *Lab Resources Online,* Ch. 4
Assessment Options		❑ Ready to Go On? Quiz, SE ❑ *Ready to Go On? Intervention* ❑ Section 4A Quiz, AR ❑ *Test and Practice Generator*	❑ Ready to Go On? Quiz, SE ❑ *Ready to Go On? Intervention* ❑ *IDEA Works!* Quiz 4A

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	CR	Chapter Resources	SE	Student Edition
	AR	Assessment Resources	TE	Teacher's Edition

Developing Learners [RTI Tier 1 and 2]	Advanced Learners [RTI Tier 2]	English Language Learners
❑ Are You Ready?, SE ❑ *Know-It Notebook* 4-1 ❑ Reading Strategies 4-1, CR ❑ Questioning Strategies, TE ❑ *Ready to Go On? Intervention,* 4-1 ❑ *Lesson Tutorial Videos,* 4-1	❑ Practice C 4-1, CR ❑ Challenge 4-1, CR ❑ Problem Solving 4-1, CR	❑ *Success for Every Learner,* 4-1 ❑ Reading Strategies 4-1, CR ❑ *Multi-Language Visual Glossary* ❑ *Lesson Tutorial Videos,* 4-1
❑ *Know-It Notebook* 4-2 ❑ Reading Strategies 4-2, CR ❑ Questioning Strategies, TE ❑ *Ready to Go On? Intervention,* 4-2 ❑ *Lesson Tutorial Videos,* 4-2	❑ Practice C 4-2, CR ❑ Challenge 4-2, CR ❑ Problem Solving 4-2, CR	❑ *Success for Every Learner,* 4-2 ❑ Reading Strategies 4-2, CR ❑ *Multi-Language Visual Glossary* ❑ *Lesson Tutorial Videos,* 4-2
❑ *Lab Resources Online,* Ch. 4	❑ *Lab Resources Online,* Ch. 4	❑ *Lab Resources Online,* Ch. 4
❑ *Lab Resources Online,* Ch. 4	❑ *Lab Resources Online,* Ch. 4	❑ *Lab Resources Online,* Ch. 4
❑ *Know-It Notebook* 4-3 ❑ Reading Strategies 4-3, CR ❑ Questioning Strategies, TE ❑ *Ready to Go On? Intervention,* 4-3 ❑ *Lesson Tutorial Videos,* 4-3	❑ Practice C 4-3, CR ❑ Challenge 4-3, CR ❑ Problem Solving 4-3, CR	❑ *Success for Every Learner,* 4-3 ❑ Reading Strategies 4-3, CR ❑ *Multi-Language Visual Glossary* ❑ *Lesson Tutorial Videos,* 4-3
❑ *Know-It Notebook* 4-4 ❑ Reading Strategies 4-4, CR ❑ Questioning Strategies, TE ❑ *Ready to Go On? Intervention,* 4-4 ❑ *Lesson Tutorial Videos,* 4-4	❑ Practice C 4-4, CR ❑ Challenge 4-4, CR ❑ Problem Solving 4-4, CR	❑ *Success for Every Learner,* 4-4 ❑ Reading Strategies 4-4, CR ❑ *Multi-Language Visual Glossary* ❑ *Lesson Tutorial Videos,* 4-4
❑ *Lab Resources Online,* Ch. 4	❑ *Lab Resources Online,* Ch. 4	❑ *Lab Resources Online,* Ch. 4
❑ Ready to Go On? Quiz, SE ❑ *Ready to Go On? Intervention* ❑ *Test and Practice Generator*	❑ Ready to Go On? Quiz, SE ❑ *Ready to Go On? Enrichment* ❑ Section 4A Quiz, AR ❑ *Test and Practice Generator*	❑ Ready to Go On? Quiz, SE ❑ *Ready to Go On? Intervention* ❑ *Test and Practice Generator*

Course Planner – Section 4B

Functions

Lesson	Content Standards	On-Level Learners [RTI Tier 1]	Special Needs Learners
4-5 Scatter Plots and Trend Lines *(1 day)*	CC.9-12.NQ.1; CC.9-12.S.ID.6	❑ Problem Solving 4-5, CR ❑ *Know-It Notebook* 4-5 ❑ Questioning Strategies, TE ❑ *Lesson Tutorial Videos,* 4-5	❑ *IDEA Works!* Practice 4-5 ❑ Reading Strategies 4-5, CR ❑ Reteach 4-5, CR ❑ *Ready to Go On? Intervention,* 4-5 ❑ *Lesson Tutorial Videos,* 4-5
Technology Lab: Interpret Scatter Plots and Trend Lines *(1 day)*	CC.9-12.S.ID.6	❑ *Lab Resources Online,* Ch. 4	❑ *Lab Resources Online,* Ch. 4
4-6 Arithmetic Sequences *(1 day)*	CC.9-12.F.IF.3; CC.9-12.F.BF.2; CC.9-12.F.LE.2	❑ Problem Solving 4-6, CR ❑ *Know-It Notebook* 4-6 ❑ Questioning Strategies, TE ❑ *Lesson Tutorial Videos,* 4-6	❑ *IDEA Works!* Practice 4-6 ❑ Reading Strategies 4-6, CR ❑ Reteach 4-6, CR ❑ *Ready to Go On? Intervention,* 4-6 ❑ *Lesson Tutorial Videos,* 4-6
Assessment Options		❑ Ready to Go On? Quiz, SE ❑ *Ready to Go On? Intervention* ❑ Section 4B Quiz, AR ❑ Chapter Test, SE ❑ Multiple-Choice or Free-Response Chapter Test B, AR ❑ Performance Assessment, AR ❑ Cumulative Test, AR ❑ *Test and Practice Generator*	❑ Ready to Go On? Quiz, SE ❑ *Ready to Go On? Intervention* ❑ *IDEA Works!* Quiz 4B ❑ Multiple-Choice or Free-Response Chapter Test A, AR ❑ Performance Assessment, AR ❑ *IDEA Works!* Test Ch. 4

See pages 2–33 for the full text of the Common Core Standards for Mathematical Content.

KEY	Red Type	Minimum Course of Study	CC	Curriculum Companion
	CR	Chapter Resources	SE	Student Edition
	AR	Assessment Resources	TE	Teacher's Edition

	Developing Learners [RTI Tier 1 and 2]	Advanced Learners [RTI Tier 2]	English Language Learners
	❑ *Know-It Notebook* 4-5 ❑ Reading Strategies 4-5, CR ❑ Questioning Strategies, TE ❑ *Ready to Go On? Intervention,* 4-5 ❑ *Lesson Tutorial Videos,* 4-5	❑ Practice C 4-5, CR ❑ Challenge 4-5, CR ❑ Problem Solving 4-5, CR	❑ *Success for Every Learner,* 4-5 ❑ Reading Strategies 4-5, CR ❑ *Multi-Language Visual Glossary* ❑ *Lesson Tutorial Videos,* 4-5
	❑ *Lab Resources Online,* Ch. 4	❑ *Lab Resources Online,* Ch. 4	❑ *Lab Resources Online,* Ch. 4
	❑ *Know-It Notebook* 4-6 ❑ Reading Strategies 4-6, CR ❑ Questioning Strategies, TE ❑ *Ready to Go On? Intervention,* 4-6 ❑ *Lesson Tutorial Videos,* 4-6	❑ Practice C 4-6, CR ❑ Challenge 4-6, CR ❑ Problem Solving 4-6, CR	❑ *Success for Every Learner,* 4-6 ❑ Reading Strategies 4-6, CR ❑ *Multi-Language Visual Glossary* ❑ *Lesson Tutorial Videos,* 4-6
	❑ Ready to Go On? Quiz, SE ❑ *Ready to Go On? Intervention* ❑ Multiple-Choice or Free-Response Chapter Test A, AR ❑ Performance Assessment, AR ❑ *Test and Practice Generator*	❑ Ready to Go On? Quiz, SE ❑ *Ready to Go On? Enrichment* ❑ Section 4B Quiz, AR ❑ Chapter Test, SE ❑ Multiple-Choice or Free-Response Chapter Test C, AR ❑ Cumulative Test, AR ❑ *Test and Practice Generator*	❑ Ready to Go On? Quiz, SE ❑ *Ready to Go On? Intervention* ❑ Performance Assessment, AR ❑ *Test and Practice Generator*

Course Planner – Section 5A

Linear Functions

Lesson	Content Standards	On-Level Learners [RTI Tier 1]	Special Needs Learners
5-1 Identifying Linear Functions *(1 day)*	**CC.9-12.A.CED.2; CC.9-12.A.CED.3; CC.9-12.F.IF.4; CC.9-12.F.IF.5; CC.9-12.F.IF.7; CC.9-12.F.LE.2; CC.9-12.F.IF.9; CC.9-12.F.BF.1**	❑ Problem Solving 5-1, CR ❑ *Know-It Notebook* 5-1 ❑ Questioning Strategies, TE ❑ *Lesson Tutorial Videos,* 5-1	❑ Are You Ready?, SE ❑ *IDEA Works!* Practice 5-1 ❑ Reading Strategies 5-1, CR ❑ Reteach 5-1, CR ❑ *Ready to Go On? Intervention,* 5-1 ❑ *Lesson Tutorial Videos,* 5-1
5-2 Using Intercepts *(1 day)*	**CC.9-12.A.CED.2; CC.9-12.A.CED.3; CC.9-12.F.IF.2; CC.9-12.F.IF.4; CC.9-12.F.IF.6; CC.9-12.F.IF.7; CC.9-12.F.BF.1**	❑ Problem Solving 5-2, CR ❑ *Know-It Notebook* 5-2 ❑ Questioning Strategies, TE ❑ *Lesson Tutorial Videos,* 5-2	❑ *IDEA Works!* Practice 5-2 ❑ Reading Strategies 5-2, CR ❑ Reteach 5-2, CR ❑ *Ready to Go On? Intervention,* 5-2 ❑ *Lesson Tutorial Videos,* 5-2
5-3 Rate of Change and Slope *(1 day)*	**CC.9-12.A.CED.2; CC.9-12.F.IF.6**	❑ Problem Solving 5-3, CR ❑ *Know-It Notebook* 5-3 ❑ Questioning Strategies, TE ❑ *Lesson Tutorial Videos,* 5-3	❑ *IDEA Works!* Practice 5-3 ❑ Reading Strategies 5-3, CR ❑ Reteach 5-3, CR ❑ *Ready to Go On? Intervention,* 5-3 ❑ *Lesson Tutorial Videos,* 5-3
Algebra Lab: Explore Constant Changes *(1 day)*	**CC.9-12.A.CED.2; CC.9-12.F.IF.6**	❑ *Lab Resources Online,* Ch. 5	❑ *Lab Resources Online,* Ch. 5
5-4 The Slope Formula *(1 day)*	**CC.9-12.A.CED.2; CC.9-12.F.IF.6**	❑ Problem Solving 5-4, CR ❑ *Know-It Notebook* 5-4 ❑ Questioning Strategies, TE ❑ *Lesson Tutorial Videos,* 5-4	❑ *IDEA Works!* Practice 5-4 ❑ Reading Strategies 5-4, CR ❑ Reteach 5-4, CR ❑ *Ready to Go On? Intervention,* 5-4 ❑ *Lesson Tutorial Videos,* 5-4
5-6 Direct Variation *(1 day)*	**CC.9-12.A.CED.2; CC.9-12.A.CED.3; CC.9-12.F.IF.5; CC.9-12.F.IF.7; CC.9-12.F.LE.2**	❑ Problem Solving 5-6, CR ❑ *Know-It Notebook* 5-6 ❑ Questioning Strategies, TE ❑ *Lesson Tutorial Videos,* 5-6	❑ *IDEA Works!* Practice 5-6 ❑ Reading Strategies 5-6, CR ❑ Reteach 5-6, CR ❑ *Ready to Go On? Intervention,* 5-6 ❑ *Lesson Tutorial Videos,* 5-6
Assessment Options		❑ Ready to Go On? Quiz, SE ❑ *Ready to Go On? Intervention* ❑ Section 5A Quiz, AR ❑ *Test and Practice Generator*	❑ Ready to Go On? Quiz, SE ❑ *Ready to Go On? Intervention* ❑ *IDEA Works!* Quiz 5A

See pages 2–33 for the full text of the Common Core Standards for Mathematical Content.

KEY	Red Type	Minimum Course of Study	CC	Curriculum Companion
	CR	Chapter Resources	SE	Student Edition
	AR	Assessment Resources	TE	Teacher's Edition

	Developing Learners [RTI Tier 1 and 2]	Advanced Learners [RTI Tier 2]	English Language Learners
	❑ Are You Ready?, SE ❑ *Know-It Notebook* 5-1 ❑ Reading Strategies 5-1, CR ❑ Questioning Strategies, TE ❑ *Ready to Go On? Intervention,* 5-1 ❑ *Lesson Tutorial Videos,* 5-1	❑ Practice C 5-1, CR ❑ Challenge 5-1, CR ❑ Problem Solving 5-1, CR	❑ *Success for Every Learner,* 5-1 ❑ Reading Strategies 5-1, CR ❑ *Multi-Language Visual Glossary* ❑ *Lesson Tutorial Videos,* 5-1
	❑ *Know-It Notebook* 5-2 ❑ Reading Strategies 5-2, CR ❑ Questioning Strategies, TE ❑ *Ready to Go On? Intervention,* 5-2 ❑ *Lesson Tutorial Videos,* 5-2	❑ Practice C 5-2, CR ❑ Challenge 5-2, CR ❑ Problem Solving 5-2, CR	❑ *Success for Every Learner,* 5-2 ❑ Reading Strategies 5-2, CR ❑ *Multi-Language Visual Glossary* ❑ *Lesson Tutorial Videos,* 5-2
	❑ *Know-It Notebook* 5-3 ❑ Reading Strategies 5-3, CR ❑ Questioning Strategies, TE ❑ *Ready to Go On? Intervention,* 5-3 ❑ *Lesson Tutorial Videos,* 5-3	❑ Practice C 5-3, CR ❑ Challenge 5-3, CR ❑ Problem Solving 5-3, CR	❑ *Success for Every Learner,* 5-3 ❑ Reading Strategies 5-3, CR ❑ *Multi-Language Visual Glossary* ❑ *Lesson Tutorial Videos,* 5-3
	❑ *Lab Resources Online,* Ch. 5	❑ *Lab Resources Online,* Ch. 5	❑ *Lab Resources Online,* Ch. 5
	❑ *Know-It Notebook* 5-4 ❑ Reading Strategies 5-4, CR ❑ Questioning Strategies, TE ❑ *Ready to Go On? Intervention,* 5-4 ❑ *Lesson Tutorial Videos,* 5-4	❑ Practice C 5-4, CR ❑ Challenge 5-4, CR ❑ Problem Solving 5-4, CR	❑ *Success for Every Learner,* 5-4 ❑ Reading Strategies 5-4, CR ❑ *Multi-Language Visual Glossary* ❑ *Lesson Tutorial Videos,* 5-4
	❑ *Know-It Notebook* 5-6 ❑ Reading Strategies 5-6, CR ❑ Questioning Strategies, TE ❑ *Ready to Go On? Intervention,* 5-6 ❑ *Lesson Tutorial Videos,* 5-6	❑ Practice C 5-6, CR ❑ Challenge 5-6, CR ❑ Problem Solving 5-6, CR	❑ *Success for Every Learner,* 5-6 ❑ Reading Strategies 5-6, CR ❑ *Multi-Language Visual Glossary* ❑ *Lesson Tutorial Videos,* 5-6
	❑ Ready to Go On? Quiz, SE ❑ *Ready to Go On? Intervention* ❑ *Test and Practice Generator*	❑ Ready to Go On? Quiz, SE ❑ *Ready to Go On? Enrichment* ❑ Section 5A Quiz, AR ❑ *Test and Practice Generator*	❑ Ready to Go On? Quiz, SE ❑ *Ready to Go On? Intervention* ❑ *Test and Practice Generator*

Course Planner – Section 5B

Linear Functions

Lesson	Content Standards	On-Level Learners [RTI Tier 1]	Special Needs Learners
5-7 Slope-Intercept Form *(1 day)*	**CC.9-12.A.CED.2; CC.9-12.A.CED.3; CC.9-12.F.IF.2; CC.9-12.F.IF.4; CC.9-12.F.IF.6; CC.9-12.F.IF.7; CC.9-12.F.BF.1; CC.9-12.F.BF.2; CC.9-12.F.LE.2**	❑ Problem Solving 5-7, CR ❑ *Know-It Notebook* 5-7 ❑ Questioning Strategies, TE ❑ *Lesson Tutorial Videos,* 5-7	❑ *IDEA Works!* Practice 5-7 ❑ Reading Strategies 5-7, CR ❑ Reteach 5-7, CR ❑ *Ready to Go On? Intervention,* 5-7 ❑ *Lesson Tutorial Videos,* 5-7
5-8 Point-Slope Form *(1 day)*	**CC.9-12.A.CED.2; CC.9-12.A.CED.3; CC.9-12.F.BF.1; CC.9-12.F.LE.2; CC.9-12.F.IF.7; CC.9-12.F.LE.2**	❑ Problem Solving 5-8, CR ❑ *Know-It Notebook* 5-8 ❑ Questioning Strategies, TE ❑ *Lesson Tutorial Videos,* 5-8	❑ *IDEA Works!* Practice 5-8 ❑ Reading Strategies 5-8, CR ❑ Reteach 5-8, CR ❑ *Ready to Go On? Intervention,* 5-8 ❑ *Lesson Tutorial Videos,* 5-8
Lab: Graph Linear Functions *(1 day)*	**CC.9-12.A.CED.2; CC.9-12.F.IF.7**	❑ *Lab Resources Online,* Ch. 5	❑ *Lab Resources Online,* Ch. 5
5-9A Line of Best Fit (CC) *(2 days)*	**CC.9-12.S.ID.6; CC.9-12.S.ID.7; CC.9-12.S.ID.8; CC.9-12.SID.9**	❑ Problem Solving 5-9A, CR ❑ Questioning Strategies, TE	❑ Are You Ready?, SE ❑ Reading Strategies 5-9A, CR ❑ Reteach 5-9A, CR
5-9 Slopes of Parallel and Perpendicular Lines *(1 day)*	**CC.9-12.G.GPE.5; CC.9-12.F.IF.7**	❑ Problem Solving 5-9, CR ❑ *Know-It Notebook* 5-9 ❑ Questioning Strategies, TE ❑ *Lesson Tutorial Videos,* 5-9	❑ *IDEA Works!* Practice 5-9 ❑ Reading Strategies 5-9, CR ❑ Reteach 5-9, CR ❑ *Ready to Go On? Intervention,* 5-9 ❑ *Lesson Tutorial Videos,* 5-9
Technology Lab: The Family of Linear Functions *(1 day)*	**CC.9-12.A.CED.2; CC.9-12.F.BF.3**	❑ *Lab Resources Online,* Ch. 5	❑ *Lab Resources Online,* Ch. 5
5-10 Transforming Linear Functions *(1 day)*	**CC.9-12.A.CED.2; CC.9-12.A.CED.3; CC.9-12.F.IF.7; CC.9-12.F.BF.3**	❑ Problem Solving 5-10, CR ❑ *Know-It Notebook* 5-10 ❑ Questioning Strategies, TE ❑ *Lesson Tutorial Videos,* 5-10	❑ *IDEA Works!* Practice 5-10 ❑ Reading Strategies 5-10, CR ❑ Reteach 5-10, CR ❑ *Ready to Go On? Intervention,* 5-10 ❑ *Lesson Tutorial Videos,* 5-10
Extension: Absolute-Value Functions *(1 day)*	**CC.9-12.F.IF.7; CC.9-12.F.BF.5**		
Assessment Options		❑ Ready to Go On? Quiz, SE ❑ *Ready to Go On? Intervention* ❑ Section 5B Quiz, AR ❑ Chapter Test, SE ❑ Multiple-Choice or Free-Response Chapter Test B, AR ❑ Performance Assessment, AR ❑ *Test and Practice Generator*	❑ Ready to Go On? Quiz, SE ❑ *Ready to Go On? Intervention* ❑ *IDEA Works!* Quiz 5B ❑ Multiple-Choice or Free-Response Chapter Test A, AR ❑ Performance Assessment, AR ❑ *IDEA Works!* Test Ch. 5

See pages 2–33 for the full text of the Common Core Standards for Mathematical Content.

KEY	Red Type	Minimum Course of Study	CC	Curriculum Companion
	CR	Chapter Resources	SE	Student Edition
	AR	Assessment Resources	TE	Teacher's Edition

Developing Learners [RTI Tier 1 and 2]	Advanced Learners [RTI Tier 2]	English Language Learners
❑ *Know-It Notebook* 5-7 ❑ Reading Strategies 5-7, CR ❑ Questioning Strategies, TE ❑ *Ready to Go On? Intervention,* 5-7 ❑ *Lesson Tutorial Videos,* 5-7	❑ Practice C 5-7, CR ❑ Challenge 5-7, CR ❑ Problem Solving 5-7, CR	❑ *Success for Every Learner,* 5-7 ❑ Reading Strategies 5-7, CR ❑ *Multi-Language Visual Glossary* ❑ *Lesson Tutorial Videos,* 5-7
❑ *Know-It Notebook* 5-8 ❑ Reading Strategies 5-8, CR ❑ Questioning Strategies, TE ❑ *Ready to Go On? Intervention,* 5-8 ❑ *Lesson Tutorial Videos,* 5-8	❑ Practice C 5-8, CR ❑ Challenge 5-8, CR ❑ Problem Solving 5-8, CR	❑ *Success for Every Learner,* 5-8 ❑ Reading Strategies 5-8, CR ❑ *Multi-Language Visual Glossary* ❑ *Lesson Tutorial Videos,* 5-8
❑ *Lab Resources Online,* Ch. 5	❑ *Lab Resources Online,* Ch. 5	❑ *Lab Resources Online,* Ch. 5
❑ Are You Ready?, SE ❑ Reading Strategies 5-9A, CR ❑ Questioning Strategies, TE	❑ Challenge 5-9A, CR ❑ Problem Solving 5-9A, CR	❑ *Success for Every Learner,* 5-9A ❑ Reading Strategies 5-9A, CR
❑ *Know-It Notebook* 5-9 ❑ Reading Strategies 5-9, CR ❑ Questioning Strategies, TE ❑ *Ready to Go On? Intervention,* 5-9 ❑ *Lesson Tutorial Videos,* 5-9	❑ Practice C 5-9, CR ❑ Challenge 5-9, CR ❑ Problem Solving 5-9, CR	❑ *Success for Every Learner,* 5-9 ❑ Reading Strategies 5-9, CR ❑ *Multi-Language Visual Glossary* ❑ *Lesson Tutorial Videos,* 5-9
❑ *Lab Resources Online,* Ch. 5	❑ *Lab Resources Online,* Ch. 5	❑ *Lab Resources Online,* Ch. 5
❑ *Know-It Notebook* 5-10 ❑ Reading Strategies 5-10, CR ❑ Questioning Strategies, TE ❑ *Ready to Go On? Intervention,* 5-10 ❑ *Lesson Tutorial Videos,* 5-10	❑ Practice C 5-10, CR ❑ Challenge 5-10, CR ❑ Problem Solving 5-10, CR	❑ *Success for Every Learner,* 5-10 ❑ Reading Strategies 5-10, CR ❑ *Multi-Language Visual Glossary* ❑ *Lesson Tutorial Videos,* 5-10
❑ Ready to Go On? Quiz, SE ❑ *Ready to Go On? Intervention* ❑ Multiple-Choice or Free-Response Chapter Test A, AR ❑ Performance Assessment, AR ❑ *Test and Practice Generator*	❑ Ready to Go On? Quiz, SE ❑ *Ready to Go On? Enrichment* ❑ Section 5B Quiz, AR ❑ Chapter Test, SE ❑ Multiple-Choice or Free-Response Chapter Test C, AR ❑ Cumulative Test, AR ❑ *Test and Practice Generator*	❑ Ready to Go On? Quiz, SE ❑ *Ready to Go On? Intervention* ❑ Performance Assessment, AR ❑ *Test and Practice Generator*

Course Planner – Section 6A

Systems of Equations and Inequalities

Lesson	Content Standards	On-Level Learners [RTI Tier 1]	Special Needs Learners
Technology Lab: Solve Linear Equations by Using a Spreadsheet *(1/2 day)*	CC.9-12.A.CED.2; CC.9-12.A.CED.3	❑ *Lab Resources Online,* Ch. 6	❑ *Lab Resources Online,* Ch. 6
6-1 Solving Systems by Graphing *(1 day)*	CC.9-12.A.CED.2; CC.9-12.A.CED.3; CC.9-12.A.REI.6	❑ Problem Solving 6-1, CR ❑ *Know-It Notebook* 6-1 ❑ Questioning Strategies, TE ❑ *Lesson Tutorial Videos,* 6-1	❑ Are You Ready?, SE ❑ *IDEA Works!* Practice 6-1 ❑ Reading Strategies 6-1, CR ❑ Reteach 6-1, CR ❑ *Ready to Go On? Intervention,* 6-1 ❑ *Lesson Tutorial Videos,* 6-1
Algebra Lab: Model Systems of Linear Equations *(1/2 day)*	CC.9-12.A.CED.2; CC.9-12.A.CED.3; CC.9-12.A.REI.6	❑ *Lab Resources Online,* Ch. 6	❑ *Lab Resources Online,* Ch. 6
6-2 Solving Systems by Substitution *(1 day)*	CC.9-12.A.CED.2; CC.9-12.A.CED.3; CC.9-12.A.REI.6	❑ Problem Solving 6-2, CR ❑ *Know-It Notebook* 6-2 ❑ Questioning Strategies, TE ❑ *Lesson Tutorial Videos,* 6-2	❑ *IDEA Works!* Practice 6-2 ❑ Reading Strategies 6-2, CR ❑ Reteach 6-2, CR ❑ *Ready to Go On? Intervention,* 6-2 ❑ *Lesson Tutorial Videos,* 6-2
6-3 Solving Systems by Elimination *(1 day)*	CC.9-12.A.CED.2; CC.9-12.A.CED.3; CC.9-12.A.REI.5; CC.9-12.A.REI.6	❑ Problem Solving 6-3, CR ❑ *Know-It Notebook* 6-3 ❑ Questioning Strategies, TE ❑ *Lesson Tutorial Videos,* 6-3	❑ *IDEA Works!* Practice 6-3 ❑ Reading Strategies 6-3, CR ❑ Reteach 6-3, CR ❑ *Ready to Go On? Intervention,* 6-3 ❑ *Lesson Tutorial Videos,* 6-3
6-4 Solving Special Systems *(2 days)*	CC.9-12.A.CED.2; CC.9-12.A.CED.3; CC.9-12.A.REI.6	❑ Problem Solving 6-4, CR ❑ *Know-It Notebook* 6-4 ❑ Questioning Strategies, TE ❑ *Lesson Tutorial Videos,* 6-4	❑ *IDEA Works!* Practice 6-4 ❑ Reading Strategies 6-4, CR ❑ Reteach 6-4, CR ❑ *Ready to Go On? Intervention,* 6-4 ❑ *Lesson Tutorial Videos,* 6-4
Assessment Options		❑ Ready to Go On? Quiz, SE ❑ *Ready to Go On? Intervention* ❑ Section 6A Quiz, AR ❑ *Test and Practice Generator*	❑ Ready to Go On? Quiz, SE ❑ *Ready to Go On? Intervention* ❑ *IDEA Works!* Quiz 6A

See pages 2–33 for the full text of the Common Core Standards for Mathematical Content.

KEY				
Red Type	**Minimum Course of Study**	CC	Curriculum Companion
CR	Chapter Resources	SE	Student Edition
AR	Assessment Resources	TE	Teacher's Edition

Developing Learners [RTI Tier 1 and 2]	Advanced Learners [RTI Tier 2]	English Language Learners
❑ *Lab Resources Online,* Ch. 6	❑ *Lab Resources Online,* Ch. 6	❑ *Lab Resources Online,* Ch. 6
❑ Are You Ready?, SE ❑ *Know-It Notebook* 6-1 ❑ Reading Strategies 6-1, CR ❑ Questioning Strategies, TE ❑ *Ready to Go On? Intervention,* 6-1 ❑ *Lesson Tutorial Videos,* 6-1	❑ Practice C 6-1, CR ❑ Challenge 6-1, CR ❑ Problem Solving 6-1, CR	❑ *Success for Every Learner,* 6-1 ❑ Reading Strategies 6-1, CR ❑ *Multi-Language Visual Glossary* ❑ *Lesson Tutorial Videos,* 6-1
❑ *Lab Resources Online,* Ch. 6	❑ *Lab Resources Online,* Ch. 6	❑ *Lab Resources Online,* Ch. 6
❑ *Know-It Notebook* 6-2 ❑ Reading Strategies 6-2, CR ❑ Questioning Strategies, TE ❑ *Ready to Go On? Intervention,* 6-2 ❑ *Lesson Tutorial Videos,* 6-2	❑ Practice C 6-2, CR ❑ Challenge 6-2, CR ❑ Problem Solving 6-2, CR	❑ *Success for Every Learner,* 6-2 ❑ Reading Strategies 6-2, CR ❑ *Multi-Language Visual Glossary* ❑ *Lesson Tutorial Videos,* 6-2
❑ *Know-It Notebook* 6-3 ❑ Reading Strategies 6-3, CR ❑ Questioning Strategies, TE ❑ *Ready to Go On? Intervention,* 6-3 ❑ *Lesson Tutorial Videos,* 6-3	❑ Practice C 6-3, CR ❑ Challenge 6-3, CR ❑ Problem Solving 6-3, CR	❑ *Success for Every Learner,* 6-3 ❑ Reading Strategies 6-3, CR ❑ *Multi-Language Visual Glossary* ❑ *Lesson Tutorial Videos,* 6-3
❑ *Know-It Notebook* 6-4 ❑ Reading Strategies 6-4, CR ❑ Questioning Strategies, TE ❑ *Ready to Go On? Intervention,* 6-4 ❑ *Lesson Tutorial Videos,* 6-4	❑ Practice C 6-4, CR ❑ Challenge 6-4, CR ❑ Problem Solving 6-4, CR	❑ *Success for Every Learner,* 6-4 ❑ Reading Strategies 6-4, CR ❑ *Multi-Language Visual Glossary* ❑ *Lesson Tutorial Videos,* 6-4
❑ Ready to Go On? Quiz, SE ❑ *Ready to Go On? Intervention* ❑ *Test and Practice Generator*	❑ Ready to Go On? Quiz, SE ❑ *Ready to Go On? Enrichment* ❑ Section 6A Quiz, AR ❑ *Test and Practice Generator*	❑ Ready to Go On? Quiz, SE ❑ *Ready to Go On? Intervention* ❑ *Test and Practice Generator*

Course Planner – Section 6B

Systems of Equations and Inequalities

Lesson	Content Standards	On-Level Learners [RTI Tier 1]	Special Needs Learners
6-5 Linear Inequalities *(1 day)*	**CC.9-12.A.CED.3; CC.9-12.A.REI.12**	❑ Problem Solving 6-5, CR ❑ *Know-It Notebook* 6-5 ❑ Questioning Strategies, TE ❑ *Lesson Tutorial Videos,* 6-5	❑ *IDEA Works!* Practice 6-5 ❑ Reading Strategies 6-5, CR ❑ Reteach 6-5, CR ❑ *Ready to Go On? Intervention,* 6-5 ❑ *Lesson Tutorial Videos,* 6-5
6-6 Systems of Linear Inequalities *(2 days)*	**CC.9-12.A.CED.3; CC.9-12.A.REI.12**	❑ Problem Solving 6-6, CR ❑ *Know-It Notebook* 6-6 ❑ Questioning Strategies, TE ❑ *Lesson Tutorial Videos,* 6-6	❑ *IDEA Works!* Practice 6-6 ❑ Reading Strategies 6-6, CR ❑ Reteach 6-6, CR ❑ *Ready to Go On? Intervention,* 6-6 ❑ *Lesson Tutorial Videos,* 6-6
Technology Lab: Solve Systems of Linear Inequalities *(1 day)*	**CC.9-12.A.CED.3**	❑ *Lab Resources Online,* Ch. 6	❑ *Lab Resources Online,* Ch. 6
Assessment Options		❑ Ready to Go On? Quiz, SE ❑ *Ready to Go On? Intervention* ❑ Section 6B Quiz, AR ❑ Chapter Test, SE ❑ Multiple-Choice or Free-Response Chapter Test B, AR ❑ Performance Assessment, AR ❑ Cumulative Test, AR ❑ *Test and Practice Generator*	❑ Ready to Go On? Quiz, SE ❑ *Ready to Go On? Intervention* ❑ *IDEA Works!* Quiz 6B ❑ Multiple-Choice or Free-Response Chapter Test A, AR ❑ Performance Assessment, AR ❑ *IDEA Works!* Test Ch. 6

See pages 2–33 for the full text of the Common Core Standards for Mathematical Content.

KEY				
Red Type	**Minimum Course of Study**	CC	Curriculum Companion
CR	Chapter Resources	SE	Student Edition
AR	Assessment Resources	TE	Teacher's Edition

	Developing Learners [RTI Tier 1 and 2]	Advanced Learners [RTI Tier 2]	English Language Learners
	❑ *Know-It Notebook* 6-5 ❑ Reading Strategies 6-5, CR ❑ Questioning Strategies, TE ❑ *Ready to Go On? Intervention,* 6-5 ❑ *Lesson Tutorial Videos,* 6-5	❑ Practice C 6-5, CR ❑ Challenge 6-5, CR ❑ Problem Solving 6-5, CR	❑ *Success for Every Learner,* 6-5 ❑ Reading Strategies 6-5, CR ❑ *Multi-Language Visual Glossary* ❑ *Lesson Tutorial Videos,* 6-5
	❑ *Know-It Notebook* 6-6 ❑ Reading Strategies 6-6, CR ❑ Questioning Strategies, TE ❑ *Ready to Go On? Intervention,* 6-6 ❑ *Lesson Tutorial Videos,* 6-6	❑ Practice C 6-6, CR ❑ Challenge 6-6, CR ❑ Problem Solving 6-6, CR	❑ *Success for Every Learner,* 6-6 ❑ Reading Strategies 6-6, CR ❑ *Multi-Language Visual Glossary* ❑ *Lesson Tutorial Videos,* 6-6
	❑ *Lab Resources Online,* Ch. 6	❑ *Lab Resources Online,* Ch. 6	❑ *Lab Resources Online,* Ch. 6
	❑ Ready to Go On? Quiz, SE ❑ *Ready to Go On? Intervention* ❑ Multiple-Choice or Free-Response Chapter Test A, AR ❑ Performance Assessment, AR ❑ *Test and Practice Generator*	❑ Ready to Go On? Quiz, SE ❑ *Ready to Go On? Enrichment* ❑ Section 6B Quiz, AR ❑ Chapter Test, SE ❑ Multiple-Choice or Free-Response Chapter Test C, AR ❑ Cumulative Test, AR ❑ *Test and Practice Generator*	❑ Ready to Go On? Quiz, SE ❑ *Ready to Go On? Intervention* ❑ Performance Assessment, AR ❑ *Test and Practice Generator*

Course Planner – Section 7A

Exponents and Polynomials

Lesson	Content Standards	On-Level Learners [RTI Tier 1]	Special Needs Learners
7-1 Integer Exponents *(1 day)*	CC.9-12.N.RN.1	❑ Problem Solving 7-1, CR ❑ *Know-It Notebook* 7-1 ❑ Questioning Strategies, TE ❑ *Lesson Tutorial Videos,* 7-1	❑ Are You Ready?, SE ❑ *IDEA Works!* Practice 7-1 ❑ Reading Strategies 7-1, CR ❑ Reteach 7-1, CR ❑ *Ready to Go On? Intervention,* 7-1 ❑ *Lesson Tutorial Videos,* 7-1
7-2 Powers of 10 and Scientific Notation		❑ Problem Solving 7-2, CR ❑ *Know-It Notebook* 7-2 ❑ Questioning Strategies, TE ❑ *Lesson Tutorial Videos,* 7-2	❑ *IDEA Works!* Practice 7-2 ❑ Reading Strategies 7-2, CR ❑ Reteach 7-2, CR ❑ *Ready to Go On? Intervention,* 7-2 ❑ *Lesson Tutorial Videos,* 7-2
Algebra Lab: Explore Properties of Exponents		❑ *Lab Resources Online,* Ch. 7	❑ *Lab Resources Online,* Ch. 7
7-3 Multiplication Properties of Exponents		❑ *IDEA Works!* Practice 7-3 ❑ Reading Strategies 7-3, CR ❑ Reteach 7-3, CR ❑ *Ready to Go On? Intervention,* 7-3 ❑ *Lesson Tutorial Videos,* 7-3	❑ *Know-It Notebook* 7-3 ❑ Reading Strategies 7-3, CR ❑ Questioning Strategies, TE ❑ *Ready to Go On? Intervention,* 7-3 ❑ *Lesson Tutorial Videos,* 7-3
7-4 Division Properties of Exponents		❑ Problem Solving 7-4, CR ❑ *Know-It Notebook* 7-4 ❑ Questioning Strategies, TE ❑ *Lesson Tutorial Videos,* 7-4	❑ *IDEA Works!* Practice 7-4 ❑ Reading Strategies 7-4, CR ❑ Reteach 7-4, CR ❑ *Ready to Go On? Intervention,* 7-4 ❑ *Lesson Tutorial Videos,* 7-4
7-5 Rational Exponents *(1 day)*	CC.9-12.N.RN.1; CC.9-12.NRN.2	❑ Problem Solving 7-5, CR ❑ *Know-It Notebook* 7-5 ❑ Questioning Strategies, TE ❑ *Lesson Tutorial Videos,* 7-5	❑ *IDEA Works!* Practice 7-5 ❑ Reading Strategies 7-5, CR ❑ Reteach 7-5, CR ❑ *Ready to Go On? Intervention,* 7-5 ❑ *Lesson Tutorial Videos,* 7-5
Assessment Options		❑ Ready to Go On? Quiz, SE ❑ *Ready to Go On? Intervention* ❑ Section 7A Quiz, AR ❑ *Test and Practice Generator*	❑ Ready to Go On? Quiz, SE ❑ *Ready to Go On? Intervention* ❑ *IDEA Works!* Quiz 7A

See pages 2–33 for the full text of the Common Core Standards for Mathematical Content.

KEY				
Red Type	**Minimum Course of Study**	CC	Curriculum Companion
CR	Chapter Resources	SE	Student Edition
AR	Assessment Resources	TE	Teacher's Edition

Developing Learners [RTI Tier 1 and 2]	Advanced Learners [RTI Tier 2]	English Language Learners
❑ Are You Ready?, SE ❑ *Know-It Notebook* 7-1 ❑ Reading Strategies 7-1, CR ❑ Questioning Strategies, TE ❑ *Ready to Go On? Intervention,* 7-1 ❑ *Lesson Tutorial Videos,* 7-1	❑ Practice C 7-1, CR ❑ Challenge 7-1, CR ❑ Problem Solving 7-1, CR	❑ *Success for Every Learner,* 7-1 ❑ Reading Strategies 7-1, CR ❑ *Multi-Language Visual Glossary* ❑ *Lesson Tutorial Videos,* 7-1
❑ *Know-It Notebook* 7-2 ❑ Reading Strategies 7-2, CR ❑ Questioning Strategies, TE ❑ *Ready to Go On? Intervention,* 7-2 ❑ *Lesson Tutorial Videos,* 7-2	❑ Practice C 7-2, CR ❑ Challenge 7-2, CR ❑ Problem Solving 7-2, CR	❑ *Success for Every Learner,* 7-2 ❑ Reading Strategies 7-2, CR ❑ *Multi-Language Visual Glossary* ❑ *Lesson Tutorial Videos,* 7-2
❑ *Lab Resources Online,* Ch. 7	❑ *Lab Resources Online,* Ch. 7	❑ *Lab Resources Online,* Ch. 7
❑ Practice C 7-3, CR ❑ Challenge 7-3, CR ❑ Problem Solving 7-3, CR	❑ *Success for Every Learner,* 7-3 ❑ Reading Strategies 7-3, CR ❑ *Multi-Language Visual Glossary* ❑ *Lesson Tutorial Videos,* 7-3	❑ *IDEA Works!* Practice 7-3 ❑ Reading Strategies 7-3, CR ❑ Reteach 7-3, CR ❑ *Ready to Go On? Intervention,* 7-3 ❑ *Lesson Tutorial Videos,* 7-3
❑ *Know-It Notebook* 7-4 ❑ Reading Strategies 7-4, CR ❑ Questioning Strategies, TE ❑ *Ready to Go On? Intervention,* 7-4 ❑ *Lesson Tutorial Videos,* 7-4	❑ Practice C 7-4, CR ❑ Challenge 7-4, CR ❑ Problem Solving 7-4, CR	❑ *Success for Every Learner,* 7-4 ❑ Reading Strategies 7-4, CR ❑ *Multi-Language Visual Glossary* ❑ *Lesson Tutorial Videos,* 7-4
❑ *Know-It Notebook* 7-5 ❑ Reading Strategies 7-5, CR ❑ Questioning Strategies, TE ❑ *Ready to Go On? Intervention,* 7-5 ❑ *Lesson Tutorial Videos,* 7-5	❑ Practice C 7-5, CR ❑ Challenge 7-5, CR ❑ Problem Solving 7-5, CR	❑ *Success for Every Learner,* 7-5 ❑ Reading Strategies 7-5, CR ❑ *Multi-Language Visual Glossary* ❑ *Lesson Tutorial Videos,* 7-5
❑ Ready to Go On? Quiz, SE ❑ *Ready to Go On? Intervention* ❑ *Test and Practice Generator*	❑ Ready to Go On? Quiz, SE ❑ *Ready to Go On? Enrichment* ❑ Section 7A Quiz, AR ❑ *Test and Practice Generator*	❑ Ready to Go On? Quiz, SE ❑ *Ready to Go On? Intervention* ❑ *Test and Practice Generator*

Course Planner – Section 7B

Exponents and Polynomials

Lesson	Content Standards	On-Level Learners [RTI Tier 1]	Special Needs Learners
7-6 Polynomials *(1 day)*	**CC.9-12.A.APR.1**	❑ Problem Solving 7-6, CR ❑ *Know-It Notebook* 7-6 ❑ Questioning Strategies, TE ❑ *Lesson Tutorial Videos,* 7-6	❑ *IDEA Works!* Practice 7-6 ❑ Reading Strategies 7-6, CR ❑ Reteach 7-6, CR ❑ *Ready to Go On? Intervention,* 7-6 ❑ *Lesson Tutorial Videos,* 7-6
Algebra Lab: Model Polynomial Addition and Subtraction *(1/2 day)*	**CC.9-12.A.APR.1**	❑ *Lab Resources Online,* Ch. 7	❑ *Lab Resources Online,* Ch. 7
7-7 Adding and Subtracting Polynomials *(1 day)*	**CC.9-12.A.APR.1**	❑ Problem Solving 7-7, CR ❑ *Know-It Notebook* 7-7 ❑ Questioning Strategies, TE ❑ *Lesson Tutorial Videos,* 7-7	❑ *IDEA Works!* Practice 7-7 ❑ Reading Strategies 7-7, CR ❑ Reteach 7-7, CR ❑ *Ready to Go On? Intervention,* 7-7 ❑ *Lesson Tutorial Videos,* 7-7
Algebra Lab: Model Polynomial Multiplication *(1/2 day)*	**CC.9-12.A.APR.1**	❑ *Lab Resources Online,* Ch. 7	❑ *Lab Resources Online,* Ch. 7
7-8 Multiplying Polynomials *(1 day)*	**CC.9-12.A.APR.1**	❑ Problem Solving 7-8, CR ❑ *Know-It Notebook* 7-8 ❑ Questioning Strategies, TE ❑ *Lesson Tutorial Videos,* 7-8	❑ *IDEA Works!* Practice 7-8 ❑ Reading Strategies 7-8, CR ❑ Reteach 7-8, CR ❑ *Ready to Go On? Intervention,* 7-8 ❑ *Lesson Tutorial Videos,* 7-8
Extension: Closure (CC) *(2 days)*	**CC.9-12.N.RN.3; CC.9-12.A.APR.1**		
7-9 Special Products of Binomials *(1 day)*	**CC.9-12.A.APR.1**	❑ Problem Solving 7-9, CR ❑ *Know-It Notebook* 7-9 ❑ Questioning Strategies, TE ❑ *Lesson Tutorial Videos,* 7-9	❑ *IDEA Works!* Practice 7-9 ❑ Reading Strategies 7-9, CR ❑ Reteach 7-9, CR ❑ *Ready to Go On? Intervention,* 7-9 ❑ *Lesson Tutorial Videos,* 7-9
Assessment Options		❑ Ready to Go On? Quiz, SE ❑ *Ready to Go On? Intervention* ❑ Section 7B Quiz, AR ❑ Chapter Test, SE ❑ Multiple-Choice or Free-Response Chapter Test B, AR ❑ Performance Assessment, AR ❑ Cumulative Test, AR ❑ *Test and Practice Generator*	❑ Ready to Go On? Quiz, SE ❑ *Ready to Go On? Intervention* ❑ *IDEA Works!* Quiz 7B ❑ Multiple-Choice or Free-Response Chapter Test A, AR ❑ Performance Assessment, AR ❑ *IDEA Works!* Test Ch. 7

See pages 2–33 for the full text of the Common Core Standards for Mathematical Content.

KEY	Red Type	Minimum Course of Study	CC	Curriculum Companion
	CR	Chapter Resources	SE	Student Edition
	AR	Assessment Resources	TE	Teacher's Edition

Developing Learners [RTI Tier 1 and 2]	Advanced Learners [RTI Tier 2]	English Language Learners
❑ *Know-It Notebook* 7-6 ❑ Reading Strategies 7-6, CR ❑ Questioning Strategies, TE ❑ *Ready to Go On? Intervention,* 7-6 ❑ *Lesson Tutorial Videos,* 7-6	❑ Practice C 7-6, CR ❑ Challenge 7-6, CR ❑ Problem Solving 7-6, CR	❑ *Success for Every Learner,* 7-6 ❑ Reading Strategies 7-6, CR ❑ *Multi-Language Visual Glossary* ❑ *Lesson Tutorial Videos,* 7-6
❑ *Lab Resources Online,* Ch. 7	❑ *Lab Resources Online,* Ch. 7	❑ *Lab Resources Online,* Ch. 7
❑ *Know-It Notebook* 7-7 ❑ Reading Strategies 7-7, CR ❑ Questioning Strategies, TE ❑ *Ready to Go On? Intervention,* 7-7 ❑ *Lesson Tutorial Videos,* 7-7	❑ Practice C 7-7, CR ❑ Challenge 7-7, CR ❑ Problem Solving 7-7, CR	❑ *Success for Every Learner,* 7-7 ❑ Reading Strategies 7-7, CR ❑ *Multi-Language Visual Glossary* ❑ *Lesson Tutorial Videos,* 7-7
❑ *Lab Resources Online,* Ch. 7	❑ *Lab Resources Online,* Ch. 7	❑ *Lab Resources Online,* Ch. 7
❑ *Know-It Notebook* 7-8 ❑ Reading Strategies 7-8, CR ❑ Questioning Strategies, TE ❑ *Ready to Go On? Intervention,* 7-8 ❑ *Lesson Tutorial Videos,* 7-8	❑ Practice C 7-8, CR ❑ Challenge 7-8, CR ❑ Problem Solving 7-8, CR	❑ *Success for Every Learner,* 7-8 ❑ Reading Strategies 7-8, CR ❑ *Multi-Language Visual Glossary* ❑ *Lesson Tutorial Videos,* 7-8
❑ *Know-It Notebook* 7-9 ❑ Reading Strategies 7-9, CR ❑ Questioning Strategies, TE ❑ *Ready to Go On? Intervention,* 7-9 ❑ *Lesson Tutorial Videos,* 7-9	❑ Practice C 7-9, CR ❑ Challenge 7-9, CR ❑ Problem Solving 7-9, CR	❑ *Success for Every Learner,* 7-9 ❑ Reading Strategies 7-9, CR ❑ *Multi-Language Visual Glossary* ❑ *Lesson Tutorial Videos,* 7-9
❑ Ready to Go On? Quiz, SE ❑ *Ready to Go On? Intervention* ❑ Multiple-Choice or Free-Response Chapter Test A, AR ❑ Performance Assessment, AR ❑ *Test and Practice Generator*	❑ Ready to Go On? Quiz, SE ❑ *Ready to Go On? Enrichment* ❑ Section 7B Quiz, AR ❑ Chapter Test, SE ❑ Multiple-Choice or Free-Response Chapter Test C, AR ❑ Cumulative Test, AR ❑ *Test and Practice Generator*	❑ Ready to Go On? Quiz, SE ❑ *Ready to Go On? Intervention* ❑ Performance Assessment, AR ❑ *Test and Practice Generator*

Course Planner – Section 8A

Factoring Polynomials

Lesson	Common Core Content Standards	On-Level Learners [RTI Tier 1]	Special Needs Learners
8-1 Factors and Greatest Common Factors *(1 day)*	**CC.9-12.A.APR.1**	❑ Problem Solving 8-1, CR ❑ *Know-It Notebook* 8-1 ❑ Questioning Strategies, TE ❑ *Lesson Tutorial Videos,* 8-1	❑ Are You Ready?, SE ❑ *IDEA Works!* Practice 8-1 ❑ Reading Strategies 8-1, CR ❑ Reteach 8-1, CR ❑ *Ready to Go On? Intervention,* 8-1 ❑ *Lesson Tutorial Videos,* 8-1
Algebra Lab: Model Factoring *(1/2 day)*	**CC.9-12.A.APR.1**	❑ *Lab Resources Online,* Ch. 8	❑ *Lab Resources Online,* Ch. 8
8-2 Factoring by GCF *(1 day)*	**CC.9-12.A.APR.1; CC.9-12.A.SSE.2**	❑ Problem Solving 8-2, CR ❑ *Know-It Notebook* 8-2 ❑ Questioning Strategies, TE ❑ *Lesson Tutorial Videos,* 8-2	❑ *IDEA Works!* Practice 8-2 ❑ Reading Strategies 8-2, CR ❑ Reteach 8-2, CR ❑ *Ready to Go On? Intervention,* 8-2 ❑ *Lesson Tutorial Videos,* 8-2
Algebra Lab: Model Factorization of Trinomials *(1 day)*	**CC.9-12.A.APR.1**	❑ *Lab Resources Online,* Ch. 8	❑ *Lab Resources Online,* Ch. 8
8-3 Factoring $x^2 + bx + c$ *(1 day)*	**CC.9-12.A.SSE.2; CC.9-12.A.SSE.3**	❑ Problem Solving 8-3, CR ❑ *Know-It Notebook* 8-3 ❑ Questioning Strategies, TE ❑ *Lesson Tutorial Videos,* 8-3	❑ *IDEA Works!* Practice 8-3 ❑ Reading Strategies 8-3, CR ❑ Reteach 8-3, CR ❑ *Ready to Go On? Intervention,* 8-3 ❑ *Lesson Tutorial Videos,* 8-3
8-4 Factoring $ax^2 + bx + c$ *(1 1/2 days)*	**CC.9-12.A.SSE.2; CC.9-12.A.SSE.3**	❑ Problem Solving 8-4, CR ❑ *Know-It Notebook* 8-4 ❑ Questioning Strategies, TE ❑ *Lesson Tutorial Videos,* 8-4	❑ *IDEA Works!* Practice 8-4 ❑ Reading Strategies 8-4, CR ❑ Reteach 8-4, CR ❑ *Ready to Go On? Intervention,* 8-4 ❑ *Lesson Tutorial Videos,* 8-4
Technology Lab: Use a Graph to Factor Polynomials *(1 day)*	**CC.9-12.A.SSE.2; CC.9-12.A.SSE.3**	❑ *Lab Resources Online,* Ch. 8	❑ *Lab Resources Online,* Ch. 8
Assessment Options		❑ Ready to Go On? Quiz, SE ❑ *Ready to Go On? Intervention* ❑ Section 8A Quiz, AR ❑ *Test and Practice Generator*	❑ Ready to Go On? Quiz, SE ❑ *Ready to Go On? Intervention* ❑ *IDEA Works!* Quiz 8A

See pages 2–33 for the full text of the Common Core Standards for Mathematical Content.

KEY				
Red Type	**Minimum Course of Study**	CC	Curriculum Companion
CR	Chapter Resources	SE	Student Edition
AR	Assessment Resources	TE	Teacher's Edition

Developing Learners [RTI Tier 1 and 2]	Advanced Learners [RTI Tier 2]	English Language Learners
❑ Are You Ready?, SE ❑ *Know-It Notebook* 8-1 ❑ Reading Strategies 8-1, CR ❑ Questioning Strategies, TE ❑ *Ready to Go On? Intervention,* 8-1 ❑ *Lesson Tutorial Videos,* 8-1	❑ Practice C 8-1, CR ❑ Challenge 8-1, CR ❑ Problem Solving 8-1, CR	❑ *Success for Every Learner,* 8-1 ❑ Reading Strategies 8-1, CR ❑ *Multi-Language Visual Glossary* ❑ *Lesson Tutorial Videos,* 8-1
❑ *Lab Resources Online,* Ch. 8	❑ *Lab Resources Online,* Ch. 8	❑ *Lab Resources Online,* Ch. 8
❑ *Know-It Notebook* 8-2 ❑ Reading Strategies 8-2, CR ❑ Questioning Strategies, TE ❑ *Ready to Go On? Intervention,* 8-2 ❑ *Lesson Tutorial Videos,* 8-2	❑ Practice C 8-2, CR ❑ Challenge 8-2, CR ❑ Problem Solving 8-2, CR	❑ *Success for Every Learner,* 8-2 ❑ Reading Strategies 8-2, CR ❑ *Multi-Language Visual Glossary* ❑ *Lesson Tutorial Videos,* 8-2
❑ *Lab Resources Online,* Ch. 8	❑ *Lab Resources Online,* Ch. 8	❑ *Lab Resources Online,* Ch. 8
❑ *Know-It Notebook* 8-3 ❑ Reading Strategies 8-3, CR ❑ Questioning Strategies, TE ❑ *Ready to Go On? Intervention,* 8-3 ❑ *Lesson Tutorial Videos,* 8-3	❑ Practice C 8-3, CR ❑ Challenge 8-3, CR ❑ Problem Solving 8-3, CR	❑ *Success for Every Learner,* 8-3 ❑ Reading Strategies 8-3, CR ❑ *Multi-Language Visual Glossary* ❑ *Lesson Tutorial Videos,* 8-3
❑ *Know-It Notebook* 8-4 ❑ Reading Strategies 8-4, CR ❑ Questioning Strategies, TE ❑ *Ready to Go On? Intervention,* 8-4 ❑ *Lesson Tutorial Videos,* 8-4	❑ Practice C 8-4, CR ❑ Challenge 8-4, CR ❑ Problem Solving 8-4, CR	❑ *Success for Every Learner,* 8-4 ❑ Reading Strategies 8-4, CR ❑ *Multi-Language Visual Glossary* ❑ *Lesson Tutorial Videos,* 8-4
❑ *Lab Resources Online,* Ch. 8	❑ *Lab Resources Online,* Ch. 8	❑ *Lab Resources Online,* Ch. 8
❑ Ready to Go On? Quiz, SE ❑ *Ready to Go On? Intervention* ❑ *Test and Practice Generator*	❑ Ready to Go On? Quiz, SE ❑ *Ready to Go On? Enrichment* ❑ Section 8A Quiz, AR ❑ *Test and Practice Generator*	❑ Ready to Go On? Quiz, SE ❑ *Ready to Go On? Intervention* ❑ *Test and Practice Generator*

Course Planner – Section 8B

Factoring Polynomials

Lesson	Content Standards	On-Level Learners [RTI Tier 1]	Special Needs Learners
8-5 Factoring Special Products *(1 day)*	**CC.9-12.A.SSE.2; CC.9-12.A.SSE.3**	❑ Problem Solving 8-5, CR ❑ *Know-It Notebook* 8-5 ❑ Questioning Strategies, TE ❑ *Lesson Tutorial Videos,* 8-5	❑ *IDEA Works!* Practice 8-5 ❑ Reading Strategies 8-5, CR ❑ Reteach 8-5, CR ❑ *Ready to Go On? Intervention,* 8-5 ❑ *Lesson Tutorial Videos,* 8-5
8-6 Choosing a Factoring Method *(1 day)*	**CC.9-12.A.SSE.2; CC.9-12.A.SSE.3**	❑ Problem Solving 8-6, CR ❑ *Know-It Notebook* 8-6 ❑ Questioning Strategies, TE ❑ *Lesson Tutorial Videos,* 8-6	❑ *IDEA Works!* Practice 8-6 ❑ Reading Strategies 8-6, CR ❑ Reteach 8-6, CR ❑ *Ready to Go On? Intervention,* 8-6 ❑ *Lesson Tutorial Videos,* 8-6
Assessment Options		❑ Ready to Go On? Quiz, SE ❑ *Ready to Go On? Intervention* ❑ Section 8B Quiz, AR ❑ Chapter Test, SE ❑ Multiple-Choice or Free-Response Chapter Test B, AR ❑ Performance Assessment, AR ❑ Cumulative Test, AR ❑ *Test and Practice Generator*	❑ Ready to Go On? Quiz, SE ❑ *Ready to Go On? Intervention* ❑ *IDEA Works!* Quiz 8B ❑ Multiple-Choice or Free-Response Chapter Test A, AR ❑ Performance Assessment, AR ❑ *IDEA Works!* Test Ch. 8

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KEY

Red Type	Minimum Course of Study	CC	Curriculum Companion
CR	Chapter Resources	SE	Student Edition
AR	Assessment Resources	TE	Teacher's Edition

	Developing Learners [RTI Tier 1 and 2]	Advanced Learners [RTI Tier 2]	English Language Learners
	❑ *Know-It Notebook* 8-5 ❑ Reading Strategies 8-5, CR ❑ Questioning Strategies, TE ❑ *Ready to Go On? Intervention,* 8-5 ❑ *Lesson Tutorial Videos,* 8-5	❑ Practice C 8-5, CR ❑ Challenge 8-5, CR ❑ Problem Solving 8-5, CR	❑ *Success for Every Learner,* 8-5 ❑ Reading Strategies 8-5, CR ❑ *Multi-Language Visual Glossary* ❑ *Lesson Tutorial Videos,* 8-5
	❑ *Know-It Notebook* 8-6 ❑ Reading Strategies 8-6, CR ❑ Questioning Strategies, TE ❑ *Ready to Go On? Intervention,* 8-6 ❑ *Lesson Tutorial Videos,* 8-6	❑ Practice C 8-6, CR ❑ Challenge 8-6, CR ❑ Problem Solving 8-6, CR	❑ *Success for Every Learner,* 8-6 ❑ Reading Strategies 8-6, CR ❑ *Multi-Language Visual Glossary* ❑ *Lesson Tutorial Videos,* 8-6
	❑ Ready to Go On? Quiz, SE ❑ *Ready to Go On? Intervention* ❑ Multiple-Choice or Free-Response Chapter Test A, AR ❑ Performance Assessment, AR ❑ *Test and Practice Generator*	❑ Ready to Go On? Quiz, SE ❑ *Ready to Go On? Enrichment* ❑ Section 8B Quiz, AR ❑ Chapter Test, SE ❑ Multiple-Choice or Free-Response Chapter Test C, AR ❑ Cumulative Test, AR ❑ *Test and Practice Generator*	❑ Ready to Go On? Quiz, SE ❑ *Ready to Go On? Intervention* ❑ Performance Assessment, AR ❑ *Test and Practice Generator*

Course Planner – Section 9A

Quadratic Functions and Equations

Lesson	Content Standards	On-Level Learners [RTI Tier 1]	Special Needs Learners
9-1 Identifying Quadratic Functions *(1 day)*	**CC.9-12.F.IF.4; CC.9-12.F.IF.7**	❑ Problem Solving 9-1, CR ❑ *Know-It Notebook* 9-1 ❑ Questioning Strategies, TE ❑ *Lesson Tutorial Videos,* 9-1	❑ Are You Ready?, SE ❑ *IDEA Works!* Practice 9-1 ❑ Reading Strategies 9-1, CR ❑ Reteach 9-1, CR ❑ *Ready to Go On? Intervention,* 9-1 ❑ *Lesson Tutorial Videos,* 9-1
Algebra Lab: Explore the Axis of Symmetry *(1/2 day)*	**CC.9-12.F.IF.4; CC.9-12.F.IF.7**	❑ *Lab Resources Online,* Ch. 9	❑ *Lab Resources Online,* Ch. 9
9-2 Characteristics of Quadratic Functions *(1 1/2 days)*	**CC.9-12.F.IF.4; CC.9-12.F.IF.7; CC.9-12.F.IF.8**	❑ Problem Solving 9-2, CR ❑ *Know-It Notebook* 9-2 ❑ Questioning Strategies, TE ❑ *Lesson Tutorial Videos,* 9-2	❑ *IDEA Works!* Practice 9-2 ❑ Reading Strategies 9-2, CR ❑ Reteach 9-2, CR ❑ *Ready to Go On? Intervention,* 9-2 ❑ *Lesson Tutorial Videos,* 9-2
9-3 Graphing Quadratic Functions *(1 day)*	**CC.9-12.A.CED.2; CC.9-12.A.CED.3; CC.9-12.F.IF.4; CC.9-12.F.IF.7; CC.9-12.F.IF.8**	❑ Problem Solving 9-3, CR ❑ *Know-It Notebook* 9-3 ❑ Questioning Strategies, TE ❑ *Lesson Tutorial Videos,* 9-3	❑ *IDEA Works!* Practice 9-3 ❑ Reading Strategies 9-3, CR ❑ Reteach 9-3, CR ❑ *Ready to Go On? Intervention,* 9-3 ❑ *Lesson Tutorial Videos,* 9-3
Technology Lab: The Family of Quadratic Functions *(1/2 day)*	**CC.9-12.A.CED.3; CC.9-12.F.IF.4; CC.9-12.F.IF.7**	❑ *Lab Resources Online,* Ch. 9	❑ *Lab Resources Online,* Ch. 9
9-4 Transforming Quadratic Functions *(1 days)*	**CC.9-12.A.CED.2; CC.9-12.A.CED.3; CC.9-12.F.IF.4; CC.9-12.F.IF.5; CC.9-12.F.IF.7; CC.9-12.F.BF.1; CC.9-12.F.BF.3**	❑ Problem Solving 9-4, CR ❑ *Know-It Notebook* 9-4 ❑ Questioning Strategies, TE ❑ *Lesson Tutorial Videos,* 9-4	❑ *IDEA Works!* Practice 9-4 ❑ Reading Strategies 9-4, CR ❑ Reteach 9-4, CR ❑ *Ready to Go On? Intervention,* 9-4 ❑ *Lesson Tutorial Videos,* 9-4
Assessment Options		❑ Ready to Go On? Quiz, SE ❑ *Ready to Go On? Intervention* ❑ Section 9A Quiz, AR ❑ *Test and Practice Generator*	❑ Ready to Go On? Quiz, SE ❑ *Ready to Go On? Intervention* ❑ *IDEA Works!* Quiz 9A

See pages 2–33 for the full text of the Common Core Standards for Mathematical Content.

KEY	Red Type	Minimum Course of Study	CC	Curriculum Companion
	CR	Chapter Resources	SE	Student Edition
	AR	Assessment Resources	TE	Teacher's Edition

	Developing Learners [RTI Tier 1 and 2]	Advanced Learners [RTI Tier 2]	English Language Learners
	❑ Are You Ready?, SE ❑ *Know-It Notebook* 9-1 ❑ Reading Strategies 9-1, CR ❑ Questioning Strategies, TE ❑ *Ready to Go On? Intervention,* 9-1 ❑ *Lesson Tutorial Videos,* 9-1	❑ Practice C 9-1, CR ❑ Challenge 9-1, CR ❑ Problem Solving 9-1, CR	❑ *Success for Every Learner,* 9-1 ❑ Reading Strategies 9-1, CR ❑ *Multi-Language Visual Glossary* ❑ *Lesson Tutorial Videos,* 9-1
	❑ *Lab Resources Online,* Ch. 9	❑ *Lab Resources Online,* Ch. 9	❑ *Lab Resources Online,* Ch. 9
	❑ *Know-It Notebook* 9-2 ❑ Reading Strategies 9-2, CR ❑ Questioning Strategies, TE ❑ *Ready to Go On? Intervention,* 9-2 ❑ *Lesson Tutorial Videos,* 9-2	❑ Practice C 9-2, CR ❑ Challenge 9-2, CR ❑ Problem Solving 9-2, CR	❑ *Success for Every Learner,* 9-2 ❑ Reading Strategies 9-2, CR ❑ *Multi-Language Visual Glossary* ❑ *Lesson Tutorial Videos,* 9-2
	❑ *Know-It Notebook* 9-3 ❑ Reading Strategies 9-3, CR ❑ Questioning Strategies, TE ❑ *Ready to Go On? Intervention,* 9-3 ❑ *Lesson Tutorial Videos,* 9-3	❑ Practice C 9-3, CR ❑ Challenge 9-3, CR ❑ Problem Solving 9-3, CR	❑ *Success for Every Learner,* 9-3 ❑ Reading Strategies 9-3, CR ❑ *Multi-Language Visual Glossary* ❑ *Lesson Tutorial Videos,* 9-3
	❑ *Lab Resources Online,* Ch. 9	❑ *Lab Resources Online,* Ch. 9	❑ *Lab Resources Online,* Ch. 9
	❑ *Know-It Notebook* 9-4 ❑ Reading Strategies 9-4, CR ❑ Questioning Strategies, TE ❑ *Ready to Go On? Intervention,* 9-4 ❑ *Lesson Tutorial Videos,* 9-4	❑ Practice C 9-4, CR ❑ Challenge 9-4, CR ❑ Problem Solving 9-4, CR	❑ *Success for Every Learner,* 9-4 ❑ Reading Strategies 9-4, CR ❑ *Multi-Language Visual Glossary* ❑ *Lesson Tutorial Videos,* 9-4
	❑ Ready to Go On? Quiz, SE ❑ *Ready to Go On? Intervention* ❑ *Test and Practice Generator*	❑ Ready to Go On? Quiz, SE ❑ *Ready to Go On? Enrichment* ❑ Section 9A Quiz, AR ❑ *Test and Practice Generator*	❑ Ready to Go On? Quiz, SE ❑ *Ready to Go On? Intervention* ❑ *Test and Practice Generator*

Course Planner – Section 9B

Quadratic Functions and Equations

Lesson	Content Standards	On-Level Learners [RTI Tier 1]	Special Needs Learners
9-5 Solving Quadratic Equations by Graphing *(1 day)*	CC.9-12.A.CED.2; CC.9-12.A.CED.3; CC.9-12.A.REI.4; CC.9-12.A.REI.11; CC.9-12.F.IF.7; CC.9-12.F.IF.4	❑ Problem Solving 9-5, CR ❑ *Know-It Notebook* 9-5 ❑ Questioning Strategies, TE ❑ *Lesson Tutorial Videos,* 9-5	❑ *IDEA Works!* Practice 9-5 ❑ Reading Strategies 9-5, CR ❑ Reteach 9-5, CR ❑ *Ready to Go On? Intervention,* 9-5 ❑ *Lesson Tutorial Videos,* 9-5
Technology Lab: Explore Roots, Zeros, and *x*-intercepts *(1/2 day)*	CC.9-12.A.CED.2; CC.9-12.A.CED.3; CC.9-12.A.REI.4; CC.9-12.A.REI.11	❑ *Lab Resources Online,* Ch. 9	❑ *Lab Resources Online,* Ch. 9
9-6 Solving Quadratic Equations by Factoring *(1 day)*	CC.9-12.A.SSE.3; CC.9-12.A.CED.3; CC.9-12.A.REI.4; CC.9-12.A.APR.3; CC.9-12.A.CED.1	❑ Problem Solving 9-6, CR ❑ *Know-It Notebook* 9-6 ❑ Questioning Strategies, TE ❑ *Lesson Tutorial Videos,* 9-6	❑ *IDEA Works!* Practice 9-6 ❑ Reading Strategies 9-6, CR ❑ Reteach 9-6, CR ❑ *Ready to Go On? Intervention,* 9-6 ❑ *Lesson Tutorial Videos,* 9-6
9-7 Solving Quadratic Equations by Using Square Roots *(1 day)*	CC.9-12.A.CED.3; CC.9-12.A.REI.4; CC.9-12.F.BF.1; CC.9-12.A.CED.1	❑ Problem Solving 9-7, CR ❑ *Know-It Notebook* 9-7 ❑ Questioning Strategies, TE ❑ *Lesson Tutorial Videos,* 9-7	❑ *IDEA Works!* Practice 9-7 ❑ Reading Strategies 9-7, CR ❑ Reteach 9-7, CR ❑ *Ready to Go On? Intervention,* 9-7 ❑ *Lesson Tutorial Videos,* 9-7
Algebra Lab: Model Completing the Square *(1 day)*	CC.9-12.A.CED.3; CC.9-12.A.REI.4	❑ *Lab Resources Online,* Ch. 9	❑ *Lab Resources Online,* Ch. 9
9-8 Completing the Square *(1 day)*	CC.9-12.A.CED.3; CC.9-12.A.REI.4; CC.9-12.A.CED.1	❑ Problem Solving 9-8, CR ❑ *Know-It Notebook* 9-8 ❑ Questioning Strategies, TE ❑ *Lesson Tutorial Videos,* 9-8	❑ *IDEA Works!* Practice 9-8 ❑ Reading Strategies 9-8, CR ❑ Reteach 9-8, CR ❑ *Ready to Go On? Intervention,* 9-8 ❑ *Lesson Tutorial Videos,* 9-8

See pages 2–33 for the full text of the Common Core Standards for Mathematical Content.

KEY	Red Type	Minimum Course of Study	CC	Curriculum Companion
	CR	Chapter Resources	SE	Student Edition
	AR	Assessment Resources	TE	Teacher's Edition

	Developing Learners [RTI Tier 1 and 2]	Advanced Learners [RTI Tier 2]	English Language Learners
	❑ *Know-It Notebook* 9-5 ❑ Reading Strategies 9-5, CR ❑ Questioning Strategies, TE ❑ *Ready to Go On? Intervention,* 9-5 ❑ *Lesson Tutorial Videos,* 9-5	❑ Practice C 9-5, CR ❑ Challenge 9-5, CR ❑ Problem Solving 9-5, CR	❑ *Success for Every Learner,* 9-5 ❑ Reading Strategies 9-5, CR ❑ *Multi-Language Visual Glossary* ❑ *Lesson Tutorial Videos,* 9-5
	❑ *Lab Resources Online,* Ch. 9	❑ *Lab Resources Online,* Ch. 9	❑ *Lab Resources Online,* Ch. 9
	❑ *Know-It Notebook* 9-6 ❑ Reading Strategies 9-6, CR ❑ Questioning Strategies, TE ❑ *Ready to Go On? Intervention,* 9-6 ❑ *Lesson Tutorial Videos,* 9-6	❑ Practice C 9-6, CR ❑ Challenge 9-6, CR ❑ Problem Solving 9-6, CR	❑ *Success for Every Learner,* 9-6 ❑ Reading Strategies 9-6, CR ❑ *Multi-Language Visual Glossary* ❑ *Lesson Tutorial Videos,* 9-6
	❑ *Know-It Notebook* 9-7 ❑ Reading Strategies 9-7, CR ❑ Questioning Strategies, TE ❑ *Ready to Go On? Intervention,* 9-7 ❑ *Lesson Tutorial Videos,* 9-7	❑ Practice C 9-7, CR ❑ Challenge 9-7, CR ❑ Problem Solving 9-7, CR	❑ *Success for Every Learner,* 9-7 ❑ Reading Strategies 9-7, CR ❑ *Multi-Language Visual Glossary* ❑ *Lesson Tutorial Videos,* 9-7
	❑ *Lab Resources Online,* Ch. 9	❑ *Lab Resources Online,* Ch. 9	❑ *Lab Resources Online,* Ch. 9
	❑ *Know-It Notebook* 9-8 ❑ Reading Strategies 9-8, CR ❑ Questioning Strategies, TE ❑ *Ready to Go On? Intervention,* 9-8 ❑ *Lesson Tutorial Videos,* 9-8	❑ Practice C 9-8, CR ❑ Challenge 9-8, CR ❑ Problem Solving 9-8, CR	❑ *Success for Every Learner,* 9-8 ❑ Reading Strategies 9-8, CR ❑ *Multi-Language Visual Glossary* ❑ *Lesson Tutorial Videos,* 9-8

Course Planner – Section 9B

Quadratic Functions and Equations

Lesson	Content Standards	On-Level Learners [RTI Tier 1]	Special Needs Learners
9-9 The Quadratic Formula and the Discriminant *(1 day)*	**CC.9-12.A.CED.2; CC.9-12.A.CED.3; CC.9-12.A.REI.4; CC.9-12.A.CED.1**	❑ Problem Solving 9-9, CR ❑ *Know-It Notebook* 9-9 ❑ Questioning Strategies, TE ❑ *Lesson Tutorial Videos,* 9-9	❑ *IDEA Works!* Practice 9-9 ❑ Reading Strategies 9-9, CR ❑ Reteach 9-9, CR ❑ *Ready to Go On? Intervention,* 9-9 ❑ *Lesson Tutorial Videos,* 9-9
9-9A Nonlinear Systems (CC) *(2 days)*	**CC.9-12.A.REI.7**	❑ Problem Solving 9-9A, CR ❑ Questioning Strategies, TE	❑ Are You Ready?, SE ❑ Reading Strategies 9-9A, CR ❑ Reteach 9-9A, CR
Extension: Cubic Functions and Equations *(1 day)*	**CC.9-12.F.IF.7**		
Assessment Options		❑ Ready to Go On? Quiz, SE ❑ *Ready to Go On? Intervention* ❑ Section 9B Quiz, AR ❑ Chapter Test, SE ❑ Multiple-Choice or Free-Response Chapter Test B, AR ❑ Performance Assessment, AR ❑ Cumulative Test, AR ❑ *Test and Practice Generator*	❑ Ready to Go On? Quiz, SE ❑ *Ready to Go On? Intervention* ❑ *IDEA Works!* Quiz 9B ❑ Multiple-Choice or Free-Response Chapter Test A, AR ❑ Performance Assessment, AR ❑ *IDEA Works!* Test Ch. 9

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KEY				
Red Type	**Minimum Course of Study**	CC	Curriculum Companion
CR	Chapter Resources	SE	Student Edition
AR	Assessment Resources	TE	Teacher's Edition

	Developing Learners [RTI Tier 1 and 2]	Advanced Learners [RTI Tier 2]	English Language Learners
	❑ *Know-It Notebook* 9-9 ❑ Reading Strategies 9-9, CR ❑ Questioning Strategies, TE ❑ *Ready to Go On? Intervention,* 9-9 ❑ *Lesson Tutorial Videos,* 9-9	❑ Practice C 9-9, CR ❑ Challenge 9-9, CR ❑ Problem Solving 9-9, CR	❑ *Success for Every Learner,* 9-9 ❑ Reading Strategies 9-9, CR ❑ *Multi-Language Visual Glossary* ❑ *Lesson Tutorial Videos,* 9-9
	❑ Are You Ready?, SE ❑ Reading Strategies 9-9A, CR ❑ Questioning Strategies, TE	❑ Challenge 9-9A, CR ❑ Problem Solving 9-9A, CR	❑ *Success for Every Learner,* 9-9A ❑ Reading Strategies 9-9A, CR
	❑ Ready to Go On? Quiz, SE ❑ *Ready to Go On? Intervention* ❑ Multiple-Choice or Free-Response Chapter Test A, AR ❑ Performance Assessment, AR ❑ *Test and Practice Generator*	❑ Ready to Go On? Quiz, SE ❑ *Ready to Go On? Enrichment* ❑ Section 9B Quiz, AR ❑ Chapter Test, SE ❑ Multiple-Choice or Free-Response Chapter Test C, AR ❑ Cumulative Test, AR ❑ *Test and Practice Generator*	❑ Ready to Go On? Quiz, SE ❑ *Ready to Go On? Intervention* ❑ Performance Assessment, AR ❑ *Test and Practice Generator*

Course Planner – Section 10A

Data Analysis and Probability

Lesson	Content Standards	On-Level Learners [RTI Tier 1]	Special Needs Learners
10-1 Organizing and Displaying Data *(1 day)*		❑ Problem Solving 10-1, CR ❑ *Know-It Notebook* 10-1 ❑ Questioning Strategies, TE ❑ *Lesson Tutorial Videos,* 10-1	❑ Are You Ready?, SE ❑ *IDEA Works!* Practice 10-1 ❑ Reading Strategies 10-1, CR ❑ Reteach 10-1, CR ❑ *Ready to Go On? Intervention,* 10-1 ❑ *Lesson Tutorial Videos,* 10-1
10-2 Frequency and Histograms *(1 day)*	CC.9-12.S.ID.1	❑ Problem Solving 10-2, CR ❑ *Know-It Notebook* 10-2 ❑ Questioning Strategies, TE ❑ *Lesson Tutorial Videos,* 10-2	❑ *IDEA Works!* Practice 10-2 ❑ Reading Strategies 10-2, CR ❑ Reteach 10-2, CR ❑ *Ready to Go On? Intervention,* 10-2 ❑ *Lesson Tutorial Videos,* 10-2
10-3 Data Distributions *(2 days)*	CC.9-12.S.ID.1; CC.9-12.S.ID.2; CC.9-12.S.ID.3	❑ Problem Solving 10-3, CR ❑ *Know-It Notebook* 10-3 ❑ Questioning Strategies, TE ❑ *Lesson Tutorial Videos,* 10-3	❑ *IDEA Works!* Practice 10-3 ❑ Reading Strategies 10-3, CR ❑ Reteach 10-3, CR ❑ *Ready to Go On? Intervention,* 10-3 ❑ *Lesson Tutorial Videos,* 10-3
10-3A Extension: Dot Plots (CC) *(1 day)*	CC.9-12.S.ID.1; CC.9-12.S.ID.3		
Technology Lab: Use Technology to Make Graphs *(1/2 day)*	CC.9-12.S.ID.1	❑ *Lab Resources Online,* Ch. 10	❑ *Lab Resources Online,* Ch. 10
10-4 Misleading Graphs and Statistics *(1 day)*	CC.9-12.S.IC.1; CC.9-12.S.IC.6	❑ Problem Solving 10-4, CR ❑ *Know-It Notebook* 10-4 ❑ Questioning Strategies, TE ❑ *Lesson Tutorial Videos,* 10-4	❑ *IDEA Works!* Practice 10-4 ❑ Reading Strategies 10-4, CR ❑ Reteach 10-4, CR ❑ *Ready to Go On? Intervention,* 10-4 ❑ *Lesson Tutorial Videos,* 10-4
Assessment Options		❑ Ready to Go On? Quiz, SE ❑ *Ready to Go On? Intervention* ❑ Section 10A Quiz, AR ❑ *Test and Practice Generator*	❑ Ready to Go On? Quiz, SE ❑ *Ready to Go On? Intervention* ❑ *IDEA Works!* Quiz 10A

See pages 2–33 for the full text of the Common Core Standards for Mathematical Content.

KEY				
	Red Type	**Minimum Course of Study**	CC	Curriculum Companion
	CR	Chapter Resources	SE	Student Edition
	AR	Assessment Resources	TE	Teacher's Edition

	Developing Learners [RTI Tier 1 and 2]	Advanced Learners [RTI Tier 2]	English Language Learners
	❑ Are You Ready?, SE ❑ *Know-It Notebook* 10-1 ❑ Reading Strategies 10-1, CR ❑ Questioning Strategies, TE ❑ *Ready to Go On? Intervention,* 10-1 ❑ *Lesson Tutorial Videos,* 10-1	❑ Practice C 10-1, CR ❑ Challenge 10-1, CR ❑ Problem Solving 10-1, CR	❑ *Success for Every Learner,* 10-1 ❑ Reading Strategies 10-1, CR ❑ *Multi-Language Visual Glossary* ❑ *Lesson Tutorial Videos,* 10-1
	❑ *Know-It Notebook* 10-2 ❑ Reading Strategies 10-2, CR ❑ Questioning Strategies, TE ❑ *Ready to Go On? Intervention,* 10-2 ❑ *Lesson Tutorial Videos,* 10-2	❑ Practice C 10-2, CR ❑ Challenge 10-2, CR ❑ Problem Solving 10-2, CR	❑ *Success for Every Learner,* 10-2 ❑ Reading Strategies 10-2, CR ❑ *Multi-Language Visual Glossary* ❑ *Lesson Tutorial Videos,* 10-2
	❑ *Know-It Notebook* 10-3 ❑ Reading Strategies 10-3, CR ❑ Questioning Strategies, TE ❑ *Ready to Go On? Intervention,* 10-3 ❑ *Lesson Tutorial Videos,* 10-3	❑ Practice C 10-3, CR ❑ Challenge 10-3, CR ❑ Problem Solving 10-3, CR	❑ *Success for Every Learner,* 10-3 ❑ Reading Strategies 10-3, CR ❑ *Multi-Language Visual Glossary* ❑ *Lesson Tutorial Videos,* 10-3
	❑ *Lab Resources Online,* Ch. 10	❑ *Lab Resources Online,* Ch. 10	❑ *Lab Resources Online,* Ch. 10
	❑ *Know-It Notebook* 10-4 ❑ Reading Strategies 10-4, CR ❑ Questioning Strategies, TE ❑ *Ready to Go On? Intervention,* 10-4 ❑ *Lesson Tutorial Videos,* 10-4	❑ Practice C 10-4, CR ❑ Challenge 10-4, CR ❑ Problem Solving 10-4, CR	❑ *Success for Every Learner,* 10-4 ❑ Reading Strategies 10-4, CR ❑ *Multi-Language Visual Glossary* ❑ *Lesson Tutorial Videos,* 10-4
	❑ Ready to Go On? Quiz, SE ❑ *Ready to Go On? Intervention* ❑ *Test and Practice Generator*	❑ Ready to Go On? Quiz, SE ❑ *Ready to Go On? Enrichment* ❑ Section 10A Quiz, AR ❑ *Test and Practice Generator*	❑ Ready to Go On? Quiz, SE ❑ *Ready to Go On? Intervention* ❑ *Test and Practice Generator*

Course Planner – Section 10B

Data Analysis and Probability

Lesson	Content Standards	On-Level Learners [RTI Tier 1]	Special Needs Learners
Algebra Lab: Simulations *(1/2 day)*	CC.9-12.S.CP.1	❑ *Lab Resources Online,* Ch. 10	❑ *Lab Resources Online,* Ch. 10
10-5 Experimental Probability *(1 1/2 days)*	CC.9-12.S.CP.1	❑ Problem Solving 10-5, CR ❑ *Know-It Notebook* 10-5 ❑ Questioning Strategies, TE ❑ *Lesson Tutorial Videos,* 10-5	❑ *IDEA Works!* Practice 10-5 ❑ Reading Strategies 10-5, CR ❑ Reteach 10-5, CR ❑ *Ready to Go On? Intervention,* 10-5 ❑ *Lesson Tutorial Videos,* 10-5
Technology Lab: Use Random Numbers *(1/2 day)*	CC.9-12.S.CP.1	❑ *Lab Resources Online,* Ch. 10	❑ *Lab Resources Online,* Ch. 10
10-6 Theoretical Probability *(1 day)*	CC.9-12.S.CP.1	❑ Problem Solving 10-6, CR ❑ *Know-It Notebook* 10-6 ❑ Questioning Strategies, TE ❑ *Lesson Tutorial Videos,* 10-6	❑ *IDEA Works!* Practice 10-6 ❑ Reading Strategies 10-6, CR ❑ Reteach 10-6, CR ❑ *Ready to Go On? Intervention,* 10-6 ❑ *Lesson Tutorial Videos,* 10-6
10-7 Independent and Dependent Events *(1 day)*	CC.9-12.S.CP.1; CC.9-12.S.CP.2; CC.9-12.S.CP.3; CC.9-12.S.CP.5; CC.9-12.S.CP.6; CC.9-12.S.CP.8	❑ Problem Solving 10-7, CR ❑ *Know-It Notebook* 10-7 ❑ Questioning Strategies, TE ❑ *Lesson Tutorial Videos,* 10-7	❑ *IDEA Works!* Practice 10-7 ❑ Reading Strategies 10-7, CR ❑ Reteach 10-7, CR ❑ *Ready to Go On? Intervention,* 10-7 ❑ *Lesson Tutorial Videos,* 10-7
Algebra Lab: Compound Events *(1 day)*	CC.9-12.S.CP.1	❑ *Lab Resources Online,* Ch. 10	❑ *Lab Resources Online,* Ch. 10
10-8 Combinations and Permutations		❑ Problem Solving 10-8, CR ❑ *Know-It Notebook* 10-8 ❑ Questioning Strategies, TE ❑ *Lesson Tutorial Videos,* 10-8	❑ *IDEA Works!* Practice 10-8 ❑ Reading Strategies 10-8, CR ❑ Reteach 10-8, CR ❑ *Ready to Go On? Intervention,* 10-8 ❑ *Lesson Tutorial Videos,* 10-8
Assessment Options		❑ Ready to Go On? Quiz, SE ❑ *Ready to Go On? Intervention* ❑ Section 10B Quiz, AR ❑ Chapter Test, SE ❑ Multiple-Choice or Free-Response Chapter Test B, AR ❑ Performance Assessment, AR ❑ Cumulative Test, AR ❑ *Test and Practice Generator*	❑ Ready to Go On? Quiz, SE ❑ *Ready to Go On? Intervention* ❑ *IDEA Works!* Quiz 10B ❑ Multiple-Choice or Free-Response Chapter Test A, AR ❑ Performance Assessment, AR ❑ *IDEA Works!* Test Ch. 10

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KEY

Red Type	Minimum Course of Study	CC	Curriculum Companion
CR	Chapter Resources	SE	Student Edition
AR	Assessment Resources	TE	Teacher's Edition

Developing Learners [RTI Tier 1 and 2]	Advanced Learners [RTI Tier 2]	English Language Learners
❑ *Lab Resources Online,* Ch. 10	❑ *Lab Resources Online,* Ch. 10	❑ *Lab Resources Online,* Ch. 10
❑ *Know-It Notebook* 10-5 ❑ Reading Strategies 10-5, CR ❑ Questioning Strategies, TE ❑ *Ready to Go On? Intervention,* 10-5 ❑ *Lesson Tutorial Videos,* 10-5	❑ Practice C 10-5, CR ❑ Challenge 10-5, CR ❑ Problem Solving 10-5, CR	❑ *Success for Every Learner,* 10-5 ❑ Reading Strategies 10-5, CR ❑ *Multi-Language Visual Glossary* ❑ *Lesson Tutorial Videos,* 10-5
❑ *Lab Resources Online,* Ch. 10	❑ *Lab Resources Online,* Ch. 10	❑ *Lab Resources Online,* Ch. 10
❑ *Know-It Notebook* 10-6 ❑ Reading Strategies 10-6, CR ❑ Questioning Strategies, TE ❑ *Ready to Go On? Intervention,* 10-6 ❑ *Lesson Tutorial Videos,* 10-6	❑ Practice C 10-6, CR ❑ Challenge 10-6, CR ❑ Problem Solving 10-6, CR	❑ *Success for Every Learner,* 10-6 ❑ Reading Strategies 10-6, CR ❑ *Multi-Language Visual Glossary* ❑ *Lesson Tutorial Videos,* 10-6
❑ *Know-It Notebook* 10-7 ❑ Reading Strategies 10-7, CR ❑ Questioning Strategies, TE ❑ *Ready to Go On? Intervention,* 10-7 ❑ *Lesson Tutorial Videos,* 10-7	❑ Practice C 10-7, CR ❑ Challenge 10-7, CR ❑ Problem Solving 10-7, CR	❑ *Success for Every Learner,* 10-7 ❑ Reading Strategies 10-7, CR ❑ *Multi-Language Visual Glossary* ❑ *Lesson Tutorial Videos,* 10-7
❑ *Lab Resources Online,* Ch. 10	❑ *Lab Resources Online,* Ch. 10	❑ *Lab Resources Online,* Ch. 10
❑ *Know-It Notebook* 10-8 ❑ Reading Strategies 10-8, CR ❑ Questioning Strategies, TE ❑ *Ready to Go On? Intervention,* 10-8 ❑ *Lesson Tutorial Videos,* 10-8	❑ Practice C 10-8, CR ❑ Challenge 10-8, CR ❑ Problem Solving 10-8, CR	❑ *Success for Every Learner,* 10-8 ❑ Reading Strategies 10-8, CR ❑ *Multi-Language Visual Glossary* ❑ *Lesson Tutorial Videos,* 10-8
❑ Ready to Go On? Quiz, SE ❑ *Ready to Go On? Intervention* ❑ Multiple-Choice or Free-Response Chapter Test A, AR ❑ Performance Assessment, AR ❑ *Test and Practice Generator*	❑ Ready to Go On? Quiz, SE ❑ *Ready to Go On? Enrichment* ❑ Section 10B Quiz, AR ❑ Chapter Test, SE ❑ Multiple-Choice or Free-Response Chapter Test C, AR ❑ Cumulative Test, AR ❑ *Test and Practice Generator*	❑ Ready to Go On? Quiz, SE ❑ *Ready to Go On? Intervention* ❑ Performance Assessment, AR ❑ *Test and Practice Generator*

Course Planner – Section 11A

Exponential and Radical Functions

Lesson	Content Standards	On-Level Learners [RTI Tier 1]	Special Needs Learners
11-1 Geometric Sequences *(1 day)*	CC.9-12.F.IF.3; CC.9-12.F.LE.2; CC.9-12.F.BF.2	❑ Problem Solving 11-1, CR ❑ *Know-It Notebook* 11-1 ❑ Questioning Strategies, TE ❑ *Lesson Tutorial Videos,* 11-1	❑ Are You Ready?, SE ❑ *IDEA Works!* Practice 11-1 ❑ Reading Strategies 11-1, CR ❑ Reteach 11-1, CR ❑ *Ready to Go On? Intervention*, 11-1 ❑ *Lesson Tutorial Videos,* 11-1
11-2 Exponential Functions *(1 day)*	CC.9-12.A.REI.11; CC.9-12.F.IF.4; CC.9-12.F.IF.7; CC.9-12.F.LE.1; CC.9-12.F.LE.3; CC.9-12.F.IF.9	❑ Problem Solving 11-2, CR ❑ *Know-It Notebook* 11-2 ❑ Questioning Strategies, TE ❑ *Lesson Tutorial Videos,* 11-2	❑ *IDEA Works!* Practice 11-2 ❑ Reading Strategies 11-2, CR ❑ Reteach 11-2, CR ❑ *Ready to Go On? Intervention*, 11-2 ❑ *Lesson Tutorial Videos,* 11-2
Algebra Lab: Model Growth and Decay *(1 day)*	CC.9-12.F.LE.2; CC.9-12.F.LE.3	❑ *Lab Resources Online,* Ch. 11	❑ *Lab Resources Online,* Ch. 11
11-3 Exponential Growth and Decay *(2 days)*	CC.9-12.A.CED.2; CC.9-12.A.CED.3; CC.9-12.F.BF.1; CC.9-12.F.LE.2; CC.9-12.F.LE.5; CC.9-12.F.IF.9; CC.9-12.F.BF.7	❑ Problem Solving 11-3, CR ❑ *Know-It Notebook* 11-3 ❑ Questioning Strategies, TE ❑ *Lesson Tutorial Videos,* 11-3	❑ *IDEA Works!* Practice 11-3 ❑ Reading Strategies 11-3, CR ❑ Reteach 11-3, CR ❑ *Ready to Go On? Intervention*, 11-3 ❑ *Lesson Tutorial Videos,* 11-3
A-4 Patterns and Recursion *(1 day)*	CC.9-12.F.IF.3; CC.9-12.F.IF.4; CC.9-12.F.BF.2; CC.9-12.F.LE.2		
11-4 Linear, Quadratic, and Exponential Models *(2 days)*	CC.9-12.A.CED.2; CC.9-12.A.CED.3; CC.9-12.F.IF.4; CC.9-12.F.IF.7; CC.9-12.F.BF.1; CC.9-12.F.LE.1; CC.9-12.F.BF.7	❑ Problem Solving 11-4, CR ❑ *Know-It Notebook* 11-4 ❑ Questioning Strategies, TE ❑ *Lesson Tutorial Videos,* 11-4	❑ *IDEA Works!* Practice 11-4 ❑ Reading Strategies 11-4, CR ❑ Reteach 11-4, CR ❑ *Ready to Go On? Intervention*, 11-4 ❑ *Lesson Tutorial Videos,* 11-4
A-5 Linear and Nonlinear Rates of Change *(1 day)*	CC.9-12.F.IF.6		
11-4A Comparing Functions (CC) *(2 days)*	CC.9-12.F.IF.6; CC.9-12.F.IF.9; CC.9-12.F.LE.3	❑ Problem Solving 11-4A, CR ❑ Questioning Strategies, TE	❑ Are You Ready?, SE ❑ Reading Strategies 11-4A, CR ❑ Reteach 11-4A, CR
Assessment Options		❑ Ready to Go On? Quiz, SE ❑ *Ready to Go On? Intervention* ❑ Section 11A Quiz, AR ❑ *Test and Practice Generator*	❑ Ready to Go On? Quiz, SE ❑ *Ready to Go On? Intervention* ❑ *IDEA Works!* Quiz 11A

See pages 2–33 for the full text of the Common Core Standards for Mathematical Content.

KEY				
Red Type	**Minimum Course of Study**	CC	Curriculum Companion
CR	Chapter Resources	SE	Student Edition
AR	Assessment Resources	TE	Teacher's Edition

Developing Learners [RTI Tier 1 and 2]	Advanced Learners [RTI Tier 2]	English Language Learners
❑ Are You Ready?, SE ❑ *Know-It Notebook* 11-1 ❑ Reading Strategies 11-1, CR ❑ Questioning Strategies, TE ❑ *Ready to Go On? Intervention*, 11-1 ❑ *Lesson Tutorial Videos,* 11-1	❑ Practice C 11-1, CR ❑ Challenge 11-1, CR ❑ Problem Solving 11-1, CR	❑ *Success for Every Learner,* 11-1 ❑ Reading Strategies 11-1, CR ❑ *Multi-Language Visual Glossary* ❑ *Lesson Tutorial Videos,* 11-1
❑ *Know-It Notebook* 11-2 ❑ Reading Strategies 11-2, CR ❑ Questioning Strategies, TE ❑ *Ready to Go On? Intervention*, 11-2 ❑ *Lesson Tutorial Videos,* 11-2	❑ Practice C 11-2, CR ❑ Challenge 11-2, CR ❑ Problem Solving 11-2, CR	❑ *Success for Every Learner,* 11-2 ❑ Reading Strategies 11-2, CR ❑ *Multi-Language Visual Glossary* ❑ *Lesson Tutorial Videos,* 11-2
❑ *Lab Resources Online,* Ch. 11	❑ *Lab Resources Online,* Ch. 11	❑ *Lab Resources Online,* Ch. 11
❑ *Know-It Notebook* 11-3 ❑ Reading Strategies 11-3, CR ❑ Questioning Strategies, TE ❑ *Ready to Go On? Intervention*, 11-3 ❑ *Lesson Tutorial Videos,* 11-3	❑ Practice C 11-3, CR ❑ Challenge 11-3, CR ❑ Problem Solving 11-3, CR	❑ *Success for Every Learner,* 11-3 ❑ Reading Strategies 11-3, CR ❑ *Multi-Language Visual Glossary* ❑ *Lesson Tutorial Videos,* 11-3
❑ *Know-It Notebook* 11-4 ❑ Reading Strategies 11-4, CR ❑ Questioning Strategies, TE ❑ *Ready to Go On? Intervention*, 11-4 ❑ *Lesson Tutorial Videos,* 11-4	❑ Practice C 11-4, CR ❑ Challenge 11-4, CR ❑ Problem Solving 11-4, CR	❑ *Success for Every Learner,* 11-4 ❑ Reading Strategies 11-4, CR ❑ *Multi-Language Visual Glossary* ❑ *Lesson Tutorial Videos,* 11-4
❑ Are You Ready?, SE ❑ Reading Strategies 11-4A, CR ❑ Questioning Strategies, TE	❑ Challenge 11-4A, CR ❑ Problem Solving 11-4A, CR	❑ Success for Every Learner, 11-4A ❑ Reading Strategies 11-4A, CR
❑ Ready to Go On? Quiz, SE ❑ *Ready to Go On? Intervention* ❑ *Test and Practice Generator*	❑ Ready to Go On? Quiz, SE ❑ *Ready to Go On? Enrichment* ❑ Section 11A Quiz, AR ❑ *Test and Practice Generator*	❑ Ready to Go On? Quiz, SE ❑ *Ready to Go On? Intervention* ❑ *Test and Practice Generator*

Course Planner – Section 11B

Exponential and Radical Functions

Lesson	Content Standards	On-Level Learners [RTI Tier 1]	Special Needs Learners
11-5 Square-Root Functions		❑ Problem Solving 11-5, CR ❑ *Know-It Notebook* 11-5 ❑ Questioning Strategies, TE ❑ *Lesson Tutorial Videos,* 11-5	❑ *IDEA Works!* Practice 11-5 ❑ Reading Strategies 11-5, CR ❑ Reteach 11-5, CR ❑ *Ready to Go On? Intervention*, 11-5 ❑ *Lesson Tutorial Videos,* 11-5
Technology Lab: Graph Radical Functions		❑ *Lab Resources Online,* Ch. 11	❑ *Lab Resources Online,* Ch. 11
11-6 Radical Expressions		❑ Problem Solving 11-6, CR ❑ *Know-It Notebook* 11-6 ❑ Questioning Strategies, TE ❑ *Lesson Tutorial Videos,* 11-6	❑ *IDEA Works!* Practice 11-6 ❑ Reading Strategies 11-6, CR ❑ Reteach 11-6, CR ❑ *Ready to Go On? Intervention*, 11-6 ❑ *Lesson Tutorial Videos,* 11-6
11-7 Adding and Subtracting Radical Expressions		❑ Problem Solving 11-7, CR ❑ *Know-It Notebook* 11-7 ❑ Questioning Strategies, TE ❑ *Lesson Tutorial Videos,* 11-7	❑ *IDEA Works!* Practice 11-7 ❑ Reading Strategies 11-7, CR ❑ Reteach 11-7, CR ❑ *Ready to Go On? Intervention*, 11-7 ❑ *Lesson Tutorial Videos,* 11-7
11-8 Multiplying and Dividing Radical Expressions		❑ Problem Solving 11-8, CR ❑ *Know-It Notebook* 11-8 ❑ Questioning Strategies, TE ❑ *Lesson Tutorial Videos,* 11-8	❑ *IDEA Works!* Practice 11-8 ❑ Reading Strategies 11-8, CR ❑ Reteach 11-8, CR ❑ *Ready to Go On? Intervention*, 11-8 ❑ *Lesson Tutorial Videos,* 11-8
11-9 Solving Radical Equations		❑ Problem Solving 11-9, CR ❑ *Know-It Notebook* 11-9 ❑ Questioning Strategies, TE ❑ *Lesson Tutorial Videos,* 11-9	❑ *IDEA Works!* Practice 11-9 ❑ Reading Strategies 11-9, CR ❑ Reteach 11-9, CR ❑ *Ready to Go On? Intervention*, 11-9 ❑ *Lesson Tutorial Videos,* 11-9
Assessment Options		❑ Ready to Go On? Quiz, SE ❑ *Ready to Go On? Intervention* ❑ Section 11B Quiz, AR ❑ Chapter Test, SE ❑ Multiple-Choice or Free-Response Chapter Test B, AR ❑ Performance Assessment, AR ❑ Cumulative Test, AR ❑ *Test and Practice Generator*	❑ *Ready to Go On? Quiz, SE* ❑ *Ready to Go On? Intervention* ❑ *IDEA Works!* Quiz 11B ❑ Multiple-Choice or Free-Response Chapter Test A, AR ❑ Performance Assessment, AR ❑ *IDEA Works!* Test Ch. 11

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KEY				
Red Type	**Minimum Course of Study**	CC	Curriculum Companion
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AR	Assessment Resources	TE	Teacher's Edition

Developing Learners [RTI Tier 1 and 2]	Advanced Learners [RTI Tier 2]	English Language Learners
❑ *Know-It Notebook* 11-5 ❑ Reading Strategies 11-5, CR ❑ Questioning Strategies, TE ❑ *Ready to Go On? Intervention*, 11-5 ❑ *Lesson Tutorial Videos,* 11-5	❑ Practice C 11-5, CR ❑ Challenge 11-5, CR ❑ Problem Solving 11-5, CR	❑ *Success for Every Learner,* 11-5 ❑ Reading Strategies 11-5, CR ❑ *Multi-Language Visual Glossary* ❑ *Lesson Tutorial Videos,* 11-5
❑ *Lab Resources Online,* Ch. 11	❑ *Lab Resources Online,* Ch. 11	❑ *Lab Resources Online,* Ch. 11
❑ *Know-It Notebook* 11-6 ❑ Reading Strategies 11-6, CR ❑ Questioning Strategies, TE ❑ *Ready to Go On? Intervention*, 11-6 ❑ *Lesson Tutorial Videos,* 11-6	❑ Practice C 11-6, CR ❑ Challenge 11-6, CR ❑ Problem Solving 11-6, CR	❑ *Success for Every Learner,* 11-6 ❑ Reading Strategies 11-6, CR ❑ *Multi-Language Visual Glossary* ❑ *Lesson Tutorial Videos,* 11-6
❑ *Know-It Notebook* 11-7 ❑ Reading Strategies 11-7, CR ❑ Questioning Strategies, TE ❑ *Ready to Go On? Intervention*, 11-7 ❑ *Lesson Tutorial Videos,* 11-7	❑ Practice C 11-7, CR ❑ Challenge 11-7, CR ❑ Problem Solving 11-7, CR	❑ *Success for Every Learner,* 11-7 ❑ Reading Strategies 11-7, CR ❑ *Multi-Language Visual Glossary* ❑ *Lesson Tutorial Videos,* 11-7
❑ *Know-It Notebook* 11-8 ❑ Reading Strategies 11-8, CR ❑ Questioning Strategies, TE ❑ *Ready to Go On? Intervention*, 11-8 ❑ *Lesson Tutorial Videos,* 11-8	❑ Practice C 11-8, CR ❑ Challenge 11-8, CR ❑ Problem Solving 11-8, CR	❑ *Success for Every Learner,* 11-8 ❑ Reading Strategies 11-8, CR ❑ *Multi-Language Visual Glossary* ❑ *Lesson Tutorial Videos,* 11-8
❑ *Know-It Notebook* 11-9 ❑ Reading Strategies 11-9, CR ❑ Questioning Strategies, TE ❑ *Ready to Go On? Intervention*, 11-9 ❑ *Lesson Tutorial Videos,* 11-9	❑ Practice C 11-9, CR ❑ Challenge 11-9, CR ❑ Problem Solving 11-9, CR	❑ *Success for Every Learner,* 11-9 ❑ Reading Strategies 11-9, CR ❑ *Multi-Language Visual Glossary* ❑ *Lesson Tutorial Videos,* 11-9
❑ Ready to Go On? Quiz, SE ❑ *Ready to Go On? Intervention* ❑ Multiple-Choice or Free-Response Chapter Test A, AR ❑ Performance Assessment, AR ❑ *Test and Practice Generator*	❑ Ready to Go On? Quiz, SE ❑ *Ready to Go On? Enrichment* ❑ Section 11B Quiz, AR ❑ Chapter Test, SE ❑ Multiple-Choice or Free-Response Chapter Test C, AR ❑ Cumulative Test, AR ❑ *Test and Practice Generator*	❑ Ready to Go On? Quiz, SE ❑ *Ready to Go On? Intervention* ❑ Performance Assessment, AR ❑ *Test and Practice Generator*

Course Planner – Section 12A

Rational Functions and Equations

Lesson	Content Standards	On-Level Learners [RTI Tier 1]	Special Needs Learners
Algebra Lab: Model Inverse Variation		❑ *Lab Resources Online,* Ch. 12	❑ *Lab Resources Online,* Ch. 12
12-1 Inverse Variation		❑ Problem Solving 12-1, CR ❑ *Know-It Notebook* 12-1 ❑ Questioning Strategies, TE ❑ *Lesson Tutorial Videos,* 12-1	❑ Are You Ready?, SE ❑ *IDEA Works!* Practice 12-1 ❑ Reading Strategies 12-1, CR ❑ Reteach 12-1, CR ❑ *Ready to Go On? Intervention,* 12-1 ❑ *Lesson Tutorial Videos,* 12-1
12-2 Rational Functions		❑ Problem Solving 12-2, CR ❑ *Know-It Notebook* 12-2 ❑ Questioning Strategies, TE ❑ *Lesson Tutorial Videos,* 12-2	❑ *IDEA Works!* Practice 12-2 ❑ Reading Strategies 12-2, CR ❑ Reteach 12-2, CR ❑ *Ready to Go On? Intervention,* 12-2 ❑ *Lesson Tutorial Videos,* 12-2
12-3 Simplifying Rational Expressions		❑ Problem Solving 12-3, CR ❑ *Know-It Notebook* 12-3 ❑ Questioning Strategies, TE ❑ *Lesson Tutorial Videos,* 12-3	❑ *IDEA Works!* Practice 12-3 ❑ Reading Strategies 12-3, CR ❑ Reteach 12-3, CR ❑ *Ready to Go On? Intervention,* 12-3 ❑ *Lesson Tutorial Videos,* 12-3
Technology Lab: Graph Rational Functions		❑ *Lab Resources Online,* Ch. 12	❑ *Lab Resources Online,* Ch. 12
Assessment Options		❑ Ready to Go On? Quiz, SE ❑ *Ready to Go On? Intervention* ❑ Section 12A Quiz, AR ❑ *Test and Practice Generator*	❑ Ready to Go On? Quiz, SE ❑ *Ready to Go On? Intervention* ❑ *IDEA Works!* Quiz 12A

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	Developing Learners [RTI Tier 1 and 2]	Advanced Learners [RTI Tier 2]	English Language Learners
	❑ *Lab Resources Online,* Ch. 12	❑ *Lab Resources Online,* Ch. 12	❑ *Lab Resources Online,* Ch. 12
	❑ Are You Ready?, SE ❑ *Know-It Notebook* 12-1 ❑ Reading Strategies 12-1, CR ❑ Questioning Strategies, TE ❑ *Ready to Go On? Intervention,* 12-1 ❑ *Lesson Tutorial Videos,* 12-1	❑ Practice C 12-1, CR ❑ Challenge 12-1, CR ❑ Problem Solving 12-1, CR	❑ *Success for Every Learner,* 12-1 ❑ Reading Strategies 12-1, CR ❑ *Multi-Language Visual Glossary* ❑ *Lesson Tutorial Videos,* 12-1
	❑ *Know-It Notebook* 12-2 ❑ Reading Strategies 12-2, CR ❑ Questioning Strategies, TE ❑ *Ready to Go On? Intervention,* 12-2 ❑ *Lesson Tutorial Videos,* 12-2	❑ Practice C 12-2, CR ❑ Challenge 12-2, CR ❑ Problem Solving 12-2, CR	❑ *Success for Every Learner,* 12-2 ❑ Reading Strategies 12-2, CR ❑ *Multi-Language Visual Glossary* ❑ *Lesson Tutorial Videos,* 12-2
	❑ *Know-It Notebook* 12-3 ❑ Reading Strategies 12-3, CR ❑ Questioning Strategies, TE ❑ *Ready to Go On? Intervention,* 12-3 ❑ *Lesson Tutorial Videos,* 12-3	❑ Practice C 12-3, CR ❑ Challenge 12-3, CR ❑ Problem Solving 12-3, CR	❑ *Success for Every Learner,* 12-3 ❑ Reading Strategies 12-3, CR ❑ *Multi-Language Visual Glossary* ❑ *Lesson Tutorial Videos,* 12-3
	❑ *Lab Resources Online,* Ch. 12	❑ *Lab Resources Online,* Ch. 12	❑ *Lab Resources Online,* Ch. 12
	❑ Ready to Go On? Quiz, SE ❑ *Ready to Go On? Intervention* ❑ *Test and Practice Generator*	❑ Ready to Go On? Quiz, SE ❑ *Ready to Go On? Enrichment* ❑ Section 12A Quiz, AR ❑ *Test and Practice Generator*	❑ Ready to Go On? Quiz, SE ❑ *Ready to Go On? Intervention* ❑ *Test and Practice Generator*

Course Planner – Section 12B

Rational Functions and Equations

Lesson	Content Standards	On-Level Learners [RTI Tier 1]	Special Needs Learners
12-4 Multiplying and Dividing Rational Expressions		❑ Problem Solving 12-4, CR ❑ *Know-It Notebook* 12-4 ❑ Questioning Strategies, TE ❑ *Lesson Tutorial Videos,* 12-4	❑ *IDEA Works!* Practice 12-4 ❑ Reading Strategies 12-4, CR ❑ Reteach 12-4, CR ❑ *Ready to Go On? Intervention,* 12-4 ❑ *Lesson Tutorial Videos,* 12-4
12-5 Adding and Subtracting Rational Expressions		❑ Problem Solving 12-5, CR ❑ *Know-It Notebook* 12-5 ❑ Questioning Strategies, TE ❑ *Lesson Tutorial Videos,* 12-5	❑ *IDEA Works!* Practice 12-5 ❑ Reading Strategies 12-5, CR ❑ Reteach 12-5, CR ❑ *Ready to Go On? Intervention,* 12-5 ❑ *Lesson Tutorial Videos,* 12-5
Algebra Lab: Model Polynomial Division *(1/2 day)*		❑ *Lab Resources Online,* Ch. 12	❑ *Lab Resources Online,* Ch. 12
12-6 Dividing Polynomials		❑ Problem Solving 12-6, CR ❑ *Know-It Notebook* 12-6 ❑ Questioning Strategies, TE ❑ *Lesson Tutorial Videos,* 12-6	❑ *IDEA Works!* Practice 12-6 ❑ Reading Strategies 12-6, CR ❑ Reteach 12-6, CR ❑ *Ready to Go On? Intervention,* 12-6 ❑ *Lesson Tutorial Videos,* 12-6
12-7 Solving Rational Equations		❑ Problem Solving 12-7, CR ❑ *Know-It Notebook* 12-7 ❑ Questioning Strategies, TE ❑ *Lesson Tutorial Videos,* 12-7	❑ *IDEA Works!* Practice 12-7 ❑ Reading Strategies 12-7, CR ❑ Reteach 12-7, CR ❑ *Ready to Go On? Intervention,* 12-7 ❑ *Lesson Tutorial Videos,* 12-7
Assessment Options		❑ Ready to Go On? Quiz, SE ❑ *Ready to Go On? Intervention* ❑ Section 12B Quiz, AR ❑ Chapter Test, SE ❑ Multiple-Choice or Free-Response Chapter Test B, AR ❑ Performance Assessment, AR ❑ Cumulative Test, AR ❑ *Test and Practice Generator*	❑ Ready to Go On? Quiz, SE ❑ *Ready to Go On? Intervention* ❑ *IDEA Works!* Quiz 12B ❑ Multiple-Choice or Free-Response Chapter Test A, AR ❑ Performance Assessment, AR ❑ *IDEA Works!* Test Ch. 12

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KEY

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CR	Chapter Resources	SE	Student Edition
AR	Assessment Resources	TE	Teacher's Edition

Developing Learners [RTI Tier 1 and 2]	Advanced Learners [RTI Tier 2]	English Language Learners
❑ *Know-It Notebook* 12-4 ❑ Reading Strategies 12-4, CR ❑ Questioning Strategies, TE ❑ *Ready to Go On? Intervention,* 12-4 ❑ *Lesson Tutorial Videos,* 12-4	❑ Practice C 12-4, CR ❑ Challenge 12-4, CR ❑ Problem Solving 12-4, CR	❑ *Success for Every Learner,* 12-4 ❑ Reading Strategies 12-4, CR ❑ *Multi-Language Visual Glossary* ❑ *Lesson Tutorial Videos,* 12-4
❑ *Know-It Notebook* 12-5 ❑ Reading Strategies 12-5, CR ❑ Questioning Strategies, TE ❑ *Ready to Go On? Intervention,* 12-5 ❑ *Lesson Tutorial Videos,* 12-5	❑ Practice C 12-5, CR ❑ Challenge 12-5, CR ❑ Problem Solving 12-5, CR	❑ *Success for Every Learner,* 12-5 ❑ Reading Strategies 12-5, CR ❑ *Multi-Language Visual Glossary* ❑ *Lesson Tutorial Videos,* 12-5
❑ *Lab Resources Online,* Ch. 12	❑ *Lab Resources Online,* Ch. 12	❑ *Lab Resources Online,* Ch. 12
❑ *Know-It Notebook* 12-6 ❑ Reading Strategies 12-6, CR ❑ Questioning Strategies, TE ❑ *Ready to Go On? Intervention,* 12-6 ❑ *Lesson Tutorial Videos,* 12-6	❑ Practice C 12-6, CR ❑ Challenge 12-6, CR ❑ Problem Solving 12-6, CR	❑ *Success for Every Learner,* 12-6 ❑ Reading Strategies 12-6, CR ❑ *Multi-Language Visual Glossary* ❑ *Lesson Tutorial Videos,* 12-6
❑ *Know-It Notebook* 12-7 ❑ Reading Strategies 12-7, CR ❑ Questioning Strategies, TE ❑ *Ready to Go On? Intervention,* 12-7 ❑ *Lesson Tutorial Videos,* 12-7	❑ Practice C 12-7, CR ❑ Challenge 12-7, CR ❑ Problem Solving 12-7, CR	❑ *Success for Every Learner,* 12-7 ❑ Reading Strategies 12-7, CR ❑ *Multi-Language Visual Glossary* ❑ *Lesson Tutorial Videos,* 12-7
❑ Ready to Go On? Quiz, SE ❑ *Ready to Go On? Intervention* ❑ Multiple-Choice or Free-Response Chapter Test A, AR ❑ Performance Assessment, AR ❑ *Test and Practice Generator*	❑ Ready to Go On? Quiz, SE ❑ *Ready to Go On? Enrichment* ❑ Section 12B Quiz, AR ❑ Chapter Test, SE ❑ Multiple-Choice or Free-Response Chapter Test C, AR ❑ Cumulative Test, AR ❑ *Test and Practice Generator*	❑ Ready to Go On? Quiz, SE ❑ *Ready to Go On? Intervention* ❑ Performance Assessment, AR ❑ *Test and Practice Generator*

Answers:

1. 191
2. 184
3. 63
4. 1020
5. 60.01
6. 7.19
7. 1.38
8. 20.48
9. 3.2
10. 1.4
11. $\frac{1}{6}$
12. $\frac{1}{9}$
13. $1\frac{1}{6}$
14. $\frac{7}{9}$
15. -19
16. 12
17. -60
18. 5
19. 0.16, 16%
20. 1.125, 112.5%
21. 13
22. 35
23. 62
24. 225
25. $60 + 5g$
26. $9r - 54$
27. \$3.75 per student
28. 16 packages per day
29. $S = 165 + 15w$
30. C
31. E
32. A
33. $<$
34. $=$
35. 14
36. -12
37. 27
38. 24
39. $7b - 32$
40. $3f + t$
41. 6
42. 50
43. 9
44. 18
45. $-7, -2, 3, 8, 13$

ARE YOU READY?

Pre-Course Test

Whole Number Operations

Add, subtract, multiply, or divide.

1. $623 - 432$
2. 8×23
3. $882 \div 14$
4. $178 + 842$

Add and Subtract Decimals

Add or subtract.

5. $43.21 + 16.8$
6. $16.3 - 9.11$

Multiply Decimals

Multiply.

7. 2.3×0.6
8. 6.4×3.2

Divide Decimals

Divide.

9. $25.6 \div 8$
10. $0.84 \div 0.6$

Multiply and Divide Fractions

Multiply or divide. Give your answer in simplest form.

11. $\frac{2}{9} \times \frac{3}{4}$
12. $\frac{5}{9} \div 5$

Add and Subtract Fractions

Add or subtract. Give your answer in simplest form.

13. $\frac{3}{4} + \frac{5}{12}$
14. $1\frac{2}{9} - \frac{4}{9}$

Add and Subtract Integers

Add or subtract.

15. $-54 + 35$
16. $-18 - (-30)$

Multiply and Divide Integers

Multiply or divide.

17. $15(-4)$
18. $-30 \div (-6)$

Fractions, Decimals, and Percents

Write the equivalent decimal and the equivalent percent.

19. $\frac{4}{25}$
20. $\frac{9}{8}$

Order of Operations

Evaluate each expression.

21. $12 + 3 \div 3$
22. $3 + 2 \times 4^2$
23. $4 + 6 \times 10 - 2$
24. $25 \times (4 + 5)$

Distributive Property

Simplify each expression.

25. $5(12 + g)$
26. $(r - 6)9$

Rates and Unit Rates

Find each unit rate.

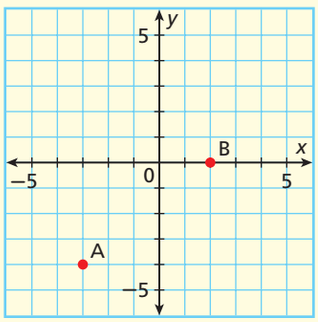
27. \$30 for 8 students
28. 96 packages in 6 days

Connect Words and Algebra

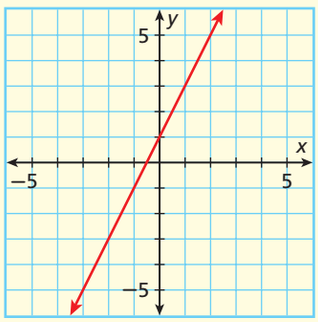
29. Mario has saved \$165. At the end of each week he saves an additional \$15. Write an equation representing the total amount S he has saved at the end of any given week w.

Are You Ready?

46, 47.



48.



Graph Numbers on a Number Line

Identify the point on the number line that matches each number.

30. -0.5

31. 2.5

32. -3

Compare and Order Real Numbers

Compare. Write <, >, or =.

33. $\frac{5}{12}$ ▢ $\frac{3}{4}$ **34.** $\frac{4}{20}$ ▢ 20%

Evaluate Expressions

Evaluate each expression for the given value of the variable.

35. $5w - 16$ for $w = 6$

36. $-8 - \frac{2}{3}h$ for $h = 6$

Solve One-Step Equations

Solve each equation.

37. $5g = 135$ **38.** $x - 16 = 8$

Combine Like Terms

Simply each expression by combining like terms.

39. $3b - 32 + 4b$

40. $-3f + 4t - 3t + 6f$

Solve Multi-Step Equations

Solve each equation.

41. $4x + 16 = 40$ **42.** $\frac{x}{5} - 9 = 1$

Solve Proportions

Solve each proportion.

43. $\frac{3}{4} = \frac{z}{12}$ **44.** $\frac{10}{30} = \frac{6}{t}$

Function Tables

45. Generate ordered pairs for the function for $x = -2, -1, 0, 1, 2$.

$y = 5x + 3$

x	y
-2	▢
-1	▢
0	▢
1	▢
2	▢

Ordered Pairs

Graph each point on the same coordinate grid.

46. $A(-3, -4)$ **47.** $B(2, 0)$

Graph Linear Functions

48. Graph the function $y = 2x + 1$.

Solve and Graph Inequalities

Solve and graph each inequality.

49. $b - 8 \geq -11$ **50.** $-\frac{3}{4}x > 3$

Are You Ready?

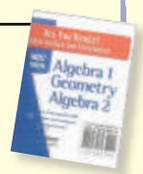
Are You Ready?

Pre-Course Test

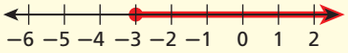
Intervention

Items	Skill
1–2	20
3–5	58
6–8	60
9–10	68
11–13	57
14–16	69
17–18	74
19–21	13
22–23	77
24–26	22
27–28	24
29–30	23
31–32	25
33–35	26
36–38	6
39–41	53
42–44	29
45–48	79
49	87
50	88

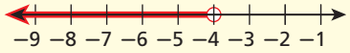
Worksheets
CD-ROM
Online



49. $b \geq -3$



50. $x < -4$



COMMON CORE

Additional Content Algebra 1

Contents

2-4A Technology LAB

Solve Equations Graphically

You can use graphs to solve equations. As you complete this activity, you will explore connections between graphs and equations.

Use with Lesson 2-4

Activity 1

Use a graphing calculator to solve $x + 1 = 3x - 5$.

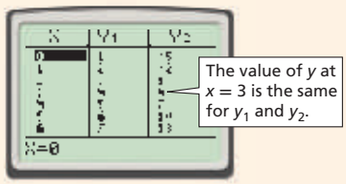
1. Write the equation $x + 1 = 3x - 5$ as two separate equations:

$$y = x + 1$$
$$y = 3x - 5$$

2. Press Y=. Enter the first equation, $y = x + 1$, in $\mathbf{Y_1}$ and the second equation, $y = 3x - 5$, in $\mathbf{Y_2}$.

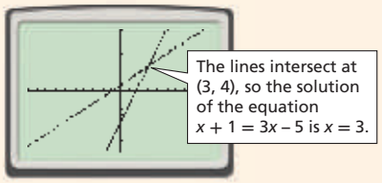
3. Press 2nd TABLE (GRAPH) to use the **TABLE** function.

4. Scroll through the values using ▲ and ▼. Look for values where $\mathbf{Y_1}$ and $\mathbf{Y_2}$ are equal, and then find the corresponding x-value. This x-value is the solution of the equation.



The value of y at $x = 3$ is the same for y_1 and y_2.

5. Press GRAPH and verify where the lines intersect.


The lines intersect at (3, 4), so the solution of the equation $x + 1 = 3x - 5$ is $x = 3$.

6. You can check your answer by solving the equation algebraically.

$$\begin{aligned} x + 1 &= 3x - 5 \\ x - x + 1 &= 3x - x - 5 \\ 1 &= 2x - 5 \\ 1 + 5 &= 2x - 5 + 5 \\ 6 &= 2x \\ \frac{6}{2} &= \frac{2x}{2} \\ 3 &= x \checkmark \end{aligned}$$

Technology LAB Organizer

Use with Lesson 2-4

Pacing: Traditional 1 day
Block $\frac{1}{2}$ day

Objective: Solve equations with variables on both sides by graphing.

Materials: graphing calculator

Teach

Discuss

Each side of the equation is entered into the **Y=** editor. No matter which side of the equation is entered into **Y1** and which side is entered into **Y2**, the intersection of the lines will remain the same.

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Close

Key Concept

Equations with variables on both sides can be solved by graphing each side of the equation and finding the x-value of the graphs' intersection point.

Assessment

Journal Have students explain the meaning of the intersection of two lines and the difference between the coordinates of the intersection and the solution of the original equation.

Try This

Solve each equation by graphing.

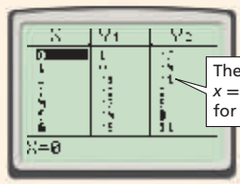
1. $2x + 1 = x + 8$ **7**
2. $4x - 3 = 2x + 9$ **6**
3. $2x - 5 = x - 9$ **–4**
4. $-x + 3 = 5 - 2x$ **2**
5. $x - 10 = -3x + 2$ **3**
6. $-6x + 5 = -x$ **1**

Activity 2

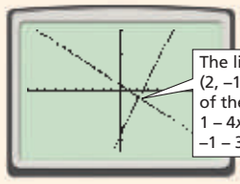
Use a graphing calculator to solve $1 - 4x + 3x = -1 - 3(2 - x)$.

1. Press Y= and enter each side of the equation into Y_1 and Y_2. You do not need to simplify first.

2. Press 2nd TABLE GRAPH to use the **TABLE** function. Scroll until you find the value of x for which the y-values are the same.



3. Press GRAPH and verify where the lines intersect.



4. You can check your answer by solving the equation algebraically.

$$\begin{aligned} 1 - 4x + 3x &= -1 - 3(2 - x) \\ 1 - x &= -1 - 6 + 3x \\ 1 - x - 3x &= -7 + 3x - 3x \\ 1 - 4x &= -7 \\ 1 - 1 - 4x &= -7 - 1 \\ -4x &= -8 \\ \frac{-4x}{-4} &= \frac{-8}{-4} \\ x &= 2 \checkmark \end{aligned}$$

Try This

Solve each equation by graphing.

7. $-5x + 2(x - 2) = 5x + 4$ **–1**
8. $3(x + 2) = -x + 18$ **3**
9. $2x - 5x + 4 = 2(x - 1) + 16$ **–2**

2-8A Precision and Accuracy

© Kristy-Anne Glubish/Design Pics/Corbis

Objectives
Analyze and compare measurements for precision and accuracy.

Choose an appropriate level of accuracy when reporting measurements.

Vocabulary
precision
accuracy
tolerance

Who uses this?
Chemists must understand precision and accuracy when weighing or mixing specific amounts of chemicals. (See Example 2.)

When you measure an object, you must use an instrument that will give an appropriate measurement. A scale to measure the mass of a person may show mass to the nearest kilogram. A scale to measure chemicals in a lab may show mass to the nearest milligram.

Precision is the level of detail in a measurement and is determined by the smallest unit or fraction of a unit that you can reasonably measure. Sometimes, the instrument determines the precision of a measurement. At other times, measurements are rounded to a specified precision.

A scale that shows the mass of an object to the nearest milligram is more precise than a scale that shows the mass of an object to the nearest kilogram, because a milligram is a smaller unit of measure than a kilogram. Likewise, a scale that shows the mass of an object as 24.23 grams is more precise than a scale that shows the mass of the same object as 24.2 grams.

EXAMPLE 1 **Comparing Precision of Measurements**

Choose the more precise measurement in each pair.

A **3.4 kg; 3421 g**

3.4 kg	*Nearest tenth of a kilogram*
3421 g	*Nearest gram*

A gram is smaller than a tenth of a kilogram, so 3421 g is more precise.

B **3.4 cm; 3.43 cm**

3.4 cm	*Nearest tenth of a centimeter*
3.43 cm	*Nearest hundredth of a centimeter*

A hundredth of a centimeter is smaller than a tenth of a centimeter, so 3.43 cm is more precise.

C **3 ft; 36 in.**

3 ft	*Nearest foot*
36 in.	*Nearest inch*

An inch is smaller than a foot, so 36 in. is more precise.

2-8A Organizer

Pacing: Traditional 2 days
Block 1 day

Objectives: Analyze and compare measurements for precision and accuracy.

Choose an appropriate level of accuracy when reporting measurements.

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Warm Up

Convert each measure.

1. 3210 mm to centimeters 321 cm
2. 18 in. to feet 1.5 ft
3. 52.5 kg to grams 52,500 g
4. 2.5 lbs to ounces 40 oz

Find each absolute value.

5. $|-2|$ 2
6. $|8.1|$ 8.1
7. $|3 - 1.2|$ 1.8
8. $|7 - 10|$ 3

Math Humor

Soccer coach: You're a terrible player. You scored five goals for the other team! What do you have to say for yourself?

Soccer player: Well, my accuracy needs work, but my precision is great!

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1 Introduce

EXPLORATION

2-8A Precision and Accuracy

1. In darts, an accurate throw hits the center of the board, called the bull's eye. Are the throws shown accurate? Why or why not?

2. The distance of each dart to the center of the bull's eye is measured as 3.4 in., 3.52 in., and 3.518 in. The most precise measurement has the greatest level of detail. Which measurement is the most precise? Why?
3. The diameter of a regulation dart board is 17.75 in. Three people measure a regulation dart board and get the following results: 18 in., 17.875 in., and 17.75 in. Which measurement is most accurate? Which is most precise?

THINK AND DISCUSS

4. **Explain** how to find the more precise measurement when the units are different.
5. **Describe** how a measurement with a particular ruler could be more precise but not as accurate as a measurement with a different ruler.

Motivate

Draw two diagrams as shown. Explain that they are the results of two players' attempts to hit a bull's eye in a game of darts. Have students compare and contrast the throwing skills of each player. Explain that they will learn how to articulate the differences in the players' skills in this lesson.

Player A

Player B

Explorations and answers are provided in the online edition.

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Additional Examples

Example 1

Choose the more precise measurement in each pair.

A. 0.8 km; 830.2 m 830.2 m

B. 2.45 in.; 2.5 in. 2.45 in.

C. 100 cm; 1 m 100 cm

Example 2

Ida works in a deli. She is testing the scales at the deli to make sure they are accurate. She uses a weight that is *exactly* 1 pound and gets the following results:

Scale 1: 1.019 lb

Scale 2: 1.01 lb

Scale 3: 0.98 lb

a. Which scale is the most precise? 1

b. Which scale is the most accurate? 2

INTERVENTION

Questioning Strategies

EXAMPLE 1

- Will you always get a more precise measurement by using smaller units, say centimeters rather than meters?

EXAMPLE 2

- If a package of deli meat measures x on scale 3, what predictions can you make about the measures of its weight on scales 1 and 2?

Teaching Tip **Critical Thinking**
Techniques used to ensure accuracy in experiments include checking a known mass on a scale, measuring twice, and using two different tools or methods. Ask students to think of other possible techniques.

CHECK IT OUT! **Choose the more precise measurement in each pair.**

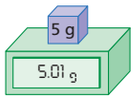
1a. 2 lb; 17 oz **1b.** 7.85 m; 7.8 m **1c.** 6 kg; 6000 g

A precise measurement is only useful if the measurement is also *accurate*. The **accuracy** of a measurement is the closeness of a measured value to the actual or true value. Two measurement tools may measure to the same precision, but not have the same accuracy. Similarly, using a more precise measuring instrument will not necessarily give a more accurate measurement.

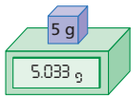
EXAMPLE 2 Comparing Precision and Accuracy

Sam is a technician in a pharmaceutical lab. Each week, she must test the scales in the lab to make sure they are accurate. She uses a standard mass that is *exactly* 5.000 grams and gets the following results:

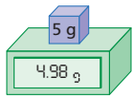
Scale 1



Scale 2



Scale 3



a. Which scale is the most precise?

Scales 1 and 3 measure to the nearest hundredth of a gram.

Scale 2 measures to the nearest thousandth of a gram.

Because a thousandth of a gram is smaller than a hundredth of a gram, Scale 2 is the most precise.

b. Which scale is the most accurate?

For each scale, find the absolute value of the difference of the standard mass and the scale reading.

Scale 1: $|5.000 - 5.01| = 0.01$

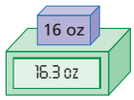
Scale 2: $|5.000 - 5.033| = 0.033$

Scale 3: $|5.000 - 4.98| = 0.02$

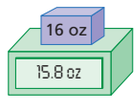
Because $0.01 < 0.02 < 0.033$, Scale 1 is the most accurate.

CHECK IT OUT! **2.** A standard mass of 16 ounces is used to test three postal scales. The results are shown below.

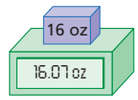
Scale A



Scale B



Scale C



a. Which scale is the most precise? C

b. Which scale is the most accurate? C

When you measure a group of objects that are expected to be similar, you may find that there are variations from the expected value. **Tolerance** describes the amount by which a measurement is permitted to vary from a specified value. Tolerance is often expressed as a range of values, such as 5 mm ± 0.3 mm, which is equivalent to 4.7 mm–5.3 mm.

2 Teach

Guided Instruction

This lesson will help students understand the significance of measurements while doing mathematical data analysis. Review how to convert between commonly used units of mass, length, and weight, as well as the concept of absolute value. Draw students' attention to the number of decimal places to which the measurements are made. Be sure that students grasp the difference between precision and accuracy.

Reaching All Learners

Through Kinesthetic Experience

Pair students and give each pair a meter stick. Have both students in each pair measure the same object. Each student may pick any of the following units to measure to: millimeter, centimeter, tenth of a centimeter, meter, tenth of a meter, or hundredth of a meter. Have each pair of students compare their results and say whether one measurement is more precise.

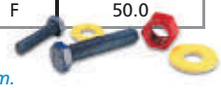
EXAMPLE 3 Using a Specified Tolerance

Writing Math

The final zero in a decimal measurement such as 50.0 mm should not be dropped. 50.0 mm indicates a precision of one-tenth of a millimeter. 50 mm indicates a precision of one millimeter, and is less precise than 50.0 mm.

Acme Nuts & Bolts is manufacturing a bolt to use in an airplane. The length of the bolt should be 50 mm, with a tolerance of 0.5 mm (50 mm ± 0.5 mm). A batch of bolts had the lengths shown in the table. Do all of the bolts measure within the specified tolerance? If not, which bolt(s) are not within the specified tolerance?

Bolt	Length (mm)
A	49.8
B	50.4
C	49.5
D	50.1
E	49.4
F	50.0



$50 - 0.5 = 49.5$ *50 mm ± 0.5 mm means that the*
$50 + 0.5 = 50.5$ *bolts must be between 49.5 and 50.5 mm.*

Bolt E measures 49.4 mm, so it is not within the specified tolerance.

CHECK IT OUT!

3. A lacrosse ball must weigh 5.25 oz ± 0.25 oz. The weights of the lacrosse balls in one box are given in the table. Do all of the lacrosse balls weigh within the specified tolerance? If not, which lacrosse ball(s) are not within the specified tolerance? **no; C**

Ball	Weight (oz)
A	5.41
B	5.23
C	5.54
D	5.33
E	5.21

Tolerance can also be expressed as a percent. A measurement written as 5 mm ± 5% means that the measurement can be greater or less than 5 mm by an amount equal to 5% of 5 mm, or 0.25 mm. Therefore, the measurement can have a range of 4.75 mm–5.25 mm.

EXAMPLE 4 Using Tolerance Expressed as a Percent

Write the possible range of each measurement. Round to the nearest hundredth if necessary.

A **50 kg ± 2%**

$50(0.02) = 1$ *Find 2% of 50.*
50 kg ± 1 kg *Write the measurement and tolerance.*
49 kg–51 kg *Write the measurement as a range.*

B **125 lb ± 1.5%**

$125(0.015) = 1.875$ *Find 1.5% of 125.*
125 lb ± 1.88 lb *Write the measurement and tolerance. Round to the nearest hundredth.*
123.12 lb–126.88 lb *Write the measurement as a range.*

C **45 mm ± 0.3%**

$45(0.003) = 0.135$ *Find 0.3% of 45.*
45 mm ± 0.14 mm *Write the measurement and tolerance. Round to the nearest hundredth.*
44.86 mm–45.14 mm *Write the measurement as a range.*

4a. 3.89 cm–4.31 cm
4b. 463.12 m–486.88 m
4c. 84.57 mg–85.43 mg

CHECK IT OUT!

Write the possible range of each measurement. Round to the nearest hundredth if necessary.

4a. 4.1 in. ± 5% **4b.** 475 m ± 2.5% **4c.** 85 mg ± 0.5%

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Additional Examples

Example 3

Bright Days Blinds makes window shades. The width of a 30-inch shade should be within 0.18 in. of 30 in. A batch of shades has the widths shown in the table.

Shade	Width (in.)
A	30.06
B	29.75
C	29.84
D	30.12
E	29.93

Do all of the shades measure within the specified tolerance? If not, which shade(s) are not within the specified tolerance? No; B

Example 4

Write the possible range of each measurement. Round to the nearest hundredth if necessary.

A. 12 lb ± 3% 11.64 lb–12.36 lb

B. 15 oz ± 1.5% 14.77 oz–15.23 oz

C. 3 m ± 0.2% 2.99 m–3.01 m

INTERVENTION

Questioning Strategies

EXAMPLES 3–4

- Why might tolerances be used in manufacturing?

3 Close

Summarize

Have students return to the dartboard diagrams from *Motivate*. Use the vocabulary they have learned to explain that player B is more precise because the darts consistently land close together, but less accurate because the darts are not near the bull's eye. Player A is less precise because the darts land further apart, but more accurate because the darts are clustered near the bull's eye.

ONGOING ASSESSMENT and INTERVENTION

***Diagnose Before* the Lesson**
2-8A Warm Up, TE p. CC3

***Monitor During* the Lesson**
Check It Out! Exercises, SE pp. CC4–CC5
Questioning Strategies, TE pp. CC4–CC5

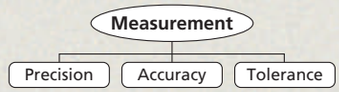
***Assess After* the Lesson**
2-8A Lesson Quiz, TE p. CC9
Alternative Assessment, TE p. CC9

Answers to *Think and Discuss*

1. Precision has to do with how small the units of measure are. Accuracy has to do with how close the measured quantity is to the actual quantity.
2. Possible answer: the length of a handmade candlestick
3. See Additional Answers.

THINK AND DISCUSS

1. Explain the difference between precision and accuracy.
2. Describe a situation where the expected size of an object might be specified as 10 in. ± 0.5 in.
3. **GET ORGANIZED** Copy and complete the graphic organizer. In each box, write an example of when that characteristic of measurement would be important.



2-8A Exercises

Assignment Guide

Assign *Guided Practice* exercises as necessary.

If you finished Examples **1–2**
- **Basic** 19–27, 37–51
- **Average** 19–27, 37–40, 43–48, 67
- **Advanced** 19–21, 27, 37–39, 43–47, 67

If you finished Examples **1–4**
- **Basic** 19–61, 64–66, 70–82
- **Average** 19–40, 43–48, 52–68, 70–82
- **Advanced** 19–21, 27–32, 37–39, 43–47, 52, 53, 60–82

Homework Quick Check
Quickly check key concepts.
Exercises: 20, 27, 28, 30, 38

2-8A Exercises

GUIDED PRACTICE

Vocabulary **Apply the vocabulary from this lesson to answer each question.**

1. A ruler that can measure length to a smaller unit than another ruler is said to be more _____?_____. (*precise* or *accurate*) **precise**
2. A scale that gives a mass closer to the true mass of an object than another scale of the exact same type is said to be more _____?_____. (*precise* or *accurate*) **accurate**

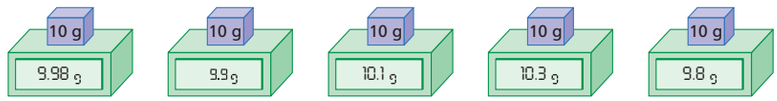
SEE EXAMPLE 1 p. CC3

Choose the more precise measurement in each pair.

3. 4 mL; 4.3 mL
4. 7 m; 6.8 m
5. 2.4 mg; 2.37 mg
6. 7 lb; 6.5 lb
7. 47 ft; 47.3 ft
8. 14 oz; 13.9 oz

SEE EXAMPLE 2 p. CC4

9. Sarah is comparing five different scales using a standard mass that is exactly 10 grams. Her results are shown below.



   a. Which scale is the most precise? **1**
   b. Which scale is the most accurate? **1**

10. A group of students compare the odometer readings on their bicycle computers after riding their bikes on a one-mile track. Their odometer readings are shown in the table. Whose odometer is the most precise? Whose is the most accurate? **Rasheed's; Jen's**

Student	Distance (mi)
Jen	1.01
Bill	0.97
Rasheed	0.989
Sasha	1.02

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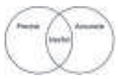
2-8A READING STRATEGIES

Precision and accuracy refer to two different characteristics of a measurement. Precision describes the level of detail in a measurement, whereas accuracy describes how close the measurement is to the true value.



Tolerance refers to the amount a measurement is allowed to vary from a specified value. For example, a specified value of 8 with a tolerance of ± 2 can be written 8 ± 2. Measurements within this tolerance are in the range 6–10. This range can be shown on a number line.

Write the range shown on each number line to the nearest tenth.

1. 8.0 ± 1.0 — 7.0–9.0
2. 3.2 ± 0.8 — 2.4–4.0

For 3 and 4, *C* represents the specified value. What is the tolerance?

3. ±3
4. ±2.5

For 5 and 6, a specified value is given. Which point is most accurate?

5. Specified value: 3.19 — *B*
6. Specified value: 6.05 — *A*

2-8A RETEACH

The *precision* of a measurement is determined by the smallest unit or fraction of a unit used.

Choose the more precise measurement in each pair.

a. 16.7 kg; 16.66 kg
Compare the two measurements: 16.7 kg is to the nearest tenth. 16.66 kg is to the nearest hundredth.
Because a hundredth of a kilogram is smaller than a tenth of a kilogram, 16.66 kg is more precise.

b. 8.5 km; 8532 m
Note that the units are different, but they can easily be converted:
8532 m = 8.532 km [1000 m = 1 km]
Compare the two measurements: 8.5 km is to the nearest tenth. 8.532 km is to the nearest thousandth.
Because a thousandth of a meter is smaller than a tenth of a meter, 8532 m is more precise.

Choose the more precise measurement in each pair.

1. 73.71 cm; 736.2 cm
   73.71 cm is to the nearest **hundredth** of a centimeter.
   736.2 cm is to the nearest **tenth** of a centimeter.
   73.71 cm is more precise.
2. 4732 mL; 4.73 L
   4732 mL = **4.732** L, which is to the nearest **thousandth** of a liter.
   4.73 L is to the nearest **hundredth** of a liter.
   4732 mL is more precise.
3. An object is weighed on three different scales. The results are shown in the table. Which scale is the most precise?

Scale	Measurement (lb)
1	44.9
2	45.105
3	45.01

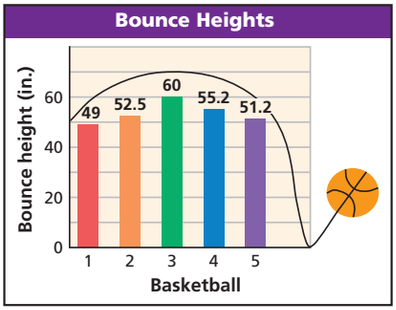
Scale 1 measures to the nearest **tenth** of a pound.
Scale 2 measures to the nearest **thousandth** of a pound.
Scale 3 measures to the nearest **hundredth** of a pound.
Scale **2** is the most precise.

SEE EXAMPLE 3 p. CC5

11. Sports A basketball for men's college games must have a mass of 595.5 ± 28.5 grams. Several basketballs are tested. Their masses are shown in the table. Do all of the basketballs fall within the specified tolerance? If not, which basketball(s) do not fall within the specified tolerance? **no; ball 4**

Basketball	1	2	3	4	5
Mass (g)	617.5	567.5	608	624.5	593.5

12. Sports A basketball for men's college games must bounce 51.5 ± 2.5 in. when dropped from a height of 6 feet. The bounce heights of several basketballs when dropped from a height of 6 feet are shown in the graph. Do all of the basketballs fall within the specified tolerance? If not, which basketball(s) do not have a bounce height within the specified tolerance? **no; balls 3 and 4**



SEE EXAMPLE 4 p. CC5

Write the possible range of each measurement. Round to the nearest hundredth if necessary.

13. 50 lb ± 2% **49 lb–51 lb**

14. 100 yd ± 0.5%

15. 25 cm ± 4%

16. 400 L ± 6%

17. 250 mm ± 4%

18. 70 kg ± 3%

14. 99.5 yd–100.5 yd
15. 24 cm–26 cm
376 L–424 L
240 mm–260 mm
67.9 kg–72.1 kg

PRACTICE AND PROBLEM SOLVING

Independent Practice

For Exercises	See Example
19–26	1
27	2
28	3
29–36	4

Choose the more precise measurement in each pair.

19. 4.33 g; 4337 mg **20.** 11 ft; 122 in. **21.** 6 tons; 11,000 lb **22.** 3 c; 2 pt

23. 67 mm; 6.83 cm **24.** 4.5 km; 3 mi **25.** 12 cm; 0.0127 m **26.** 7.23 lb; 115 oz

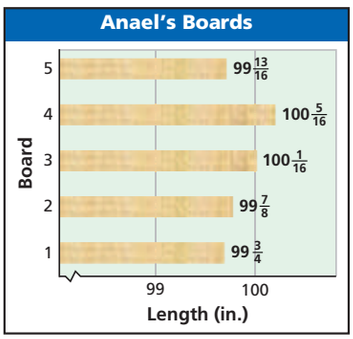
27. Maria is trying to beat the school record for the 400-meter dash. Her friends timed her using the stopwatch functions in their cell phones. The official track timer, which is highly accurate, reported that she ran the race in 51.12 seconds. Her friends recorded the times shown in the table.

Name	Time (s)
Lucy	51.1
Juan	52.23
Chandra	51.769
Pei	50.97

a. Who recorded the most precise time? **Chandra**

b. Who recorded the most accurate time? **Lucy**

28. Anael cut several boards to build a deck. The boards must be 100 in. ± 0.25 in. Her measurements of the boards after cutting them are shown in the graph. Which boards, if any, can she not use? **board 4**



2-8A PRACTICE B

Choose the more precise measurement in each pair.

1. 2.78 L; 2782 mL — **2782 mL**
2. 6 ft; 72.3 in. — **72.3 in.**
3. 2 c; 15 oz — **15 oz**
4. 52 mm; 5.24 cm — **5.24 cm**
5. 3 lb; 47 oz — **47 oz**
6. 5.2 km; 5233 m — **5233 m**

Write the possible range of each measurement. Round to the nearest hundredth if necessary.

7. 50 m ± 4% — **48.00 m–52.00 m**
8. 90 °F ± 15% — **76.50 °F–103.50 °F**
9. 15 L ± 2% — **14.70 L–15.30 L**
10. 16 ft ± 1.5% — **15.76 ft–16.24 ft**
11. 9 in. ± 10% — **8.10 in.–9.90 in.**
12. 66 g ± 3% — **64.02 g–67.98 g**

Use the following information for 13 and 14.

Marcel is measuring the volume of a liquid for chemistry class. He uses a beaker, a measuring cup, and a test tube. The teacher measures the liquid with a graduated cylinder, which gives the most accurate reading of 26.279 milliliters (mL). Marcel's measurements are shown below.

Measuring Device	Measurement (mL)
Beaker	26.3
Measuring Cup	25
Test Tube	26.21

13. Which device used by Marcel recorded the most precise measurement? **test tube**
14. Which device used by Marcel recorded the most accurate measurement? **beaker**

2-8A PROBLEM SOLVING

Write the correct answer.

1. Rolondo is measuring the length of his lawn. Using a board that is 10 feet long, he measures his lawn to be 70 feet long. He then uses his foot, which is 12 inches long, to measure his lawn to be 864 inches. Which is the more precise measurement? Which is the more precise tool? **864 in.; Rolondo's foot**
2. A bolt used to assemble a car must have a length of 37.5 mm ± 4%. Does a bolt that is 39.3 mm long fall within the specified tolerance? Why or why not? **No; it is too long**
3. According to the Billiard Congress of America, BCA Equipment Specification, the diameter of a billiard ball is 2.25 inches with a tolerance of 0.005 inch. Which billiard ball(s) in the table below meet(s) this standard?

Ball	1	2	3	4	5
Diameter (in.)	2.255	2.249	2.251	2.250	2.2
Ball	6	7	8	9	10
Diameter (in.)	2.251	2.244	2.239	2.249	2.251
Ball	11	12	13	14	15
Diameter (in.)	2.250	2.219	2.247	2.257	2.288

1, 2, 3, 4, 5, 6, 9, 10, 11, 13

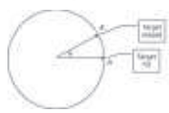
Select the best answer.

4. Ann is measuring the capacity of a 16-oz water bottle. She first uses a measuring cup and finds that the water bottle holds 16.2 oz of water. She then uses a graduated cylinder and finds that the water bottle holds 16.18 oz of water. Which is the more precise measurement? Which is the more precise tool? **D**
   A 16.2 oz; measuring cup
   B 16.2 oz; graduated cylinder
   C 16.18 oz; measuring cup
   D 16.18 oz; graduated cylinder
5. Ina added 32.155 milliliters (mL) of HCL to 64 mL of H_2O. How much solution does Ina have to the nearest milliliter? **G**
   F 95 mL H 97 mL
   G 96 mL J 98 mL
6. Jesse mixed 8.24 oz of paprika with 12.23 oz of pepper. How much of the spice combination does Jesse have to the nearest tenth of an ounce? **C**
   A 20.0 oz C 20.5 oz
   B 20.4 oz D 21.0 oz
7. An aquarium must be heated to 30˚C ± 1.5%. What is the acceptable temperature range for this aquarium? **H**
   F 25.5 ˚C–34.5 ˚C
   G 28.5 ˚C–31.5 ˚C
   H 29.55 ˚C–30.45 ˚C
   J 29.85 ˚C–30.15 ˚C

2-8A CHALLENGE

When aiming a projectile, such as an arrow, at a target, very small changes in aim can make a large difference in where the arrow lands. For example, the distance between the center and the edge of an archery target is about 2 ft. But if you aim your arrow at the center of the target and then move it two feet to one side, you will miss the target by a large distance!

The distance from an arrow's starting point to its landing point can be represented by the radius of a circle, with the starting point at the center of the circle and the landing point on the circle. In the diagram below, A represents the target and B represents where the arrow lands. The distance by which the arrow misses the target is the distance from A to B.



The circumference of a circle is $2\pi r$ times the radius. Therefore, the distance from A to B is $AB = \frac{\theta}{360} 2\pi r$.

1. William is 90 m from an archery target. His arrow lands 0.3 m left of the target. By how many degrees should he adjust his aim to hit the target? Round to the nearest hundredth of a degree. (*Hint:* $AB = 0.3$ m; $r = 90$ m) **0.19°**
2. Sharon and Tony have built a catapult for the Medieval Festival. They enter a contest to hit a 20-ft target that is 250 ft away. How wide is the angle, in degrees, that the catapult can be aimed and hit the target? **4.6°**
3. An engineer is launching a rocket to the moon. He accidentally enters the angle of the rocket's trajectory as 45.5°, instead of 45.05°. How far off target will the rocket be when it crosses the moon's orbit? Round to the nearest hundred kilometers. (*Hint:* The moon is about 384,000 km from Earth.) **3000 km**

COMMON ERROR ALERT

In **Exercise 60,** students may find the differences between the given ranges and record the tolerance for length as ±1 in. and the tolerance for width as $\pm \frac{3}{4}$ in. Remind students that because tolerance is added and subtracted from the expected value, it will be *half* of the difference.

Teaching Tip **Visual** To think through **Exercise 63**, sketch the original board and the divisions marking the 8 sections. Suggest to students that the lines marking the divisions can represent the material that becomes sawdust while cutting the boards, and that those widths must be accounted for in the context of the real-life problem.

Answers

60. length: $5\frac{1}{2}$ in. $\pm \frac{1}{2}$ in.; width: $3\frac{7}{8}$ in. $\pm \frac{3}{8}$ in.

62. Possible answer: nearest $\frac{1}{2}$ inch; the manufacturer's meas. is to the nearest in., so the actual meas. is between $38\frac{1}{2}$ in. and $39\frac{1}{2}$ in. This means Linda's door must be at least $39\frac{1}{2}$ inches wide.

63. No; the precision is too great because (1) the length of the cut boards cannot be known to a greater precision than the length of the orig. board; (2) if Yusuf measures the cut boards the same way he measured the orig. board, the precision will be the same; and (3) part of the length of the orig. board equal to the thickness of the blade used to cut it will be lost.

Write the possible range of each measurement. Round to the nearest hundredth if necessary.

29. 45 lb ± 2% **44.1 lb–45.9 lb**

30. 3 m ± 5% **2.85 m–3.15 m**

31. 37 °C ± 1.5% **36.44 °C–37.56 °C**

32. 750 kg ± 3% **727.5 kg–772.5 kg**

33. 30 ft ± 4% **28.8 ft–31.2 ft**

34. 550 mL ± 8% **506 mL–594 mL**

35. 0.2 cm ± 5% **0.19 cm–0.21 cm**

36. 0.25 kg ± 10% **0.23 kg–0.28 kg**

Round each measurement to the specified precision.

37. 5456.3 mi to the nearest mile **5456 mi**

38. 3.627 m to the nearest hundredth of a meter **3.63 m**

39. 119.8 ft to the nearest ten feet **120 ft**

40. 62.301 cg to the nearest tenth of a centigram **62.3 cg**

41. 5,721 mg to the nearest kilogram **6 kg**

42. 0.4586 km to the nearest meter **459 m**

52. 100 m ± 2%

53. 50 g ± 4%

Choose the more precise measurement in each pair. If they are equally precise, write "neither."

43. 16.270 liters; 16,453.2 mL

44. 437 cm; 437 mm

45. 0.265 cm; 260 mm

46. 5.20 kg; 5200.0 mg

47. 55 yd; 165 ft

48. 67 min; 1.1 h

49. 33 mg; 0.033 g **neither**

50. 42.7 cm; 427.0 mm

51. 475.0 mL; 0.475 L

Rewrite each specified tolerance as a percent.

52. 100 m ± 2 m **240 ft ± 5%**

53. 50 g ± 2 g **750 kg ± 2%**

54. 240 ft ± 12 ft

55. 750 kg ± 15 kg

56. 25 in. ± 0.25 in. **25 in. ± 1%**

57. 425 lb ± 8.5 lb **425 lb ± 2%**

58. 60 oz ± 1.5 oz **60 oz ± 2.5%**

59. 175 km ± 5.25 km **175 km ± 3%**

LINK Technology

Automated equipment plays a large role in processing the approximately 584 million pieces of mail that the U.S. Postal Service delivers each day. Machines sort mail, cancel stamps, scan barcodes, and even "read" handwritten addresses.

Source: Postal Facts 2010, USPS

60. Technology Postcards that do not fit in the U.S. Postal Service's automatic sorting machines require additional postage for mailing. The machine will accept postcards whose length is between 5 and 6 inches and whose width is between $3\frac{1}{2}$ and $4\frac{1}{4}$ inches. Write these requirements as tolerances.

61. Sports For women's collegiate competition, a basketball's circumference, mass, and bounce height must fall within given tolerance levels of regulation measurements. The table shows these tolerance levels as well as measurements taken on five different basketballs. Which basketball meets all of the specified tolerances? **ball 4**

	Circumference (mm)	Mass (g)	Bounce Height (mm)
Tolerance	730.56 ± 6.5	538.5 ± 28.5	1358.5 ± 63.5
Basketball #1	729.8	509.3	1343.4
Basketball #2	723.5	529.8	1299.8
Basketball #3	734.2	542.6	1293.5
Basketball #4	725.5	528.0	1364.5
Basketball #5	740.0	555.9	1407.4

62. Write About It Linda wants to purchase a new sofa. Before buying the sofa, Linda must measure her doorway to make sure that the sofa will fit through the door. The sofa manufacturer says that the sofa measures 39 inches from front to back. What level of precision would you recommend Linda measure to? Explain.

63. Critical Thinking Yusuf measured a board and determined that it was 125.5 centimeters long. He then cut the board into eight equal pieces. His calculator shows that 125.5 ÷ 8 = 15.6875. Is it reasonable for Yusuf to record the length of the 8 smaller boards as 15.6875 centimeters? Explain why or why not.

TEST PREP

64. The mass of a crystal is 0.9728 grams. What is the mass of the crystal to the nearest milligram?

Ⓐ 1 milligram
Ⓑ 9.73 milligrams
Ⓒ 973 milligrams
Ⓓ 972.8 milligrams

65. A piece used to assemble a computer must be 1.4 millimeters ± 0.02 millimeters in diameter. Which of the following measurements does NOT meet the specified tolerance?

Ⓕ 1.420 millimeters
Ⓖ 1.402 millimeters
Ⓗ 1.382 millimeters
Ⓙ 1.378 millimeters

66. Which measurement is most precise?

Ⓐ 475.3 milliliters
Ⓑ 475 milliliters
Ⓒ 0.475 liter
Ⓓ 0.5 liter

CHALLENGE AND EXTEND

Percent accuracy or *percent error* indicates how far a measurement is from the true value. An instrument that has 1.5% accuracy means that the measured value is within 1.5% of the true value.

67. A scale shows that a standard mass of exactly 5.000 grams has a mass of 5.002 grams. What is the percent accuracy of the scale? **0.04%**

68. A car odometer is accurate to within 0.5%. The odometer records the distance from Charlotte, North Carolina, to Orlando, Florida, as 525.3 miles. What is the range of possible values for the actual mileage? **522.7 mi–527.9 mi**

69. **Astronomy** A scientist measures the distance to the moon using a method that has a percent error of 0.02%. He finds that the distance at a particular time is 384,403 kilometers. What is the range of possible values for the actual distance? **384,326 km–384,480 km**

SPIRAL REVIEW

Solve each equation. *(Lessons 2-1 and 2-2)*

70. $-7 + x = 12$ **19** **71.** $w + 14 = -1$ **−15** **72.** $n - 7 = 2$ **9** **73.** $t + 12 = -8$ **−20**

74. $-8z = 72$ **−9** **75.** $\frac{r}{7} = 11$ **77** **76.** $5f = -85$ **−17** **77.** $\frac{k}{6} = 6$ **36**

Solve each equation. *(Lesson 2-4)*

78. $4x - 15 = -2x + 9$ **4** **79.** $-5k + 6 = 2k - 22$ **4** **80.** $6b - 8 = 12 + 2b$ **5**

81. A picture has a width of 8 inches and a length of 12 inches. The picture is enlarged, and the length of the enlarged copy is 18 inches. What is the new width? *(Lesson 2-8)* **12 in.**

82. A rectangle has an area of 18 square centimeters. Every dimension is multiplied by a scale factor, and the new square has an area of 162 square centimeters. What was the scale factor? *(Lesson 2-8)* **3**

TEST PREP DOCTOR

In **Exercise 64, B and D** can be eliminated because the numbers are not given to the nearest milligram. Students who selected **A** may have made an error converting units.

Journal

Have students explain a situation in which accuracy and precision are both important, and one in which other priorities might outweigh the cost of a high degree of accuracy and/or precision.

ALTERNATIVE ASSESSMENT

Have students use examples to describe the difference between precision and accuracy.

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2-8A Lesson Quiz

1. Choose the more precise measurement: 2.4 km; 2430 m 2430 m

2. Jorge works in a mail room. To test the accuracy of the scales in the mail room, he uses a weight that is *exactly* 8 oz. and gets the following results:

Scale 1: 8.02 oz
Scale 2: 7.8988 oz
Scale 3: 8.015 oz

a. Which scale is the most precise? 2

b. Which scale is the most accurate? 3

3. Monique is cutting wooden slats that are to be 20 in. long. Three slats have the following lengths:

A: 19.96875 in.
B: 19.875 in.
C: 20.0625 in.

a. Which slat(s), if any, do not fall within a tolerance of 0.0625 in.? B

b. Which slat(s), if any, do not fall within a tolerance of 0.5%? B

Mastering the Standards

for Mathematical Practice

The topics described in the Standards for Mathematical Content will vary from year to year. However, the *way* in which you learn, study, and think about mathematics will not. The Standards for Mathematical Practice describe skills that you will use in all of your math courses.

Mathematical Practices

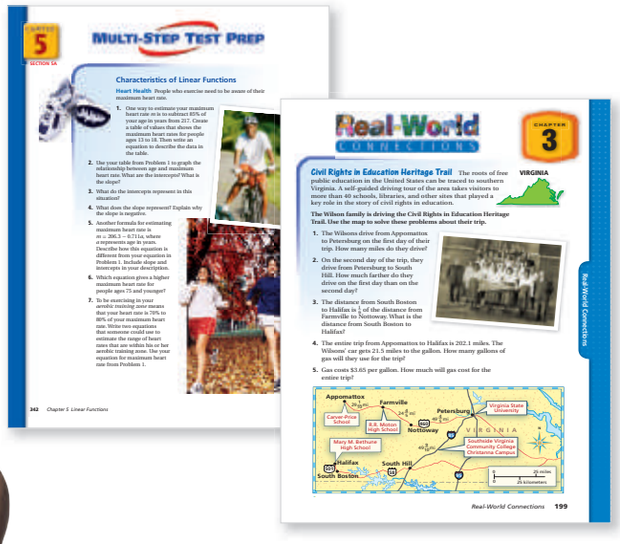
1. *Make sense of problems and persevere in solving them.*
2. *Reason abstractly and quantitatively.*
3. *Construct viable arguments and critique the reasoning of others.*
4. *Model with mathematics.*
5. *Use appropriate tools strategically.*
6. *Attend to precision.*
7. *Look for and make use of structure.*
8. *Look for and express regularity in repeated reasoning.*

4 Model with mathematics.

Mathematically proficient students can apply... mathematics... to... problems... in everyday life, society, and the workplace...

In your book

Multi-Step Test Prep and **Real-World Connections** apply mathematics to other disciplines and in real-world scenarios.



PhotoDisc/Getty Images

CC10

5-9A Line of Best Fit

Objectives
Determine a line of best fit for a set of linear data.

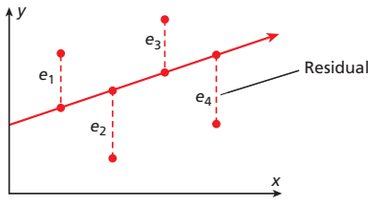
Determine and interpret the correlation coefficient.

Vocabulary
residual
least-squares line
line of best fit
linear regression
correlation coefficient

Who uses this?
Climate scientists can use a least-squares line to study temperature-latitude relationships. (See Example 2.)

Recall from Chapter 4 that a scatter plot shows two data sets as one set of ordered pairs. A trend line, or line of fit, is a model for the data.

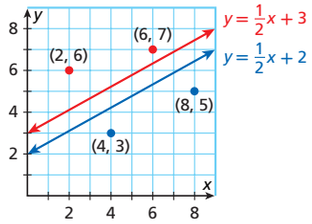
Some trend lines will fit a data set better than others. One way to evaluate how well a line fits a data set is to use *residuals*. A **residual** is the signed vertical distance between a data point and a line of fit. The closer the sum of the squared residuals is to 0, the better the line fits the data.



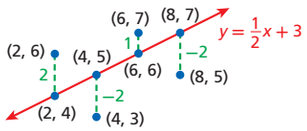
EXAMPLE 1 Calculating Residuals

The data in the table are graphed along with two lines of fit. For each line, find the sum of the squares of the residuals. Which line is a better fit?

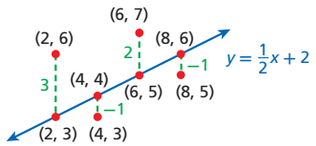
x	2	4	6	8
y	6	3	7	5



Find the residuals.



Sum of squared residuals:
$(2)^2 + (-2)^2 + (1)^2 + (-2)^2$
$4 + 4 + 1 + 4 = 13$



Sum of squared residuals:
$(3)^2 + (-1)^2 + (2)^2 + (-1)^2$
$9 + 1 + 4 + 1 = 15$

The line $y = \frac{1}{2}x + 3$ is a better fit for the data.

Helpful Hint
By using *squares* of residuals, positive and negative residuals do not "cancel out," and residuals with squares greater than 1 have a magnified effect on the sum.

5-9A Organizer

Pacing: Traditional 2 days
Block 1 day

Objectives: Determine a line of best fit for a set of linear data.

Determine and interpret the correlation coefficient.

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Warm Up

Identify the slope and the *y*-intercept.

1. $y = -2x + 1$ $m = -2, b = 1$
2. $y = \frac{2}{3}x - 4$ $m = \frac{2}{3}, b = -4$

Identify the correlation (positive, negative, or none) that you would expect to see between each pair of data sets.

3. a person's height and shoe size pos.
4. the age of a car and its value neg.

Math Humor

Q: Why did the playwright take so long to decide what the lead character should say at a crucial moment in the play?

A: She wanted to be sure it was the line of best fit.

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1 Introduce

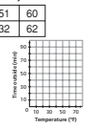
EXPLORATION

5-9A Line of Best Fit

The table shows the temperatures for five consecutive days and the number of minutes Rosa spent outside that day.

Temperature (°F)	77	70	72	51	60
Time Outside (min)	85	95	91	32	62

1. Plot the ordered pairs on the grid.
2. Graph and label the trend lines represented by $y = 2x - 20$ and $y = 2x - 60$ on the grid.



THINK AND DISCUSS

3. **Describe** how to use each equation to predict the amount of time Rosa will spend outside on a day when the temperature is 80 °F.
4. **Explain** which of the predictions you think is more accurate and why.

Motivate

In **Lesson 4-5** students learned that a scatter plot can show a correlation between two data sets, and that a trend line can help to show that correlation. On the board, make a rough sketch of a scatter plot. Then sketch two trend lines and label them ℓ_1 and ℓ_2. Ask students, by a show of hands, to indicate which line they think better fits the data. Then tell them that they will learn how to find a line of *best* fit for a data set.

Explorations and answers are provided in the online edition.

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Additional Examples

Example 1

Two lines of fit for this data are $y = 2x + 2$ and $y = x + 4$. For each line, find the sum of the squares of the residuals. Which line is a better fit?

x	1	2	3	4
y	7	5	6	9

$y = 2x + 2$: 15; $y = x + 4$: 7; $y = x + 4$ is a better fit.

Example 2

The table shows populations and numbers of U.S. Representatives for several states in the year 2000.

State	Population (millions)	Representatives
AL	4.5	7
AK	0.6	1
AZ	5.1	8
AR	2.7	4
CA	33.9	53
CO	4.3	7

A. Find an equation for a line of best fit. $y = 1.56x + 0.02$

B. Interpret the meaning of the slope and y-intercept. Slope: for each 1 million increase in pop., the number of Representatives increases by 1.56 million; y-int.: a state with a pop. of 0 (or less than a million) has 0.02 Representatives (or 1 Representative).

C. Michigan had a population of approximately 10.0 million in 2000. Use your equation to predict Michigan's number of Representatives. 16

CHECK IT OUT! **1.** Two lines of fit for this data are $y = -\frac{1}{2}x + 6$ and $y = -x + 8$. For each line, find the sum of the squares of the residuals. Which line is a better fit?

x	2	4	6	8
y	3	6	1	4

$y = -\frac{1}{2}x + 6$: 16; $y = -x + 8$: 30; $y = -\frac{1}{2}x + 6$ is better.

The **least-squares line** for a data set is the line of fit for which the sum of the squares of the residuals is as small as possible. So, the least-squares line is a *line of best fit*. A **line of best fit** is the line that comes closest to all of the points in the data set, using a given process. **Linear regression** is a process of finding the least-squares line.

EXAMPLE 2 Finding the Least-Squares Line

The table shows the latitudes and average temperatures of several cities.

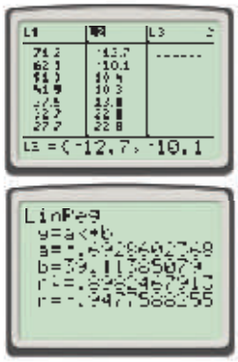
City	Latitude	Average Temperature (°C)
Barrow, Alaska, USA	71.2° N	–12.7
Yakutsk, Russia	62.1° N	–10.1
London, England	51.3° N	10.4
Chicago, Illinois, USA	41.9° N	10.3
San Francisco, California, USA	37.5° N	13.8
Yuma, Arizona, USA	32.7° N	22.8
Tindouf, Algeria	27.7° N	22.8
Dakar, Senegal	14.0° N	24.5
Mangalore, India	12.5° N	27.1

A **Find an equation for a line of best fit.**

Use your calculator. To enter the data, press STAT and select **1:Edit**. Enter the latitudes in the **L1** column and the average temperatures in the **L2** column.

Then press STAT and choose **CALC**.

Choose **4:LinReg(ax+b)** and press ENTER. An equation for a line of best fit is $y \approx -0.69x + 39.11$.



B **Interpret the meaning of the slope and y-intercept.**

The slope, −0.69, means that for each 1-degree increase in latitude, the average temperature decreases 0.69 °C. The y-intercept, 39.11, means that the average temperature is 39.11 °C at 0° N latitude.

C **The approximate latitude of Vancouver, Canada, is 49.1° N. Use your equation to predict Vancouver's average temperature.**

$y \approx -0.69x + 39.11$

$y \approx -0.69(49.1) + 39.11 \approx 5.23$

The average temperature of Vancouver should be close to 5 °C.

INTERVENTION

Questioning Strategies

EXAMPLE 1

- Why are residuals of 2 and −2 equivalent measures of fit?
- How do you use residuals to decide which line is a better fit?

EXAMPLE 2

- How are the variables x and y related to L1 and L2?

2 Teach

Guided Instruction

Before beginning this lesson, review $y = mx + b$, the slope-intercept form of a linear equation. Remind students that m is the slope and b is the y-intercept. Explain that the trend lines shown in **Example 1** were chosen to roughly follow the pattern in the scatter plot, but neither is a line of *best* fit. When discussing **Examples 2–4**, remind students that each equation *does* represent a line of best fit, and that the equations are obtained by calculator software that compares residuals.

Reaching All Learners

Through Multiple Representations

For **Example 2**, have students write these notes: L1 and x represent Latitude; L2 and y represent Average Temperature. Next, have them set up a coordinate system on graph paper, using these scales: 0 to 75 by 5's on the x-axis and −15 to 40 by 5's on the y-axis. Tell students to graph the data. Next, tell them to graph $y = -0.7x + 40$ (an approximation of $y = -0.69x + 39.11$) and confirm that the line is a good fit for the data.

CHECK IT OUT! **2.** The table shows the prices and the lengths in yards of several balls of yarn at Knit Mart.

Length (yd)	1680	100	153	99	109	109	176	100	1440	61
Price ($)	65.85	7.85	9.80	10.85	8.35	7.85	19.85	5.35	65.85	14.85

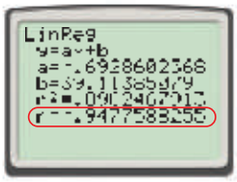
a. Find an equation for a line of best fit. $y \approx 0.04x + 6.38$

b. Interpret the meaning of the slope and y-intercept.

c. Knit Mart also sells yarn in a 1000-yard ball. Use your equation to predict the cost of this yarn. $46.38

2b. Slope: cost is $0.04/yd; y-int.: $6.38 is added to the cost of every ball of yarn.

In Example 2, you may have noticed the last value the calculator gave you, r. This is the *correlation coefficient*. The **correlation coefficient** is a number r, where $-1 \le r \le 1$, that describes how closely the points in a scatter plot cluster around a line of best fit.



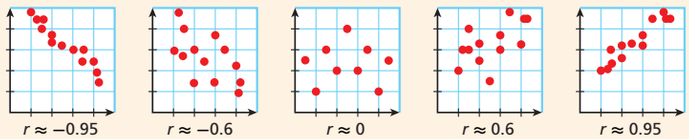
Properties of the Correlation Coefficient r

r is a value in the range $-1 \le r \le 1$.

If $r = 1$, the data set forms a straight line with a positive slope.

If $r = 0$, the data set has no correlation.

If $r = -1$, the data set forms a straight line with a negative slope.



Helpful Hint

r-values close to 1 or –1 indicate a very strong correlation. The closer r is to 0, the weaker the correlation.

EXAMPLE 3 Correlation Coefficient

The table shows a relationship between a city's population and the average time the city's citizens spend commuting to work each day.

City	Population (thousands)	Average Commute Time (min)
Albuquerque, NM	505	21.5
Atlanta, GA	486	31.1
Austin, TX	710	23.2
Charlotte, NC	630	25.1
Chicago, IL	2833	30.6
Eugene, OR	146	17.9
Houston, TX	2144	27.7
Las Vegas, NV	553	25.2
New York, NY	8496	34.0
New Orleans, LA	223	24.2

COMMON ERROR ALERT

Students may think the value of r is related to the steepness of the line of fit. For example, they may think a line of fit with $r = 0.8$ is steeper than a line of fit with $r = 0.6$. Explain that r indicates the strength of a correlation, not steepness.

Power Presentations with PowerPoint®

Additional Examples

Example 3

The table shows a relationship between points allowed and games won by a football team over eight seasons.

Year	Points Allowed	Games Won
1	285	3
2	310	4
3	301	3
4	186	6
5	146	7
6	159	7
7	170	5
8	190	6

Find an equation for a line of best fit. How well does the line represent the data?

$y \approx -0.02x + 9.91$; very well ($r \approx -0.91$)

INTERVENTION

Questioning Strategies

EXAMPLE 3

- Why does an r-value of 0.61 indicate a moderate positive correlation?

3 Close

Summarize

Have students complete the statements.

A residual is the signed vertical distance between a _____ and a _____. data point; line of fit

A line of best fit that is based on minimizing squares of the residuals is called the _____. least-squares line

Correlation coefficients that indicate strong correlations are near the value ___ or ___. 1; –1

ONGOING ASSESSMENT and INTERVENTION

***Diagnose Before* the Lesson**
5-9A Warm Up, TE p. CC11

***Monitor During* the Lesson**
Check It Out! Exercises, SE pp. CC11–CC14
Questioning Strategies, TE pp. CC11–CC14

***Assess After* the Lesson**
5-9A Lesson Quiz, TE p. CC18
Alternative Assessment, TE p. CC18

Power Presentations with PowerPoint®

Additional Examples

Example 4

Malik is a contractor, installing windows for a builder. The table shows data for his first eight weeks on the job. The equation of the least-squares line for the data is $y \approx -10.36x + 53$, and $r \approx -0.88$. Discuss correlation and causation for the data set.

Week	Average Time per Window (hr)	Net Profit per Hour ($)
1	3.5	19
2	2.8	25
3	2.5	24
4	2.1	26
5	2.3	30
6	1.9	37
7	1.7	35
8	1.8	39

strong neg. corr.; likely cause-and-effect (likely that less installation time contributes to a greater profit per hour)

INTERVENTION

Questioning Strategies

EXAMPLE 4

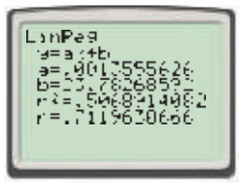
- What is a possible explanation for a positive correlation between history test averages and science test averages?

Find an equation for a line of best fit. How well does the line represent the data?

Use your calculator.

Enter the data into the lists **L1** and **L2**.

Then press **STAT** and choose **CALC**. Choose **4:LinReg(ax+b)** and press **ENTER**. An equation for a line of best fit is $y \approx 0.001x + 23.8$. The value of r is about 0.71, which indicates a moderate positive correlation.



CHECK IT OUT!

3. Kylie and Marcus designed a quiz to measure how much information adults retain after leaving school. The table below shows the quiz scores of several adults, matched with the number of years each person had been out of school. Find an equation for a line of best fit. How well does the line represent the data? **$y \approx -2.74x + 84.32$; very well ($r \approx -0.88$)**

Time Out of School (yr)	1	1	1	2	2	3	5	7	10	10	14	25
Quiz Score	85	94	98	75	80	77	63	56	45	50	34	33

Causation refers to cause-and-effect. If a change in one variable directly causes a change in the other variable, then there is a cause-and-effect relationship between the variables. There is often correlation without causation.

EXAMPLE 4 Correlation and Causation

The table shows test averages of eight students. The equation of the least-squares line for the data is $y \approx 0.77x + 18.12$ and $r \approx 0.87$. Discuss correlation and causation for the data set.

U.S. History Test Average	90	70	75	100	90	85	80	90
Science Test Average	80	75	72	95	92	82	80	92

There is a strong positive correlation between the U.S. history test average and the science test average for these students. There is *not* a likely cause-and-effect relationship because there is no apparent reason why test scores in one subject would directly affect test scores in the other subject.

Caution!

Notice in Example 4, there is a strong correlation, but no causation. Two variables can be strongly correlated without having a direct cause-and-effect relationship.

CHECK IT OUT!

4. Eight adults were surveyed about their education and earnings. The table shows the survey results. The equation of the least-squares line for the data is $y \approx 5.59x - 30.28$ and $r \approx 0.86$. Discuss correlation and causation for the data set.

Years of Education	12	16	20	14	18	16	16	18
Earnings Last Year (thousand $)	40	65	75	44	70	50	54	86

4. strong pos. corr.; likely cause-and-effect (more education often contributes to higher earnings)

THINK AND DISCUSS

1. What is the residual for a data point that lies on the line of best fit?
2. **GET ORGANIZED** Copy and complete the graphic organizer. For each *r*-value, sketch a possible scatter plot and describe the correlation, choosing from the following: strong positive, weak positive, none, strong negative, weak negative.

r-value	−0.9	−0.4	0	0.4	0.9
Scatter Plot					
Description of Correlation					

5-9A Exercises

GUIDED PRACTICE

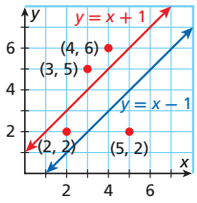
Vocabulary **Apply the vocabulary from this lesson to answer each question.**

1. A signed vertical distance between a data point and its corresponding model point is called a _____?_____ (*residual* or *correlation coefficient*) **residual**
2. A _____?_____ (*least squares line* or *correlation coefficient*) is a measure of how well a line of best fit models a data set. **correlation coefficient**

SEE EXAMPLE 1 p. CC11

3. The data in the table are graphed along with two lines of fit. For each line, find the sum of the squares of the residuals. Which line is a better fit for the data?

x	2	3	4	5
y	2	5	6	2



$y = x + 1$: 19; $y = x - 1$: 23; $y = x + 1$ is better.

SEE EXAMPLE 2 p. CC12

4. The table shows numbers of books read by students in an English class over a summer and the students' grades for the following semester.

Books	0	0	0	0	1	1	1	2	3	5	6	8	10	12	20
Grade	65	69	70	73	70	75	78	77	86	85	89	90	95	99	98

   a. Find an equation for a line of best fit. $y \approx 1.72x + 73.35$
   b. Interpret the meaning of the slope and *y*-intercept.
   c. Use your equation to predict the grade of a student who reads 15 books. ≈99.15, or 99

4b. Slope: for each bk. read, student's avg. will increase 1.72 pts; *y*-int.: a student who reads 0 bks. will have an avg. of 73.35.

Answers to *Think and Discuss*

1. 0
2. See Additional Answers

5-9A Exercises

Assignment Guide

Assign *Guided Practice* exercises as necessary.

If you finished Examples **1–2**
Basic 7, 8, 18, 21–33
Average 7, 8, 12, 14, 18–33
Advanced 7, 8, 12, 14, 18–33

If you finished Examples **1–4**
Basic 7–14, 17, 18, 21–33
Average 7–33
Advanced 7–33

Homework Quick Check
Quickly check key concepts.
Exercises: 7, 8, 9, 10, 12, 14

State Resources

go.hrw.com
State Resources Online
KEYWORD: MA7 Resources

Teaching Tip **Visual** Some students may have difficulty comparing the absolute values of decimals in **Exercise 11**. Encourage these students to draw a number line, place the corresponding points in approximately the correct locations, and then determine which is closer to 0.

SEE EXAMPLE 3 p. CC13

5. A negative correlation exists between the time Shawnda spends on homework during an evening and the amount of sleep she gets that night. The table shows data for several nights. Find an equation for a line of best fit. How well does the line represent the data?

Homework (h)	0.5	0.5	1	1	1.5	2	2	2.5	3	3	3	4	4.5	5
Sleep (h)	8	9	8	8.5	8	7.5	8	7.5	7	7	8	6.5	6.5	6

$y \approx -0.53x + 8.8$; very well ($r \approx -0.91$)

SEE EXAMPLE 4 p. CC14

6. Some students were surveyed about how much time they spent playing video games last week and their overall test average. The equation of the least-squares line for the data is $y \approx -2.93x + 89.70$ and $r \approx -0.92$. Discuss correlation and causation for the data set. strong neg. corr.; likely cause-and-effect (more time playing video games often contributes to lower test avgs.)

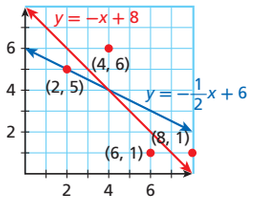
Hours Playing Video Games	1	3	3	6	2	1	9	10
Test Average for all Subjects	80	85	78	70	86	92	60	64

PRACTICE AND PROBLEM SOLVING

Independent Practice

For Exercise	See Example
7	1
8	2
9	3
10	4

7. The data in the table are graphed along with two lines of fit. For each line, find the sum of the squares of the residuals. Which line is a better fit for the data?



x	2	4	6	8
y	5	6	1	1

$y = -x + 8$: 7;
$y = -\frac{1}{2}x + 6$: 9;
$y = -x + 8$ is better.

8. The table shows the mean outside temperature for each of six months and the amount of heating oil used by a family for each of those months.

Mean Outside Temperature (°F)	30	28	44	56	62	76
Heating Oil Used (gal)	112	115	94	60	35	12

a. Find an equation for a line of best fit. $y \approx -2.23x + 181$

b. Interpret the meaning of the slope and y-intercept.

c. Use your equation to predict the amount of heating oil used in a month in which the mean outside temperature is 20 °F. ≈136 gal

8b. Slope: the family will use 2.23 fewer gal/mo for each 1 °F increase in mean temp.; y-int.: the family will use 181 gal in a month when the mean temp. is 0 °F.

9. The table shows the number of customers at a coffee shop and the number of cookies sold for several days. Find an equation for a line of best fit. How well does the line represent the data? $y \approx 0.2x + 2$; very well ($r \approx 0.94$)

Customers	10	12	25	27	40	55	67	109
Cookies Sold	2	6	5	9	10	11	20	22

10. mod. strong pos. corr.; unlikely cause-and-effect (time spent on one activity in wk 1 probably does not affect time spent on the other activity in wk 2).

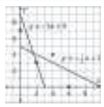
10. Some students were surveyed about how much time they spent watching television one week and how much time they spent playing video games the next week. The equation of the least-squares line for the data is $y \approx 0.76x + 1.63$ and $r \approx 0.77$. Discuss correlation and causation for the data set.

Week 1: Hours Watching Television	4	2	0	1	3	1	8	10
Week 2: Hours Playing Video Games	1	3	3	6	2	1	9	10

5-9A PRACTICE B

1. The data in the table are graphed at right along with two lines of fit.

x	0	2	4	6
y	7	3	4	0



a. Find the sum of the squares of the residuals for $y = -3x + 9$. 134
b. Find the sum of the squares of the residuals for $y = -\frac{1}{2}x + 5$. 10
c. Which line is a better fit for the data? $y = -\frac{1}{2}x + 5$

2. Use the data in the table to answer the questions that follow.

x	5	6	6.5	7.5	9
y	0	−1	3	−2	4

a. Find an equation for a line of best fit. $y \approx 0.78x - 4.54$
b. What is the correlation coefficient? 0.46
c. How well does the line represent the data? moderately well
d. Describe the correlation. weak pos. correlation

3. Use the data in the table to answer the questions that follow.

x	10	8	6	4	2
y	1	1.1	1.2	1.3	1.5

a. Find an equation for a line of best fit. $y \approx -0.06x + 1.58$
b. What is the correlation coefficient? −0.99
c. How well does the line represent the data? very well
d. Describe the correlation. strong neg. correlation

4. The table shows the number of pickles four students ate during the week versus their grades on a test. The equation of the least-squares line is $y = 2.11x + 79.28$, and $r = 0.97$. Discuss correlation and causation for the data set.

Pickles Eaten	0	2	5	10
Test Score	77	85	92	99

strong pos. correlation; unlikely cause-and-effect relationship

5-9A READING STRATEGIES

A residual is the signed vertical distance between a data point and a line of fit. The line of best fit will have the least sum of squares of residuals.

Find the line of best fit for the data set (1,1), (2, 3), (3, 2) (4, 4).

1. Enter the data into a graphing calculator.

Use **LinReg(ax + b)** to find the equation for the line of best fit.
$y = 0.8x + 0.5$

2. What is the correlation coefficient?
$r =$ 0.8

3. Use the equation of best fit to complete the table below.

x	1	2	3	4
y	1.3	2.1	2.9	3.7

4. Find each residual. 0.3 −0.9 0.9 −0.3

5. Find the square of each residual. 0.09 0.81 0.81 0.09

6. What is the sum of the squares? 1.8

5-9A RETEACH

The data in the table are graphed along with two lines of fit. The line that is a better fit will have the lesser *sum of the square of the residuals*. A residual is the vertical distance between a data point and a line of fit.

x	1	2	3	4
y	8	5	5	2

Find the sum of the squares of the residuals for $y = -x + 5$.

Step 1 Use the equation to find the y-values when $x = 1, 2, 3$, and 4.

x	$-x + 5 = y$
1	$-1 + 5 = 4$
2	$-2 + 5 = 3$
3	$-3 + 5 = 2$
4	$-4 + 5 = 1$

Step 2 Subtract each y-value in Step 1 from the corresponding y-value in the original table to find the residuals.
$8 - 4 = 4$ $5 - 3 = 2$ $5 - 2 = 3$ $2 - 1 = 1$

Step 3 Add the squares of the residuals.
$4^2 + 2^2 + 3^2 + 1^2 = 16 + 4 + 9 + 1 = 30$
The sum of the squares of the residuals for $y = -x + 5$ is 30.

1. Find the sum of squares of the residuals for $y = -x + 9$.
a. Use the equation to find the y-values when $x = 1, 2, 3$, and 4.

x	1	2	3	4
y	8	7	6	5

b. Subtract each y-value in Step 1 from the corresponding y-value in the original table to find the residuals.
8 − 8 = 0 5 − 7 = −2 5 − 6 = −1 2 − 5 = −3
c. Add the squares of the residuals.
$0^2 + -2^2 + -1^2 + -3^2 = 0 + 4 + 1 + 9 = 14$
The line for which the sum of the squares of the residuals is lesser is the better fit for the data.
2. $y = -x + 9$ is the better fit.

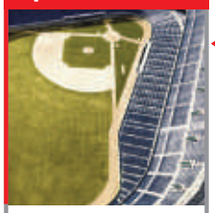
11. Write About It Tell which correlation coefficient, $r = 0.65$ or $r = -0.78$, indicates a stronger linear relationship between two variables. Explain your answer.

−0.78; −0.78 is closer to −1 than 0.65 is to 1.

12. Critical Thinking What can you conclude if the sum of the squared residuals is 0? Explain why the same conclusion might not apply when the sum of the residuals is 0. **Every data pt. lies on the least-squares line; residuals can be pos. or neg., so their sum could be 0 even when data pts. are not on the least-squares line.**

LINK

Sports



The New York Yankees opened a new stadium in 2009. Although the new stadium seats fewer fans than the old stadium (50,287 versus 56,886), the seats in the new stadium are wider, and there is more legroom between rows.

13. Sports The table shows hits and runs scored by eight New York Yankees in the 2009 baseball season. **a. $y \approx 0.48x + 12.03$**

Player	Hits	Runs
Jorge Posada	109	55
Mark Teixeira	178	103
Robinson Cano	204	103
Derek Jeter	212	107
Johnny Damon	155	107
Melky Cabrera	133	66
Nick Swisher	124	84
Hideki Matsui	125	62

a. Find the equation of the least-squares line.

b. Interpret the meaning of the slope.

c. Interpret the meaning of the y-intercept mathematically.

d. Describe any possible correlation for the data set. Use the correlation coefficient to support your answer.

e. Use the equation of the least-squares line from part **a** to predict how many runs a player will score if he gets 100 hits. **≈60 runs**

14. Community The table shows data about temperature and how much bottled water was sold at an annual summer festival in past years. The high temperature for the day of this year's festival is predicted to be 89 °F. The festival organizer must order bottled water in cases of 100. Find the equation of the least-squares line. Use the equation to decide how many cases the organizer should order.

$y \approx 30.43x - 1875$; 9 cases

Midtown Summer Fest						
Year	1	2	3	4	5	6
Daily High Temperature (°F)	75	82	95	92	80	84
Bottled Waters Sold	465	517	1052	940	611	625

Use the table for Exercises 15 and 16.

Regional Historical Museum						
Year	0	2	4	6	8	10
Visitors	980	1,251	1,667	1,785	2,110	2,056
Gift Shop Sales ($)	8,890	12,365	15,100	18,060	20,650	22,600

15b. Slope: each yr there will be 115.36 more visitors than the prev. yr; y-int.: there were 1065 visitors in yr 0.

15. Complete parts **a–d** for the relationship between the year and the number of visitors.

a. Find the equation of the least-squares line and the correlation coefficient.

b. Interpret the meaning of the slope and the y-intercept.

c. Is it reasonable to use your equation to make predictions? Explain.

d. Is it reasonable to say there is a cause-and-effect relationship? Explain.

No; the passage of time likely does not cause changes in the number of visitors.

16. Complete parts **a–d** above for the relationship between the number of visitors and the gift shop sales.

COMMON ERROR ALERT

In **Exercise 11**, students may think that a positive r-value indicates a stronger correlation than a negative r-value. Explain that the strength of a correlation is determined by the absolute value of r. For example, r-values of –0.8 and 0.8 indicate equal strength.

Teaching Tip **Diversity** In **Exercise 13**, some students may not know the official baseball definitions of *hit* and *run*. A *hit* is when a batter reaches a base safely (not including errors, walks, etc.). A *run* is scored when a player advances around all of the bases and returns safely to home plate.

Answers

13b. A player will score 0.48 run for every hit.

c. A player with no hits will score 12.03 runs.

d. There is a strong correlation between the number of hits and the number of runs, since the correlation coefficient $r \approx 0.84$

15a. $y \approx 115.36x + 1065$; $r \approx 0.96$

c. yes; $r \approx 0.96$, which is very close to 1.

16a. $y \approx 11.28x - 2239$; $r \approx 0.98$

b. slope: there is $11.28 in sales for each visitor; y-int.: there is −$2239 in sales if there are no visitors. (This could not actually happen.)

c. yes; $r \approx 0.98$, which is very close to 1. However, predictions for small numbers of visitors might not be useful because of the neg. y-int.

d. yes; more visitors likely causes more money to be spent in the gift shop.

5-9A PROBLEM SOLVING

1. The table shows the number of hours different players practice basketball each week and the number of baskets each player scored during a game.

Player	Alan	Brenda	Caleb	Shawna	Fernando	Gabriela
Hours Practiced	5	10	7	2	0	21
Baskets Scored	6	11	8	4	2	19

a. Find an equation for a line of best fit. Round decimals to the nearest tenth. $y = 0.8x + 2.3$

b. Interpret the meaning of the slope and y-intercept. Slope: for each hour practiced, a player will score 0.8 baskets; y-int.: a player who practices 0 h will score 2.3 baskets.

c. Find the correlation coefficient. 0.998

Select the best answer.

2. Use your equation above to predict the number of baskets scored by a player who practices 40 hours a week. Round to the nearest whole number.
A 32 baskets **C**
B 33 baskets
C 34 baskets
D 35 baskets

3. Which is the best description of the correlation?
F strong positive **F**
G weak positive
H weak negative
J strong negative

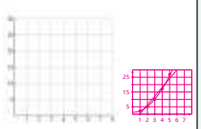
4. Given the data, what advice can you give to a player who wants to increase the number of baskets he or she scores during a game?
A Practice more hours per week. **A**
B Practice fewer hours per week.
C Practice the same hours per week.
D There is no way to increase baskets.

5. Do the data support causation, correlation, or chance?
F correlation **G**
G causation
H chance
J chance and correlation

5-9A CHALLENGE

Ellen holds fundraisers to help plant trees. The table below shows the earnings from the last five fundraisers.

Fundraiser	Earnings ($1000)
1	2
2	5
3	10
4	17
5	26



1. Plot the points on the grid at right.

2. Use a graphing calculator to find the equation of the line of best fit for the fundraiser earnings. $y = 6x - 6$

3. Sketch the line of best fit on your graph.

4. What is the value of r for this line? 0.98

5. Use the QuadReg function of a graphing calculator to find a quadratic equation to represent the fundraiser earnings. $y = x^2 + 1$

6. Sketch this parabola on your graph.

7. What is the value of r for the parabola? 1

8. Explain the significance of r for each case. Predict how much money the next fundraiser will earn using both equations.
Possible answer: $r = 0.98$ for $y = 6x - 6$, which means there is a strong positive correlation and that the linear equation is a very good model of the data; however, $r = 1$ for $y = x^2 + 1$, which means the quadratic equation perfectly models the data. For the next fundraiser, Ellen will raise $30,000 according to the linear model $y = 6x - 6$, or $37,000 according to the quadratic model $y = x^2 + 1$.

TEST PREP DOCTOR For **Exercise 17**, remind students that negative correlation coefficients correspond to negative slopes and positive correlation coefficients correspond to positive slopes. Because the slope of a line of fit for this graph is negative, choices **C** and **D** can be eliminated.

Journal

Have students explain the meanings of *line of best fit* and *correlation coefficient*.

ALTERNATIVE ASSESSMENT

Have students plot five ordered pairs that do not lie on a line. Then ask students to visually estimate a trend line and find the squares of the residuals. Finally, ask each student to find an equation for a line of best fit, and to use the correlation coefficient to explain how well the line represents the data.

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5-9A Lesson Quiz

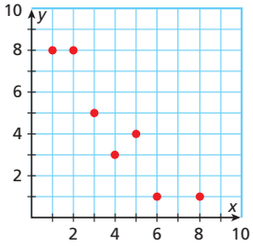
The table shows time spent on homework and number of incorrect quiz answers for several students.

Time Spent on Homework (h)	2	4	8	10
Incorrect Answers	8	9	1	4

1. Two lines of fit are $y = -x + 11$ and $y = -0.5x + 8$. Find the sum of the squares of the residuals for each line. Which line is a better fit? 18; 20; $y = -x + 11$
2. Find an equation for a line of best fit. Interpret the meaning of the slope and y-intercept. Use your equation to predict the number of incorrect answers for 5 hours of study. $y \approx -0.8x + 10.3$; slope: for every hour of study, the number of incorrect answers decreases by 0.8; y-int.: a student who studies for 0 h will get 10.3 incorrect answers; 6.3
3. How well does the line of best fit represent the data? Explain. fairly well ($r \approx -0.79$)

TEST PREP

17. Which could be the correlation coefficient of this graph?



(A) −1.00
(B) −0.93
(C) 0.93
(D) 1.00

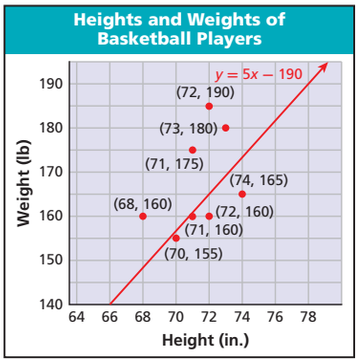
18. The table shows how much time five students studied for a test and their test scores. The equation of a line of fit for the data is $y = 5x + 60$. What is the sum of the squares of the residuals for the line of fit?

Hours Studying	0	2	4	6	8
Test Score	60	70	90	80	100

(F) 0 (G) 20 (H) 40 (J) 200

CHALLENGE AND EXTEND

19. The heights and weights of eight basketball players are graphed along with a line of fit.



a. Find the sum of the squares of the residuals. 1000

b. Find the *mean absolute deviation*. (The mean absolute deviation is the mean of the absolute values of the residuals.) Explain why the mean absolute deviation might be more useful than the sum of the squares of the residuals in some cases.

19b. 10; possible answer: The mean abs. dev. tells you the avg. vert. dist. of a data point from the line of fit.

20. Use these facts to complete the data table:
The equation of a line of fit is $y = 2x - 3$.
The sum of the residuals is 0.
The sum of the squares of the residuals is 14.
3; 2 or 0; 5

x	1	3	4	5
y	1	■	■	8

SPIRAL REVIEW

Find each root. *(Lesson 1-5)*

21. $\sqrt{144}$ 12 **22.** $\sqrt{\frac{1}{49}}$ $\frac{1}{7}$ **23.** $\sqrt[3]{-\frac{8}{1000}}$ $-\frac{1}{5}$ **24.** $\sqrt[4]{\frac{81}{625}}$ $\frac{3}{5}$

Solve each equation. Check your answer. *(Lesson 2-3)*

25. $8 = 3x - 4$ 4 **26.** $0.3a + 4 = -2$ −20 **27.** $4 = 5(x - 2) - 1$ 3

Solve each proportion. *(Lesson 2-7)*

28. $\frac{2}{r} = \frac{1}{8}$ 16 **29.** $\frac{2}{3x} = \frac{-1}{10}$ $-\frac{20}{3}$ **30.** $\frac{9}{18} = \frac{y-2}{5}$ 4.5 **31.** $\frac{12}{a} = \frac{85}{17}$ 2.4

Write each list in order from least to greatest. *(Lesson 2-9)*

32. $\frac{1}{25}$, 25%, 2.5, 0.0004, $\frac{1}{2}$ 32. 0.0004, $\frac{1}{25}$, 25%, $\frac{1}{2}$, 2.5

33. 0.59, 9.5%, 0.85, $\frac{5}{6}$, $\frac{6}{11}$ 33. 9.5%, $\frac{6}{11}$, 0.59, $\frac{5}{6}$, 0.85

7-8A EXTENSION

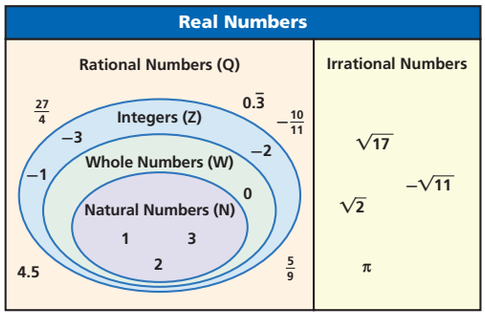
Closure

Objective
Identify sets and the operations under which they are closed.

Vocabulary
set
element
subset
closure

A **set** is a collection of objects. Each object in a set is called an **element** of the set. A set may have no elements, a finite number of elements, or an infinite number of elements. For example, $N = \{1, 2, 3, \ldots\}$ describes the set of natural numbers.

A **subset** is a set contained entirely within another set. For example, $A = \{2, 6, 11, 50\}$ is a subset of set N above. Also, N is a subset of the set of real numbers. The diagram below shows other subsets of the real numbers.



A set of numbers is *closed*, or has **closure**, under a given operation if the result of the operation on any two numbers in the set is also in the set. For example, the set of even numbers is closed under addition, since the sum of two even numbers is also an even number.

Closure Properties of the Real Numbers

WORDS	NUMBERS	ALGEBRA
The real numbers are closed under addition, subtraction, and multiplication.	$6.1 + \sqrt{2}$, $6.1 - \sqrt{2}$, and $6.1 \times \sqrt{2}$ are all real numbers.	For real numbers a and b, $a + b$, $a - b$, and ab are real numbers.

EXAMPLE 1 **Determining Closure of Sets of Numbers**

A **Is the set $\{-1, 0, 1\}$ closed under multiplication?**

Multiply each pair of elements in the set. Check whether each product is in the set.

$-1 \times (-1) = 1$ ✓ $\quad -1 \times 1 = -1$ ✓ $\quad 0 \times 1 = 0$ ✓
$-1 \times 0 = 0$ ✓ $\quad 0 \times 0 = 0$ ✓ $\quad 1 \times 1 = 1$ ✓

The set $\{-1, 0, 1\}$ is closed under multiplication.

B **Show that the set of irrational numbers is not closed under multiplication.**

Find two irrational numbers whose product is not an irrational number.

$\sqrt{2} \times \sqrt{2} = \sqrt{4} = 2$ *2 is not irrational.*

The set of irrational numbers is not closed under multiplication.

Helpful Hint

Remember the Commutative Property of Multiplication.

If $1 \times (-1) = -1$, then $-1 \times 1 = -1$. Only one instance needs to be tested.

7-8A Organizer

Pacing: Traditional 2 days
Block 1 day

Objective: Identify sets and the operations under which they are closed.

PREMIER **Online Edition**

Using the Extension

In **Chapter 7**, students learned about polynomials and exponents and performing operations with polynomials. After learning how to multiply polynomials in **Lesson 7-8**, students can use this extension to learn about closure. The extension will help students understand sets of numbers and determine whether or not a set of numbers or a set of polynomials is closed under a given operation.

State Resources

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KEYWORD: MA7 Resources

1 Introduce

Motivate

Ask students to determine whether the first set of numbers is included in the second set of numbers and explain.

1. integers, whole numbers no; neg. integers are not whole numbers.
2. natural numbers, whole numbers yes; whole numbers include all natural numbers and 0.
3. fractions, real numbers yes; all fractions are real numbers.

2 Teach

Guided Instruction

When working with closure, students need to understand sets and subsets. Use the Venn diagram of real numbers to show students how one group of numbers can be contained within a second group of numbers. Then explain how an operation performed on two numbers in a set may result in a number that is part of the original set. If this is the case, then the set is closed under that operation.

COMMON ERROR ALERT

Students may forget to verify an operation using a single element of a set twice. For example, the set {0, 3} would appear to be closed if only 0 + 3 is checked. However, 3 + 3 = 6, so the set is not closed under addition.

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Additional Examples

Example 1

A. Is the set {−2, 0, 2} closed under multiplication? no; $-2 \cdot 2 = -4$, which is not part of the original set.

B. Show that the set of irrational numbers is not closed under division. Possible answer: $\frac{\sqrt{2}}{\sqrt{2}} = 1$, which is not an irrational number.

Example 2

A. Is the set {0, 1, x, $x + 1$} closed under addition? Explain. no; $x + x + 1 = 2x + 1$, which is not a member of the set.

B. Show that the set of polynomials is closed under multiplication. Since each product of two polynomials will result in a polynomial, the set is closed.

INTERVENTION

Questioning Strategies

EXAMPLE 1

- How can you determine if a subset of the real numbers is closed under a given operation?

EXAMPLE 2

- How can you show that the set of polynomials is closed under addition?

1. Possible answer: 4 − 5 = −1, which is not a whole number.

CHECK IT OUT! **1.** Show that the set of whole numbers is not closed under subtraction.

The set of polynomials also has closure under certain operations. The closure properties of polynomials are similar to the closure properties of real numbers.

Closure Properties of Polynomials

WORDS	EXAMPLES	ALGEBRA
The set of all polynomials is closed under addition, subtraction, and multiplication.	$x^2 + (x + 1)$, $x^2 - (x + 1)$ and $x^2(x + 1)$ are all polynomials.	For polynomials p and q, $p + q$, $p - q$, and pq are all polynomials.

EXAMPLE 2 Determining Closure of Sets of Polynomials

A **Is the set $\{-x, 0, x\}$ closed under addition?**

Add each pair of elements in the set. Check whether each sum is in the set.

$-x + 0 = -x$ ✓ $\quad -x + (-x) = -2x$ ✘ $\quad 0 + 0 = 0$ ✓

$-x + x = 0$ ✓ $\quad 0 + x = x$ ✓ $\quad x + x = 2x$ ✘

The set $\{-x, 0, x\}$ is not closed under addition.

B **Show that the set of polynomials is not closed under division.**

Find two polynomials, a and b, such that their quotient, $\frac{a}{b}$, is not a polynomial. Try $a = x + 1$ and $b = 0$.

$\frac{x+1}{0}$ = undefined *The result is not a polynomial.*

The set of polynomials is not closed under division.

CHECK IT OUT! **2.** Is the set $\{x, x + 1, x^2 - 1\}$ closed under division? no

EXTENSION Exercises

Determine whether the following sets are closed under addition, subtraction, multiplication, and division.

16. The rational numbers are closed under +, −, and ×. The irrational numbers are not closed under any of the 4 ops.

1. $\{-1, 0, 1\}$ ×
2. $\{0, 8\}$ none
3. $\{x^2, 1\}$ none
4. $\{0, x\}$ none
5. $\{-x^3, 1, x^3\}$ none
6. $\{-x, 1, x + 1\}$ none
7. $\{-1, 1\}$ ×, ÷
8. $\{-1, 0, x\}$ none
9. $\{-1, x + 3, 1\}$ none
10. The set of whole numbers +, ×
11. The set of natural numbers +, ×
12. The set of integers +, −, ×
13. Polynomials without a constant term +, −, ×
14. The set of rational numbers +, −, ×
15. The set of real numbers +, −, ×
16. **Write About It** Compare closure properties under the four operations for the set of rational numbers and the set of irrational numbers.

3 Close

Summarize

A set is closed under an operation if the result of the operation on any two numbers in the set is an element of the original set. Remind students that the set of real numbers is closed under addition, subtraction, and multiplication, but not all subsets of the real numbers are closed under these same operations.

COMMON CORE

Mastering the Standards

for Mathematical Practice

The topics described in the Standards for Mathematical Content will vary from year to year. However, the *way* in which you learn, study, and think about mathematics will not. The Standards for Mathematical Practice describe skills that you will use in all of your math courses.

Mathematical Practices

1. *Make sense of problems and persevere in solving them.*
2. *Reason abstractly and quantitatively.*
3. *Construct viable arguments and critique the reasoning of others.*
4. *Model with mathematics.*
5. *Use appropriate tools strategically.*
6. *Attend to precision.*
7. *Look for and make use of structure.*
8. *Look for and express regularity in repeated reasoning.*

1 Make sense of problems and persevere in solving them.

Mathematically proficient students start by explaining to themselves the meaning of a problem... They analyze givens, constraints, relationships, and goals. They make conjectures about the form... of the solution and plan a solution pathway...

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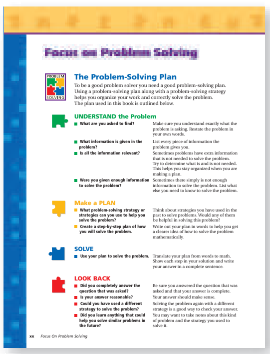
In your book

Focus on Problem Solving describes a four-step plan for problem solving. The plan is introduced at the beginning of your book, and practice with the plan appears throughout the book.



EXAMPLE 5 *Problem-Solving Application*

PROBLEM SOLVING

The cost to place an ad in a newspaper for one week is a linear function of the number of lines in the ad. The costs for 3, 5, and 10 lines are shown. Write an equation in slope-intercept form that represents the function. Then find the cost of an ad that is 18 lines long.

Newspaper Ad Costs

Lines	3	5	10
Cost ($)	13.50	18.50	31

1 Understand the Problem

- The **answer** will have two parts—an equation in slope-intercept form and the cost of an ad that is 18 lines long.
- The ordered pairs given in the table satisfy the equation.

2 Make a Plan

First, find the slope. Then use point-slope form to write the equation. Finally, write the equation in slope-intercept form.

3 Solve

Step 1 Choose any two ordered pairs from the table to find the slope.

$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{18.50 - 13.50}{5 - 3} = \frac{5}{2} = 2.5$ *Use (3, 13.50) and (5, 18.50).*

Step 2 Substitute the slope and any ordered pair from the table into the point-slope form.

$y - y_1 = m(x - x_1)$

$y - 31 = 2.5(x - 10)$ *Use (10, 31).*

Step 3 Write the equation in slope-intercept form by solving for y.

$y - 31 = 2.5(x - 10)$

$y - 31 = 2.5x - 25$ *Distribute 2.5.*

$y = 2.5x + 6$ *Add 31 to both sides.*

Step 4 Find the cost of an ad containing 18 lines by substituting 18 for x.

$y = 2.5x + 6$

$y = 2.5(18) + 6 = 51$

The cost of an ad containing 18 lines is $51.

4 Look Back

Check the equation by substituting the ordered pairs (3, 13.50) and (5, 18.50).

y	$= 2.5x + 6$
13.50	2.5(3) + 6
13.5	7.5 + 6
13.5	13.5 ✓

y	$= 2.5x + 6$
18.50	2.5(5) + 6
18.5	12.5 + 6
18.5	18.5 ✓

CC21

9-9A Organizer

Pacing: Traditional 2 days
Block 1 day

Objectives: Solve systems of equations in two variables in which one equation is linear and the other is quadratic.

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Warm Up

Solve each quadratic equation by factoring. Check your answer.

1. $x^2 - 3x - 10 = 0$ 5, −2

2. $-3x^2 - 12x = 12$ −2

Find the number of real solutions of each equation using the discriminant.

3. $25x^2 - 10x + 1 = 0$ one

4. $2x^2 + 7x + 2 = 0$ two

5. $3x^2 + x + 2 = 0$ none

Math Humor

Q: A parabola and a line got married and had two daughters. What were they?

A: Nonlinear sisters.

State Resources

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KEYWORD: MA7 Resources

9-9A Nonlinear Systems

Objective
Solve systems of equations in two variables in which one equation is linear and the other is quadratic.

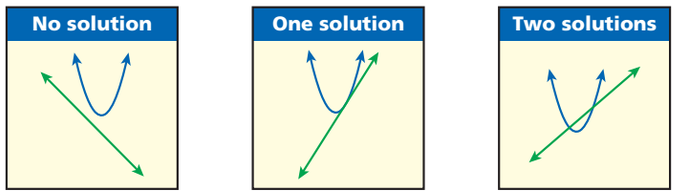
Vocabulary
nonlinear system of equations

Why learn this?
You can solve a nonlinear system to find how long it takes for two objects to reach the same height. (See Example 4.)

Recall that a system of linear equations is a set of two or more linear equations. A solution of a system is an ordered pair that satisfies each equation in the system. Points where the graphs of the equations intersect represent solutions of the system.

A **nonlinear system of equations** is a system in which at least one of the equations is nonlinear. For example, a system that contains one quadratic equation and one linear equation is a nonlinear system.

A system made up of a linear equation and a quadratic equation can have no solution, one solution, or two solutions, as shown below.



EXAMPLE 1 **Solving a Nonlinear System by Graphing**

Solve the system by graphing. Check your answer.

$$\begin{cases} y = x^2 - 2x - 3 \\ y = -x - 1 \end{cases}$$

Step 1 Graph $y = x^2 - 2x - 3$.

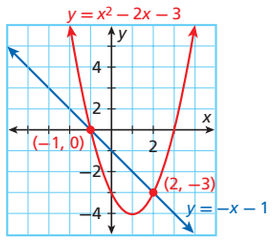
The axis of symmetry is $x = 1$.

The vertex is $(1, -4)$.

The y-intercept is -3.

Another point is $(-1, 0)$.

Graph the points and reflect them across the axis of symmetry.



Step 2 Graph $y = -x - 1$.

The slope is -1.

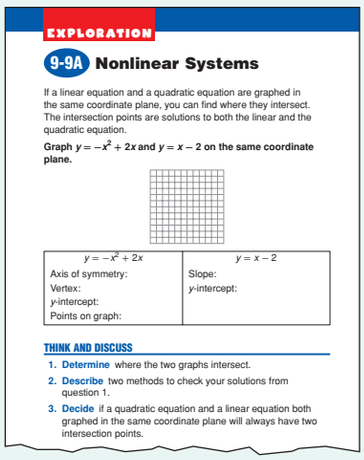
The y-intercept is -1.

Step 3 Find the points where the two graphs intersect.

The solutions appear to be $(-1, 0)$ and $(2, -3)$.

Remember!
A quadratic function has the form $y = ax^2 + bx + c$. To graph a quadratic function, start by using $x = -\frac{b}{2a}$ to find the axis of symmetry and the vertex.

1 Introduce


EXPLORATION

9-9A Nonlinear Systems

If a linear equation and a quadratic equation are graphed in the same coordinate plane, you can find where they intersect. The intersection points are solutions to both the linear and the quadratic equation.

Graph $y = -x^2 + 2x$ and $y = x - 2$ on the same coordinate plane.

$y = -x^2 + 2x$	$y = x - 2$
Axis of symmetry: Vertex: y-intercept: Points on graph:	Slope: y-intercept:

THINK AND DISCUSS

1. **Determine** where the two graphs intersect.
2. **Describe** two methods to check your solutions from question 1.
3. **Decide** if a quadratic equation and a linear equation both graphed in the same coordinate plane will always have two intersection points.

Motivate

Remind students that they have learned to solve linear systems by graphing, by substitution, and by elimination. Remind them that they have also learned to solve quadratic equations by graphing, by factoring, and by the Quadratic Formula. Tell them that in this lesson they will use all of those skills to solve systems made up of a linear equation and a quadratic equation.

Explorations and answers are provided in the online edition.

Check

Substitute $(-1, 0)$ into the system.

$y = x^2 - 2x - 3$	
0	$(-1)^2 - 2(-1) - 3$
0	$1 + 2 - 3$
0	0 ✓

$y = -x - 1$	
0	$-(-1) - 1$
0	$1 - 1$
0	0 ✓

Substitute $(2, -3)$ into the system.

$y = x^2 - 2x - 3$	
-3	$2^2 - 2(2) - 3$
-3	$4 - 4 - 3$
-3	-3 ✓

$y = -x - 1$	
-3	$-2 - 1$
-3	-3 ✓

The solutions are $(-1, 0)$ and $(2, -3)$.

CHECK IT OUT! **1.** Solve the system by graphing. Check your answer.

$$\begin{cases} y = x^2 - 4x + 5 \\ y = x + 1 \end{cases}$$

(1, 2), (4, 5)

EXAMPLE 2 Solving a Nonlinear System by Substitution

Solve the system by substitution.

$$\begin{cases} y = 2x^2 - 3x + 4 \\ y = x + 2 \end{cases}$$

Remember!

The substitution method is a good choice when either equation is solved for a variable, both equations are solved for the same variable, or a variable in either equation has a coefficient of 1 or −1.

$y = 2x^2 - 3x + 4$ — *Both equations are solved for y.*

$y = x + 2$

$y = 2x^2 - 3x + 4$

$x + 2 = 2x^2 - 3x + 4$ — *Substitute x + 2 for y in the first equation.*

$-(x + 2) \quad -(x + 2)$ — *Subtract x + 2 from both sides.*

$0 = 2x^2 - 4x + 2$

$0 = 2(x^2 - 2x + 1)$ — *Factor out the GCF, 2.*

$0 = 2(x - 1)(x - 1)$ — *Factor the trinomial.*

$2 \neq 0; \quad x - 1 = 0$ — *Use the Zero Product Property; 2 cannot equal 0.*

$x = 1$ — *Solve the remaining equation.*

$y = x + 2$ — *Write one of the original equations.*

$y = 1 + 2$ — *Substitute 1 for x.*

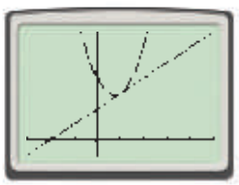
$y = 3$

The solution is $(1, 3)$.

Check

Use a graphing calculator.

The graph supports the result found above. This system has exactly one real solution. The graph of the system consists of a line and a parabola that meet in exactly one point.



CHECK IT OUT! **2.** Solve the system by substitution. Check your answer.

$$\begin{cases} y = 3x^2 - 3x + 1 \\ y = -3x + 4 \end{cases}$$

(−1, 7), (1, 1)

COMMON ERROR ALERT

When solving a system, students sometimes stop after finding the value(s) of one of the variables. Remind them that solutions of a system are ordered pairs; they need to substitute the value(s) they found into one of the original equations and solve for the other variable.

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Additional Examples

Example 1

Solve the system by graphing. Check your answer.

$$\begin{cases} y = x^2 + 4x + 3 \\ y = x + 3 \end{cases}$$

(−3, 0), (0, 3)

Example 2

Solve the system by substitution.

$$\begin{cases} y = x^2 - x - 5 \\ y = -3x + 3 \end{cases}$$

(2, −3), (−4, 15)

INTERVENTION

Questioning Strategies

EXAMPLE 1

- To graph the quadratic equation, how do you find the axis of symmetry and the vertex?
- Why should you always check your answers when solving by graphing?

EXAMPLE 2

- When solving a linear/quadratic system by substitution, why is it easier to solve for *x* first?

Teaching Tip **Technology** Encourage students to use a graphing calculator to check that their answers are reasonable.

2 Teach

Guided Instruction

Review the three possible cases when solving a linear system (see **p. 421**): one solution (intersecting lines), infinitely many solutions (coincident lines), and no solution (parallel lines). Then go over the three possible cases for linear/quadratic systems. Remind students that they have already learned the individual skills and concepts needed in this lesson, and they need only combine them.

Reaching All Learners

Through Visual Cues

When multiplying is necessary in the elimination method, have students use color and labels to identify the equations and their processes, as shown below for **Example 3B**.

Eq. 1 $y = x^2 + x - 1$ — Multiply each term by 3.

Eq. 2 $2x - 3y = 6$

Eq. 1 $3y = 3x^2 + 3x - 3$

Eq. 2 $2x - 3y = 6$

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Additional Examples

Example 3

Solve each system by elimination.

A. $\begin{cases} 3x - y = 1 \\ y = x^2 + 4x - 7 \end{cases}$

(2, 5); (−3, −10)

B. $\begin{cases} y = 2x^2 + x - 1 \\ x - 2y = 6 \end{cases}$ no sol.

INTERVENTION

Questioning Strategies

EXAMPLE 3

- How can you tell that elimination is a good method for solving a given system?
- When multiplication is needed, how do you know what to multiply by to eliminate *y*?

Teaching Tip

Math Background

Remind students why a negative discriminant indicates that there are no real solutions: A negative number has no real square root. For example, $\sqrt{25} = 5$ because $5^2 = 25$. However, $\sqrt{-25}$ is not a real number because there is no real number that you can square to obtain −25.

EXAMPLE 3 Solving a Nonlinear System by Elimination

Solve each system by elimination.

A $\begin{cases} 4x - y = 2 \\ y = x^2 + 1 \end{cases}$

$4x - y = 2$ — *Write the system to align the y-terms.*

$+ \quad y = x^2 + 1$ — *Add the equations to eliminate y.*

$4x = x^2 + 3$

$-4x \quad -4x$ — *Subtract 4x from both sides.*

$0 = x^2 - 4x + 3$

$0 = (x - 1)(x - 3)$ — *Factor the trinomial.*

$x - 1 = 0$ or $x - 3 = 0$ — *Use the Zero Product Property.*

$x = 1$ or $x = 3$ — *Solve the equations.*

$y = x^2 + 1 \qquad y = x^2 + 1$ — *Write one of the original equations.*

$y = 1^2 + 1 \qquad y = 3^2 + 1$ — *Substitute each x-value and solve for y.*

$y = 2 \qquad y = 10$

The solutions are (1, 2) and (3, 10).

B $\begin{cases} y = x^2 + x - 1 \\ 2x - 3y = 6 \end{cases}$

$y = x^2 + x - 1$ — *Write the system to align the y-terms.*

$2x - 3y = 6$

$3(y) = 3(x^2 + x - 1)$ — *Multiply each term in the first equation by 3.*

$2x - 3y = 6$

$3y = 3x^2 + 3x - 3$

$+ \; 2x - 3y = 6$ — *Add the second equation to the new first equation to eliminate y.*

$2x = 3x^2 + 3x + 3$

$0 = 3x^2 + x + 3$ — *Subtract 2x from both sides.*

$x = \dfrac{-1 \pm \sqrt{(1)^2 - 4(3)(3)}}{2(3)}$ — *Use the Quadratic Formula,* $x = \dfrac{-b \pm \sqrt{b^2 - 4ac}}{2a}$.

$x = \dfrac{-1 \pm \sqrt{1 - 36}}{6}$

$x = \dfrac{-1 \pm \sqrt{-35}}{6}$ — *Note the discriminant: $b^2 - 4ac = -35$. Its value is negative, so there are no real solutions.*

There are no real solutions.

Remember!

The elimination method is a good choice when both equations have the same variable term with the same or opposite coefficients or when a variable term in one equation is a multiple of the corresponding variable term in the other equation.

Check Use a graphing calculator.

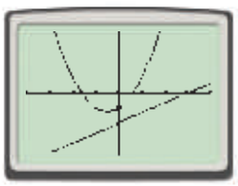
To graph $2x - 3y = 6$, first solve for *y*.

$2x - 3y = 6$

$-3y = -2x + 6$

$y = \frac{2}{3}x - 2$

The graph supports that there are no real solutions.



CHECK IT OUT!

Solve each system by elimination. Check your answers.

3a. $\begin{cases} 2x - y = 2 \\ y = x^2 - 5 \end{cases}$ (3, 4), (−1, −4)

3b. $\begin{cases} y = x^2 - 2x - 5 \\ 5x - 2y = 5 \end{cases}$ (5, 10), (−0.5, −3.75)

EXAMPLE 4 *Physics Application*

An elevator is rising at a constant rate of 20 feet per second. Its height in feet after t seconds is given by $h = 20t$. At the instant the elevator is at ground level, a ball is thrown upward with an initial velocity of 80 feet per second from ground level. The height in feet of the ball after t seconds is given by $h = -16t^2 + 80t$. Find the time it takes for the ball and the elevator to reach the same height.

Helpful Hint

When $t = 0$, the ball and elevator are at the same height because they are both at ground level.

Solve the system $\begin{cases} h = -16t^2 + 80t \\ h = 20t \end{cases}$ by substitution.

$-16t^2 + 80t = 20t$ *Substitute $-16t^2 + 80t$ for h in the second equation.*

$-20t \quad -20t$ *Subtract 20t from both sides.*

$-16t^2 + 60t = 0$

$-4t(4t - 15) = 0$ *Factor out the GCF, −4t.*

$-4t = 0$ or $4t - 15 = 0$ *Use the Zero Product Property.*

$t = 0$ $4t = 15$ *Solve the remaining equations.*

$t = 3.75$

It takes 3.75 seconds for the ball and the elevator to reach the same height.

CHECK IT OUT!

4. An elevator is rising at a constant rate of 8 feet per second. Its height in feet after t seconds is given by $h = 8t$. At the instant the elevator is at ground level, a ball is dropped from a height of 120 feet. The height in feet of the ball after t seconds is given by $h = -16t^2 + 120$. Find the time it takes for the ball and the elevator to reach the same height. 2.5 s

THINK AND DISCUSS

1. How is solving the systems in this lesson similar to solving systems of linear equations? How is it different?
2. When using elimination to solve a linear/quadratic system, which variable will be eliminated? Why?
3. A system of linear equations can have infinitely many solutions. Why can't a linear/quadratic system have infinitely many solutions?
4. **GET ORGANIZED** Copy and complete the graphic organizer by sketching diagrams to show examples. Write *not possible* for any cases that are not possible.

System of Equations	Number of Solutions			
	0	1	2	infinite
Linear				
Linear/Quadratic				

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Additional Examples

Example 4

The increasing enrollment at South Ridge High School can be modeled by the equation $E(t) = -t^2 + 25t + 600$, where t represents the number of years after 2010. The increasing enrollment at Alta Vista High School can be modeled by the equation $E(t) = 24t + 570$. In what year will the enrollments at the two schools be equal? 2016

INTERVENTION

Questioning Strategies

EXAMPLE 4

- Are the values of t solutions of the system of equations?
- If you found the complete solutions to the system, what would they tell you?

3 Close

Summarize

Point out that substitution or elimination can be used to solve any linear/quadratic system, but graphing, especially when done by hand, has limited usefulness when the coordinates of the solutions are not integers.

Ask students what the graph looks like for a linear/quadratic system that has:

- no solution no intersection
- one solution one point of intersection
- two solutions two points of intersection

ONGOING ASSESSMENT and INTERVENTION

***Diagnose* Before the Lesson**
9-9A Warm Up, TE p. CC22

***Monitor* During the Lesson**
Check It Out! Exercises, SE pp. CC22–CC25
Questioning Strategies, TE pp. CC22–CC25

***Assess* After the Lesson**
9-9A Lesson Quiz, TE p. CC29
Alternative Assessment, TE p. CC29

Answers to *Think and Discuss*

Possible answers:

1. Possible answer: Similar: You can use graphing, substitution, and elimination. Different: When using substitution and elimination, you need to solve quadratic equations.
2. y; you cannot eliminate x because one equation has an x^2-term and the other equation does not.
3. A line and a parabola cannot coincide.
4. See Additional Answers.

9-9A Exercises

Assignment Guide

Assign *Guided Practice* exercises as necessary.

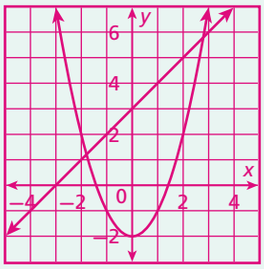
If you finished Examples **1–2**
- **Basic** 10–17, 26, 30
- **Average** 10–17, 26–33, 36
- **Advanced** 10–17, 26, 30, 36

If you finished Examples **1–4**
- **Basic** 10–26, 30, 33, 37–41, 48–69
- **Average** 10–41, 48–69
- **Advanced** 10–26, 30, 34–69

Homework Quick Check
Quickly check key concepts.
Exercises: 10, 16, 18, 22, 30

Answers

2. Possible answer:



GUIDED PRACTICE

Vocabulary **Apply the vocabulary from this lesson to answer each question.**

1. A system of equations that includes a linear equation and a quadratic equation is _____?_____. (*linear, nonlinear,* or *quadratic*) **nonlinear**
2. Sketch a nonlinear system of equations that has two solutions. The system should include one quadratic equation and one linear equation.

SEE EXAMPLE 1 p. CC22

Solve each system by graphing. Check your answers.

3. $\begin{cases} y = 2x^2 - 7x + 6 \\ y = x \end{cases}$ **(1, 1), (3, 3)**

4. $\begin{cases} y = x^2 - 2x - 5 \\ y = 2x - 8 \end{cases}$ **(1, −6), (3, −2)**

SEE EXAMPLE 2 p. CC23

Solve each system by substitution. Check your answers.

5. $\begin{cases} y = x^2 - 4x + 3 \\ y = x - 3 \end{cases}$ **(3, 0), (2, −1)**

6. $\begin{cases} y = 2x^2 - 5x + 3 \\ y = -3x + 15 \end{cases}$ **(−2, 21), (3, 6)**

SEE EXAMPLE 3 p. CC24

Solve each system by elimination. Check your answers.

7. $\begin{cases} y = x^2 - 3 \\ 4x - y = 6 \end{cases}$ **(1, −2), (3, 6)**

8. $\begin{cases} y = x^2 + 7x + 12 \\ 3x - y = 5 \end{cases}$ **no sol.**

SEE EXAMPLE 4 p. CC25

9. **Physics** A bird is flying upwards such that its height in feet after t seconds is given by $h = 4t$. At the instant the bird passes the height of a ball being held out of a window, the ball is thrown upward with an initial velocity of 80 feet per second. The height in feet of the ball after t seconds is given by $h = -16t^2 + 80t$. Find the time it takes for the ball and the bird to reach the same height. **4.75 s**

PRACTICE AND PROBLEM SOLVING

Independent Practice

For Exercises	See Example
10–13	1
14–17	2
18–21	3
22–25	4

Solve each system by graphing. Check your answers.

10. $\begin{cases} y = x^2 - 4 \\ y = 5x - 10 \end{cases}$ **(2, 0), (3, 5)**

11. $\begin{cases} y = x^2 - 3 \\ x - 6y = 18 \end{cases}$ **(0, −3)**

12. $\begin{cases} y = x^2 + 4x + 7 \\ y = x + 5 \end{cases}$ **(−1, 4), (−2, 3)**

13. $\begin{cases} y = 2x^2 - 8x + 3 \\ y = 6x - 21 \end{cases}$ **(3, −3), (4, 3)**

Solve each system by substitution. Check your answers.

14. $\begin{cases} y = x^2 + 7x + 2 \\ y = 5x + 5 \end{cases}$ **(1, 10), (−3, −10)**

15. $\begin{cases} y = 2x^2 - 3 \\ y = 2x + 9 \end{cases}$ **(3, 15), (−2, 5)**

16. $\begin{cases} y = x^2 - 5 \\ y = -2x + 3 \end{cases}$ **(2, −1), (−4, 11)**

17. $\begin{cases} y = 5x^2 - 2x \\ y = 10x + 9 \end{cases}$ **(3, 39), $\left(-\frac{3}{5}, 3\right)$**

Solve each system by elimination. Check your answers.

18. $\begin{cases} y = 2x^2 - 3x + 1 \\ 5x - y = -1 \end{cases}$ **(4, 21), (0, 1)**

19. $\begin{cases} y = x^2 - 5 \\ x - 3y = 15 \end{cases}$ **(0, −5), $\left(\frac{1}{3}, -\frac{44}{9}\right)$**

20. $\begin{cases} y = 2x^2 - x + 7 \\ 2x + 3y = 6 \end{cases}$ **no sol.**

21. $\begin{cases} y = x^2 + 5x \\ 9x - y = 3 \end{cases}$ **(1, 6), (3, 24)**

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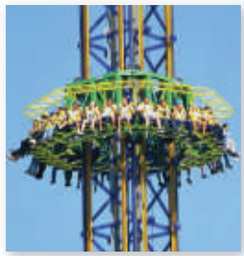
22. Demographics The growing population of town A can be modeled by the equation $P(t) = 8t^2 + 2000$, where t represents number of years after 2010. The growing population of town B can be modeled by the equation $P(t) = 100t + 3000$. In which year will the populations of the towns be approximately equal? **2029**

23. Finance The value of Danielle's investments is modeled by the equation $V(t) = 3t^2 + 70t + 100$, where t represents the number of months after she made her initial investment. Jeffrey has no money invested in stocks, but he deposits the same amount every month into a savings account that he opened at the same time as Danielle began investing. His savings account balance can be modeled by the equation $V(t) = 50t + 275$. After how many months will the value of Danielle's investments be equal to the balance of Jeffrey's savings account? **5 mo**

24. Amusement Parks A ride at an amusement park consists of an observation deck that travels directly up into the air at a constant rate of 40 feet per second. Its height in feet after t seconds is given by $h = 40t$. At the instant the deck is at ground level, a ball is thrown up with initial velocity 60 feet per second from ground level. The height in feet of the ball after t seconds is given by $h = -16t^2 + 60t$. Find the time it takes for the ball and the deck to reach the same height. Round your answer to the nearest hundredth. **1.25 s**



25. Business A company's weekly revenue can be modeled by the equation $C(p) = 0.75p^2 + 10p + 200$, where p represents the number of products sold. The weekly cost of running the business is modeled by the equation $C(p) = 80p + 700$. How many products must the company sell in a week to break even (when revenue equal the costs of running the business)? **100**

Determine whether the point is a solution of the system of equations.

26. $\begin{cases} y = x^2 - 9x + 2 \\ 2x + y = -16 \end{cases}$; $(-2, -12)$ **no**

27. $\begin{cases} y = x^2 + 2x - 9 \\ y = 8x \end{cases}$; $(3, 24)$ **no**

28. $\begin{cases} y = x^2 - 6x - 1 \\ 3x - 4y = -3 \end{cases}$; $(7, 6)$ **yes**

29. $\begin{cases} y = 3x^2 - 7x + 6 \\ y = x + 1 \end{cases}$; $(1, 2)$ **yes**

30. $\begin{cases} y = 2x^2 - 5x + 5 \\ y = x + 5 \end{cases}$; $(3, 8)$ **yes**

31. $\begin{cases} y = 3x^2 + 4x - 1 \\ 9x - 2y = -5 \end{cases}$; $(-1, -2)$ **yes**

32. $\begin{cases} y = 2x^2 - 25 \\ 4x - y = 5 \end{cases}$; $(5, 25)$ **no**

33. $\begin{cases} y = x^2 + 3x + 8 \\ 5x - y = 28 \end{cases}$; $(2, -18)$ **no**

34. Write About It Explain in your own words when you should use the substitution method to solve a nonlinear system, and when you should use the elimination method.

35. Critical Thinking Describe a scenario in which you might use the graphing method to solve a system of nonlinear equations, even if you didn't expect the solution(s) to consist of integer coordinates.

36. Estimation Estimate the solution(s) to the system by graphing.

$\begin{cases} y = x^2 + 6x - 2 \\ y = 0.5x + 7 \end{cases}$ **Possible answer: (−7, 4); (1, 8)**

Teaching Tip **Inclusion** In **Exercise 25,** some students might be unfamiliar with the business terms *revenue, cost,* and *break even*. Explain that a company's *revenue* is the amount of money it makes, and the *cost* is the amount of money it spends. To *break even* means that the revenue and cost are equal.

Answers

34. Possible answer: Use substitution when one equation is already solved for a variable. Use elimination when the coefficients of the linear terms in both equations are opposites, or could be made opposites by integer multiplication.

35. When only an approximate answer is needed, or to check whether the answer found by another method is reasonable

TEST PREP DOCTOR For **Exercise 38,** students who selected **B** most likely made a sign error when finding one of the *x*-values.

For **Exercise 39,** students who selected **J** verified that (2, 6) is a solution of the second equation, but did not verify that it is a solution of the first equation.

37. ERROR ANALYSIS Below are two solutions to the system of equations $\begin{cases} y = x^2 - 4x + 5 \\ 4x + 3y = 11 \end{cases}$. Which is incorrect? Explain the error. **B; the left side of the eq. was multiplied by −3, but the right side was not.**

A

$y = x^2 - 4x + 5 \longrightarrow \quad -3y = -3x^2 + 12x - 15$

$4x + 3y = 11 \quad \longrightarrow 4x + 3y = 11$

$4x + 0 = -3x^2 + 12x - 4$

$0 = -3x^2 + 8x - 4$

$0 = (-3x + 2)(x - 2)$

$-3x + 2 = 0 \quad \text{or} \quad x - 2 = 0$

$-3x = -2 \qquad x = 2$

$x = \frac{2}{3}$

$4x + 3y = 11 \qquad 4x + 3y = 11$

$4\left(\frac{2}{3}\right) + 3y = 11 \qquad 4(2) + 3y = 11$

$\frac{8}{3} + 3y = 11 \qquad 8 + 3y = 11$

$3y = \frac{25}{3} \qquad 3y = 3$

$y = \frac{25}{9} \qquad y = 1$

The solutions are $\left(\frac{2}{3}, \frac{25}{9}\right)$ and (2, 1).

B

$y = x^2 - 4x + 5 \longrightarrow \quad -3y = x^2 - 4x + 5$

$4x + 3y = 11 \quad \longrightarrow 4x + 3y = 11$

$4x + 0 = x^2 - 4x + 5$

$0 = x^2 - 8x + 5$

$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

$x = \frac{-(-8) \pm \sqrt{(-8)^2 - 4(1)(5)}}{2(1)}$

$x = \frac{8 \pm \sqrt{44}}{2}$

$x = \frac{8 \pm 2\sqrt{11}}{2}$

$x = 4 \pm \sqrt{11} \approx 7.32 \quad \text{or} \quad 0.68$

$4x + 3y \approx 11 \qquad 4x + 3y \approx 11$

$4(7.32) + 3y \approx 11 \qquad 4(0.68) + 3y \approx 11$

$29.28 + 3y \approx 11 \qquad 2.72 + 3y \approx 11$

$3y \approx -18.28 \qquad 3y \approx 8.28$

$y \approx -6.09 \qquad y \approx 2.76$

The solutions are approximately (7.32, −6.09) and (0.68, 2.76).

TEST PREP

38. Which are the solutions to the system of equations below?

$\begin{cases} y = x^2 - 5x - 2 \\ y = -7x + 1 \end{cases}$

(A) (−3, 22) and (1, −6)
(B) (−3, 22) and (−1, 8)
(C) (−1, 8) and (2, −10)
(D) (1, −6) and (2, −10)

39. For which system of equations is (2, 6) a solution?

(F) $\begin{cases} y = x^2 + 4x - 2 \\ y = -3x - 2 \end{cases}$

(G) $\begin{cases} y = x^2 - 4x + 14 \\ x - y = 4 \end{cases}$

(H) $\begin{cases} y = 3x^2 - x - 4 \\ y = -5x + 16 \end{cases}$

(J) $\begin{cases} y = 2x^2 + 9 \\ y = 5x - 4 \end{cases}$

40. Which system below has no real solutions?

(A) $\begin{cases} 3y + x = 9 \\ y = (x - 3)^2 \end{cases}$

(B) $\begin{cases} y = 2x^2 - 2 \\ x - y = 5 \end{cases}$

(C) $\begin{cases} y = x - 4x^2 \\ x = -2 - y \end{cases}$

(D) $\begin{cases} y = 2x - 7 \\ y = x^2 - 7 \end{cases}$

9-9A PRACTICE B

Solve each system by graphing. Check your answers.

1. $\begin{cases} y = x^2 - x - 2 \\ y = -x + 2 \end{cases}$ **(−2, 4), (2, 0)**

2. $\begin{cases} y = x^2 + x - 6 \\ y = -x - 3 \end{cases}$ **(−3, 0), (1, −4)**

Solve each system by substitution. Check your answers.

3. $\begin{cases} y = -2x^2 + x + 4 \\ y = -5x + 8 \end{cases}$ **(2, −2), (1, 3)**

4. $\begin{cases} y = -2x^2 - 3x + 2 \\ y = -x + 6 \end{cases}$ **no solution**

5. $\begin{cases} y = 3x^2 + 2x - 1 \\ x + y = 5 \end{cases}$ **(−2, 7), (1, 4)**

6. $\begin{cases} y = x^2 - 16 \\ y = x + 4 \end{cases}$ **(−4, 0), (5, 9)**

Solve each system by elimination. Check your answers.

7. $\begin{cases} y = x^2 - 1 \\ x + 2y = 8 \end{cases}$ **(−2.5, 5.25), (2, 3)**

8. $\begin{cases} y = x^2 + 3x + 2 \\ 2x + y = -4 \end{cases}$ **(−2, 0), (−3, 2)**

9. $\begin{cases} y = 2x^2 + 3x - 1 \\ 2x + y = -4 \end{cases}$ **(−1, −2), (−1.5, −1)**

10. $\begin{cases} y = -x^2 + 2x - 4 \\ 3x + y = -4 \end{cases}$ **(0, −4), (5, −19)**

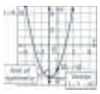
9-9A READING STRATEGIES

You can solve a nonlinear system of equations by graphing.

System of Equations

$\begin{cases} y = x^2 + 2x - 3 \\ y = 2x - 2 \end{cases}$

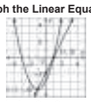
Graph the Quadratic Equation



Locate the axis of symmetry $x = -1$.
Locate key points to help you graph. Reflect points over the axis of symmetry to graph other points.

Nonlinear Systems

Graph the Linear Equation



Add the graph of $y = 2x - 2$.

Slope: 2 y-intercept: −2

Estimate the Solutions

Find the points where the two graphs intersect.
The solutions appear to be (−1, −4) and (1, 0).

Complete the following.

1. To graph a quadratic equation, first locate the **axis of symmetry**. To graph a linear equation, find the **slope** and the **y-intercept**.

2. Solve the system by graphing.

$\begin{cases} y = x^2 - x - 6 \\ y = x - 3 \end{cases}$ **(−1, −4), (3, 0)**

9-9A RETEACH

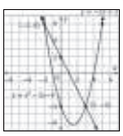
A *nonlinear system of equations* is a system in which at least one of the equations is nonlinear.

Possible Solutions for a Linear-Quadratic System

No Solutions	One Solution	Two Solutions
		

Solve the system by graphing. Check your answer.

$\begin{cases} y = x^2 - 3x - 4 \\ y = -2x + 2 \end{cases}$



Step 1: Graph $y = x^2 - 3x - 4$.
Axis of symmetry: $x = 1.5$; vertex: (1.5, −6.25)
y-intercept: (0, −4); another point (−2, 6)
Graph the points and reflect them across the axis of symmetry

Step 2: Graph $y = -2x + 2$.
Slope: −2; y-intercept: 2

Step 3: Find the points of intersection: (−2, 6) and (3, −4)

Check: Substitute the solutions into each system.

(−2, 6)

$y = x^2 - 3x - 4$
$6 = (-2)^2 - 3(-2) - 4$
$6 = 6$ ✓

$y = -2x + 2$
$6 = -2(-2) + 2$
$6 = 6$ ✓

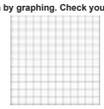
(3, −4)

$y = x^2 - 3x - 4$
$-4 = 3^2 - 3(3) - 4$
$-4 = -4$ ✓

$y = -2x + 2$
$-4 = -2(3) + 2$
$-4 = -4$ ✓

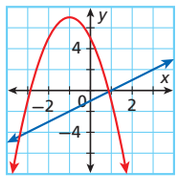
Solve each system by graphing. Check your answers.

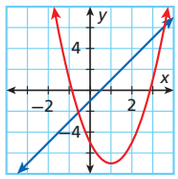
1. $\begin{cases} y = x^2 + 3x - 4 \\ y = 4x - 4 \end{cases}$ **(0, −4), (1, 0)**

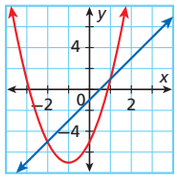


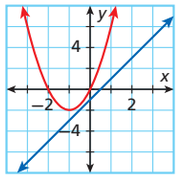
2. $\begin{cases} y = 3x^2 + 2x - 1 \\ y = 2x + 2 \end{cases}$ **(−1, 0), (1, 4)**

41. Which is the graph of $\begin{cases} y = 2x - 1 \\ y = 2x^2 + 4x - 5 \end{cases}$?

Ⓕ 

Ⓗ 

Ⓖ 

Ⓙ 

CHALLENGE AND EXTEND

Find the *x*-coordinate(s) of the solution(s) of each system.

42. $\begin{cases} y = 3x^2 + 4x - 7 \\ 3x + 5y = 8 \end{cases}$ **43.** $\begin{cases} y = x^2 - 3x - 5 \\ 3x + 2y = 8 \end{cases}$ **44.** $\begin{cases} y = x^2 + x - 2 \\ 3x + 2y = 3 \end{cases}$ **45.** $\begin{cases} y = 4x^2 - 9 \\ y = 7x - 2 \end{cases}$

42. $\frac{23 \pm \sqrt{3109}}{-30}$

43. $\frac{-3 \pm \sqrt{153}}{-4}$

44. $1, -\frac{7}{2}$

45. $\frac{7 \pm \sqrt{161}}{8}$

46. A system of two equations contains one quadratic equation and one linear equation. The quadratic equation in the system is $y = x^2 + 5x - 9$. The solutions of the system are (3, 15) and (−1, −13). What is the linear equation in the system? $y = 7x - 6$

47. Physics The formula for the height of an object in free fall (neglecting air resistance) is $h(t) = -16t^2 + v_0t + h_0$, where v_0 is the object's initial velocity in feet per second and h_0 is the object's initial height above the ground in feet. One ball is thrown with an initial velocity of 90 ft/s from a height of 20 ft. A second ball is thrown at the exact same instant with an initial velocity of 80 ft/s and a height of 30 ft. After how many seconds will the balls reach the same height? 1 s

SPIRAL REVIEW

Solve each equation. *(Lesson 2-6)*

48. $|3x| = 9$ ± 3 **49.** $|x - 7| = 5$ 2, 12 **50.** $|x + 9| = 13$ $-22, 4$ **51.** $|6x| - 8 = 22$ ± 5

52. $2|x + 1| = 10$ $4, -6$ **53.** $|3x - 1| = 5$ $2, -\frac{4}{3}$ **54.** $6|x| + 5 = 8$ $\pm\frac{1}{2}$ **55.** $|12 - 3x| = 3$ 3, 5

Solve each inequality. *(Lesson 3-5)*

56. $3x + 2 < 4 - x$ $x < \frac{1}{2}$ **57.** $x - 9 \geq 4x$ $x \leq -3$ **58.** $2 - 5x > 8$ $x < -\frac{6}{5}$

59. $8x + 9 < 11x - 6$ $x > 5$ **60.** $3(x - 1) > 7(x + 3)$ $x < -6$ **61.** $x + 1 \geq 6x - 4$ $x \leq 1$

Identify the slope and *y*-intercept. *(Lesson 5-7)*

62. $y = 5x + 2$ $m = 5$; y-int. $= 2$ **63.** $y = 0.6x$ $m = 0.6$; y-int. $= 0$ **64.** $y = -2x - 1$ $m = -2$; y-int. $= -1$ **65.** $y = 8$ $m = 0$; y-int. $= 8$

66. $2x + 3y = 12$ $m = -\frac{2}{3}$; y-int. $= 4$ **67.** $5y - 3x = 15$ $m = \frac{3}{5}$; y-int. $= 3$ **68.** $x - 8y = 2$ $m = \frac{1}{8}$; y-int. $= -\frac{1}{4}$ **69.** $5x = 4y + 12$ $m = \frac{5}{4}$; y-int. $= -3$

Journal

Have students explain how to check a solution of a linear/quadratic system algebraically. Have them also explain how to use a graphing calculator to check that they have the correct number of solutions.

ALTERNATIVE ASSESSMENT

Ask students to explain how to solve this system by graphing and how to solve it by substitution:

$\begin{cases} y = x^2 - 4 \\ y = x - 2 \end{cases}$

Ask students to explain how to solve this system by elimination:

$\begin{cases} y = 2x^2 - x + 1 \\ 3x - y = -1 \end{cases}$

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9-9A Lesson Quiz

Solve each system by the indicated method.

1. Graphing: $\begin{cases} y = x^2 - 4x + 3 \\ y = x - 1 \end{cases}$
(1, 0), (4, 3)

2. Substitution: $\begin{cases} y = 2x^2 - 9x - 5 \\ y = -3x + 3 \end{cases}$
(−1, 6), (4, −9)

3. Elimination: $\begin{cases} y = x^2 + 2x - 3 \\ x - y = 5 \end{cases}$
no solution

4. Elimination: $\begin{cases} y = x^2 - 7x + 10 \\ 2x - y = 8 \end{cases}$
(3, −2), (6, 4)

9-9A PROBLEM SOLVING

Write the correct answer.

1. A ball is thrown upward with an initial velocity of 40 feet per second from ground level. The height *h* in feet of the ball after *t* seconds is given by $h = -16t^2 + 40t$. At the same time, a balloon is rising at a constant rate of 10 feet per second. Its height *h* in feet after *t* seconds is given by $h = 10t$. Find the time it takes for the ball and the balloon to reach the same height.
1.875 s

2. A bird starts flying up from the grass in a park and climbs at a steady rate of 0.5 meters per second. Its height *h* in meters after *t* seconds is given by $h = 0.5t$. The equation $h = -4.9t^2 + 40t + 3$ models the height *h*, in meters, of a baseball *t* seconds after it is hit. Find the approximate time it takes for the ball and the bird to reach the same height.
8.14 s

3. A skateboard company's monthly sales income can be modeled by the equation $C(s) = 0.5s^2 + 25s + 500$, where *s* represents the number of skateboards sold. The monthly cost of running the business is $C(s) = 25s + 812.5$. How many skateboards must the company sell in a month before the sales income equals or exceeds the cost of running the business?
25

4. The deer population in a park can be modeled by the equation $P(y) = 4y^2 - 10y + 60$, where *y* is the number of years after 2010. The deer population in another park can be modeled by $P(y) = 10y + 80$, where *y* is the number of years after 2010. In which year will the two parks have approximately the same number of deer?
2016

Select the best answer.

5. A seagull is flying upwards such that its height *h* in feet above sea level after *t* seconds is given by $h = 3t$. At the same time, the height *h* in feet of a rock falling off a cliff above the sea after *t* seconds is given by $h = -16t^2 + 50$. Find the approximate time it takes for the rock and the bird to be at the same height.

A 1.68 s C 3.36 s
B 3.13 s D 16.67 s

A

6. A juggler at a circus throws a ball upwards such that the ball's height *h* in feet above the ground after *t* seconds is given by $h = -16t^2 + 20t + 5$. At the same time, a scenic elevator begins climbing a tower at a constant rate of 20 feet per second. Its height *h* in feet after *t* seconds is given by $h = 20t$. Find the approximate time it takes for the ball and the elevator to reach the same height.

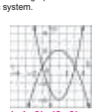
F 0.56 s H 4 s
G 1.12 s J 11.18 s

F

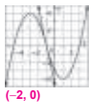
9-9A CHALLENGE

Another nonlinear system of equations in which both equations are quadratic is called a *quadratic-quadratic system*. The graph of a quadratic-quadratic system consists of two parabolas.

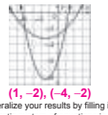
For 1–6, use the graph to estimate the solution(s) of the quadratic-quadratic system.

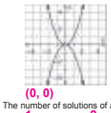
1. 
(−1, 0), (3, 0)

2. 
(−1, 0), (3, 0)

3. 
(−2, 0)

4. 
no solution

5. 
(1, −2), (−4, −2)

6. 
(0, 0)

7. Generalize your results by filling in the blanks: The number of solutions of a quadratic-quadratic system of equations is __0__, __1__, or __2__.

10-3A Organizer

Pacing: Traditional 1 day
Block $\frac{1}{2}$ day

Objectives: Create dot plots.
Use a dot plot to describe the shape of a data distribution.

PREMIER Online Edition

Using the Extension

The extension builds on content from **Lessons 10-2** and **10-3**, using frequency tables from **Lesson 10-2** and distributions from **Lesson 10-3** to introduce dot plots.

Teaching Tip **Kinesthetic** Students can use integer chips, masking tape, and markers to build the dot plots in the examples on their desks.

State Resources

go.hrw.com
State Resources Online
KEYWORD: MA7 Resources

10-3A EXTENSION Dot Plots and Distributions

A **dot plot** is a data representation that uses a number line and x's, dots, or other symbols to show frequency. Dot plots are sometimes called line plots.

EXAMPLE 1 Making a Dot Plot

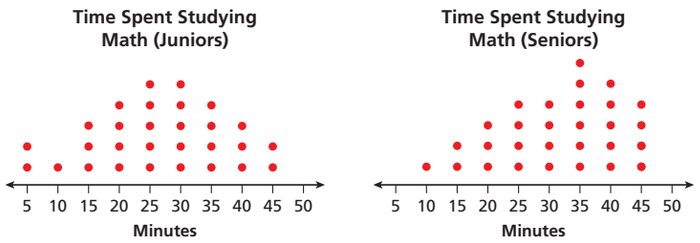
Objectives
Create dot plots.
Use a dot plot to describe the shape of a data distribution.

Vocabulary
dot plot
uniform distribution
symmetric distribution
skewed distribution

Mrs. Montoya asked her junior and senior students how many minutes each of them spent studying math in one day, rounded to the nearest five minutes. The results are shown below. Make a dot plot showing the data for juniors and a dot plot showing the data for seniors.

Time Spent Studying Math (min)	Frequency (Juniors)	Frequency (Seniors)
5	2	0
10	1	1
15	3	2
20	4	3
25	5	4
30	5	4
35	4	6
40	3	5
45	2	4

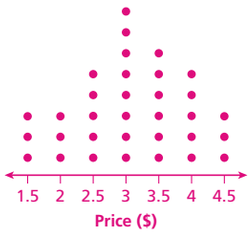
Find the least and greatest values in each data set. Then use these values to draw a number line for each graph. For each student, place a dot above the number line for the number of minutes he or she spent studying.



CHECK IT OUT! **1.** The cafeteria offers items at six different prices. John counted how many items were sold at each price for one week. Make a dot plot of the data.

Price ($)	1.50	2.00	2.50	3.00	3.50	4.00	4.50
Items	3	3	5	8	6	5	3

1. Cafeteria Sales



1 Introduce

Motivate

Draw a stem-and-leaf plot on the board. Explain to students that a dot plot looks very similar to a stem-and-leaf plot turned on its side. However, a dot plot does not divide each data value into parts as a stem-and-leaf plot does.

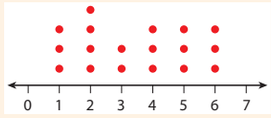
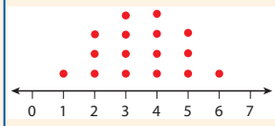
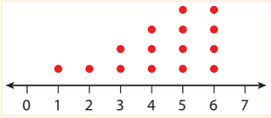
2 Teach

Guided Instruction

Begin the lesson by reviewing frequency tables from **Lesson 10-2**. Then introduce the new vocabulary, highlighting the connection between frequency tables and dot plots. Once students understand the basic construction of a dot plot, introduce common shapes of distributions and discuss how data can be visually interpreted using a dot plot.

A dot plot gives a visual representation of the distribution, or "shape", of the data. The dot plots in Example 1 have different shapes because the data sets are distributed differently.

Types of Distributions

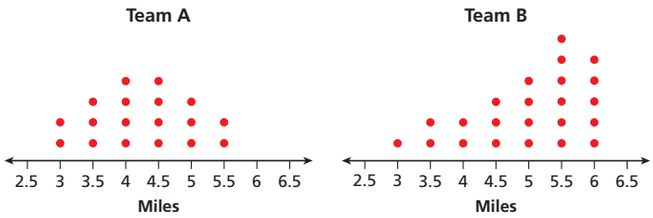
UNIFORM DISTRIBUTION	SYMMETRIC DISTRIBUTION	SKEWED DISTRIBUTION
		
In a **uniform distribution**, all data points have an approximately equal frequency.	In a **symmetric distribution**, a vertical line can be drawn and the result is a graph divided in two parts that are approximate mirror images of each other.	In a **skewed distribution**, the data is not uniform or symmetric. The data may be skewed to the right or skewed to the left.

EXAMPLE 2 Shapes of Data Distributions

The data table shows the number of miles run by members of two track teams during one day. Make a dot plot and determine the type of distribution for each team. Explain what the distribution means for each.

Miles	3	3.5	4	4.5	5	5.5	6
Team A	2	3	4	4	3	2	0
Team B	1	2	2	3	4	6	5

Make dot plots of the data.



The data for team A show a symmetric distribution. The distances run are evenly distributed about the mean.

The data for team B show a skewed right distribution. Most team members ran a distance greater than the mean.

CHECK IT OUT!

2. Data for team C members are shown below. Make a dot plot and determine the type of distribution. Explain what the distribution means.

Miles	3	3.5	4	4.5	5	5.5	6
Team C	3	2	2	2	3	2	2

2. Uniform; all team members ran about the same distance.

Teaching Tip **Reading Math** The word *skewed* may be difficult to grasp for some students. Teach synonyms such as *slanted* and *crooked* to help students better understand the word.

3 Close

Summarize

Remind students that dot plots are visual representations of frequency tables. The visual representations may show one of three common types of distributions: skewed, uniform, or symmetric.

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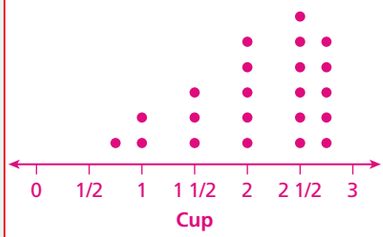
Additional Examples

Example 1 and 2

Gloria is collecting different recipes for chocolate chip cookies. The table shows the cups of flour needed in the recipes. Make a dot plot showing the data. Determine the distribution of the data and explain what the distribution means.

Flour (c)	Number of Recipes
$\frac{3}{4}$	1
1	2
$1\frac{1}{2}$	3
2	5
$2\frac{1}{2}$	6
$2\frac{3}{4}$	5

Amount of Flour in Recipes



The dist. is skewed to the right, which means most recipes require an amount of flour greater than the mean.

INTERVENTION

Questioning Strategies

EXAMPLE 1

- How can you create a frequency table for qualitative data such as students' favorite colors?

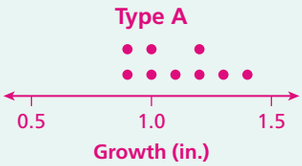
EXAMPLE 2

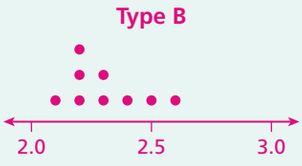
- How do you determine if a data set has no distribution?

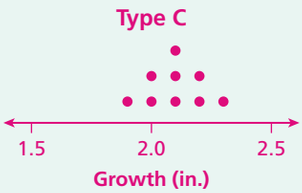
Team C

Answers

1a.





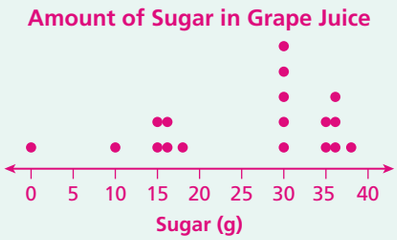


b. A: uniform; B: skewed; C: symmetric

c. A: most: 0.9, 1.0, 1.2; least: 1.1, 1.3. 1.4; B: most: 2.2; least: 2.1, 2.4, 2.5, 2.6; C: most: 2.1; least: 1.9, 2.3

d. A: 1.1, 1.3, 1.4, 0.9, 1.0, 1.2; B: 2.1, 2.4, 2.5, 2.6, 2.3, 2.2; C: 1.9, 2.3, 2.0, 2.2, 2.1

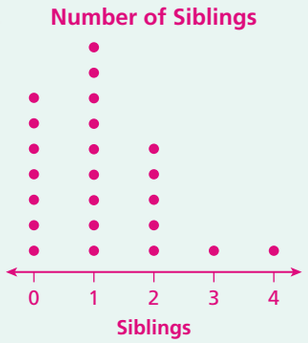
2b. With outlier:



Without outlier:

2c. Skewed right with or without the outlier

3.



Skewed left

EXTENSION Exercises

1. Biology Michael is collecting data for the growth of plants after one week. He planted nine seeds for each of three different types of plants and recorded his data in the table below.

Growth of Plants (in.)		
Type A	Type B	Type C
0.9	2.1	1.9
0.9	2.2	2.0
1.0	2.2	2.0
1.0	2.2	2.1
1.1	2.3	2.1
1.2	2.3	2.1
1.2	2.4	2.2
1.3	2.5	2.2
1.4	2.6	2.3

a. Create a dot plot for each type of plant.

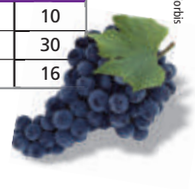
b. Describe the distributions.

c. Which data value(s) occur(s) the most often in each dot plot? the least often?

d. For each dot plot, list the heights in order from least frequent to most frequent.

2. Nutrition Julia researched grape juice brands to determine how many grams of sugar each brand contained per serving (8 fluid ounces = 1 serving). The data she collected is shown in the table.

Grams of Sugar in Grape Juice (per serving)					
15	0	36	18	30	10
30	15	35	30	36	30
36	30	38	16	35	16



a. Identify any outlier(s) in the data set. 0

b. Make a dot plot for the data with the outlier(s) and a dot plot for the data without the outlier(s).

c. Describe the distribution of the data with and without the outlier(s).

d. How does excluding the outlier(s) affect the mean, median, and mode of the data set? Mean increases by ≈1.5; median and mode are unchanged.

3. The frequency table shows the number of siblings of each student in a class. Use the table to make a dot plot of the data, and describe the distribution.

Number of Siblings	Frequency
0	7
1	9
2	5
3	1
4	1

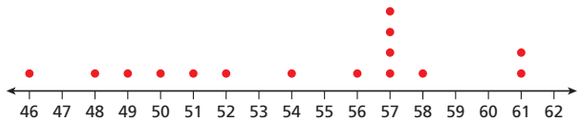
4. **School** The list below shows which grade each member of a high school marching band belongs to.

9, 12, 9, 10, 9, 12, 9, 9, 11, 12, 12, 10, 10, 9, 9, 11, 9, 10, 10, 12, 9, 12, 11, 9, 12, 11, 10, 9, 12, 12, 9, 9, 11, 12

a. Make a dot plot of the data.

b. Explain how you can use the dot plot to find the mean, median, and mode of the data set. Then find each of these values.

Use the dot plot for Exercises 5 and 6.



5. **Write About It** Compare stem-and-leaf plots and dot plots.

a. How are they similar and how are they different?

b. What information can you get from each graph?

c. Can you make a dot plot given a stem-and-leaf plot? Explain.

d. Can you make a stem-and-leaf plot given a dot plot? If so, make a stem-and-leaf plot of the data in the dot plot at right. If not, explain why not.

6. **Write About It** Compare histograms and dot plots.

a. How are they similar and how are they different?

b. What information can you get from each graph?

c. Can you make a dot plot given a histogram? Explain.

d. Can you make a histogram given a dot plot? If so, make a histogram of the data in the dot plot at right. If not, explain why not.

LINK

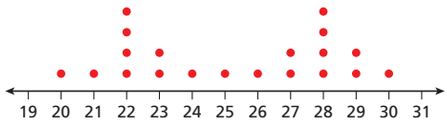
Biology

©Image Source/Getty Images

Even though identical twins share the same DNA, they are often of different heights. According to one study, the average height difference between identical twins is 1.7 cm.

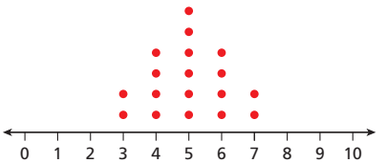
7. **Multi-Step** Gather data on the heights of people in your classroom. Separate the data for males from the data for females. Make two dot plots representing the data collected for each group. Compare the dot plots and the distributions of the data.

8. The dot plot at right shows an example of a *bimodal distribution*. Why is this an appropriate name for this type of distribution?

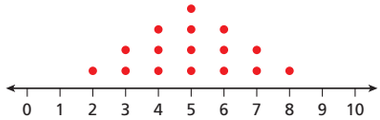


9. **Critical Thinking** Magdalene and Peter conducted the same experiment. Both of their data sets had the same mean. Both made dot plots of their data that showed symmetric distributions, but Peter's dot plot shows a greater range than Magdalene's dot plot. Identify which plot below belongs to Peter and which belongs to Magdalene. **A: Magdalene; B: Peter**

Dot Plot A



Dot Plot B

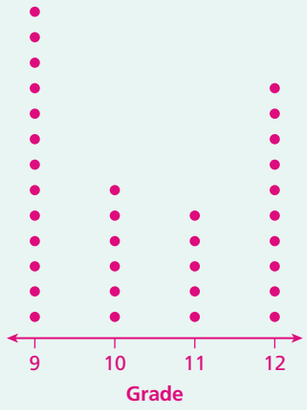


Teaching Tip

Kinesthetic For **Exercise 7**, have students line up according to height in front of the classroom. Create a "life sized" dot plot of height frequencies using students as dots in the dot plot.

Answers

4a. Marching Band Members



b. Mean: multiply each data value by its freq. and divide by the number of data values; ≈10.4

Median: find the data value(s) whose dot(s) are in the middle of the dot plot; 10

Mode: find the data value with the most dots in the dot plot; 9

5a. Both show all of the individual data values, and both show the general shape of the dist. A dot plot shows freq. for individual data values, while a stem-and-leaf plot shows freq. for ranges of data values.

b. You can find mean, med., mode, range, freq., and shape of dist. from both.

c. Yes; a stem-and-leaf plot shows all individual data values.

d. yes

Stem	Leaves
4	6 8 9
5	0 1 2 4 6 7 7 7 7 8
6	1 1

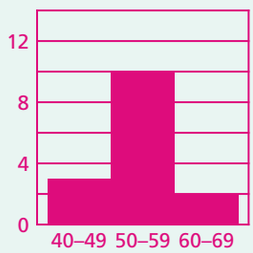
Key: *4|6 means 46.*

6a. Both show freq., but a dot plot shows freq. for individual data values, while a histogram shows freq. for ranges of data values. They are visually similar and show the general shape of the dist. A dot plot shows all of the individual data values, but a histogram does not.

b. Dot plot: individual data values, mean, med., mode, range, freq., shape of dist; histogram: shape of dist.

c. No; a histogram does not show all of the individual data values.

6d.



7. Check students' work.

8. The data set has two modes (in this case, 22 and 28)

11-4A Organizer

Pacing: Traditional 2 days
Block 1 day

Objectives: Compare functions in different representations.

Estimate and compare rates of change.

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Warm Up

Find the slope of the line that contains each pair of points.

1. (4, 8) and (−2, −10) 3

2. (−1, 5) and (6, −2) −1

Tell whether each function could be quadratic. Explain.

3. {(−1, −3), (0, 0), (1, 3), (2, 12)} yes; constant 2nd differences (6)

4. {(−2, 11), (−1, 9), (0, 7), (1, 5), (2, 3)} no; the function is linear because 1st differences are constant (−2).

Math Humor

Q: Why couldn't the linear function and the quadratic function get along?

A: Because of their constant differences.

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11-4A Comparing Functions

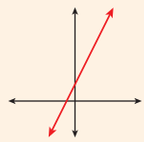
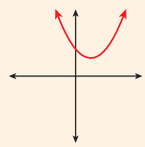
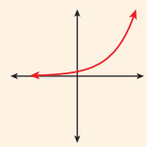
Objectives
Compare functions in different representations.

Estimate and compare rates of change.

Who uses this?

Investment analysts can use different function representations to compare investments. (See Example 2.)

You have studied different types of functions and how they can be represented as equations, graphs, and tables. Below is a review of three types of functions and some of their key properties.

	Linear	Quadratic	Exponential
Equation	$y = mx + b$ Example: $y = 2x + 1$	$y = ax^2 + bx + c$, $a \neq 0$ Example: $y = x^2 - 2x + 3$	$y = ab^x$, $a \neq 0$, $b \neq 1$, $b > 0$ Example: $y = 0.5(2)^x$
Graph			
Table	x: 0, 1, 2, 3, 4 y: 1, 3, 5, 7, 9 +2, +2, +2, +2 Constant first differences	x: 0, 1, 2, 3, 4 y: 3, 2, 3, 6, 11 −1, +1, +3, +5; +2, +2, +2 Constant second differences	x: 0, 1, 2, 3, 4 y: 0.5, 1, 2, 4, 8 ×2, ×2, ×2, ×2 Constant ratios

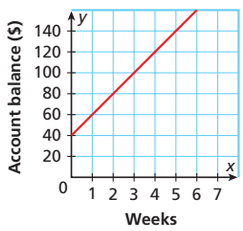
EXAMPLE 1 **Comparing Linear Functions**

Deirdre and Beth each deposit money into their checking accounts weekly. Their account information for the past several weeks is shown below.

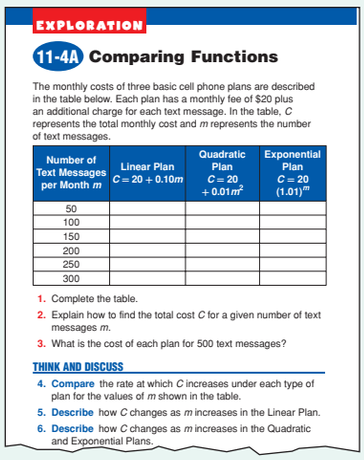
Deirdre's Account

Weeks	Account Balance ($)
0	60
1	75
2	90
3	105
4	120

Beth's Account



1 Introduce



EXPLORATION

11-4A Comparing Functions

The monthly costs of three basic cell phone plans are described in the table below. Each plan has a monthly fee of $20 plus an additional charge for each text message. In the table, C represents the total monthly cost and m represents the number of text messages.

Number of Text Messages per Month m	Linear Plan $C = 20 + 0.10m$	Quadratic Plan $C = 20 + 0.01m^2$	Exponential Plan $C = 20(1.01)^m$
50			
100			
150			
200			
250			
300			

1. Complete the table.
2. Explain how to find the total cost C for a given number of text messages m.
3. What is the cost of each plan for 500 text messages?

THINK AND DISCUSS

4. **Compare** the rate at which C increases under each type of plan for the values of m shown in the table.
5. **Describe** how C changes as m increases in the Linear Plan.
6. **Describe** how C changes as m increases in the Quadratic and Exponential Plans.

Motivate

Explain to students that different types of functions can be used to show trends. Linear functions can be used to show constant changes, such as the relationship between distance, rate of speed, and time. Quadratic functions may show a rate that increases over time, peaks, and then decreases again. Each type of function shows a different behavior.

Explorations and answers are provided in the online edition.

Compare the accounts by finding slopes and *y*-intercepts and interpreting those values in the context of the situation.

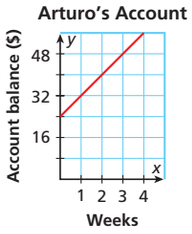
Deirdre	Beth	Interpret and Compare.
Slope Use (1, 75) and (2, 90). $\frac{90-75}{2-1} = 15$	**Slope** Use (1, 60) and (2, 80). $\frac{80-60}{2-1} = 20$	The slope is the rate of change. Beth is saving at a higher rate.
***y*-intercept** (0, 60) *y*-intercept = 60	***y*-intercept** (0, 40) *y*-intercept = 40	The *y*-intercept is the beginning account balance. Deirdre started with more money.

1. Slope: Dave is saving at a higher rate ($12/wk) than Arturo ($8/wk); *y*-int.: Dave started with more money ($30) than Arturo ($24).

CHECK IT OUT! **1.** Dave and Arturo each deposit money into their checking accounts weekly. Their account information for the past several weeks is shown. Compare the accounts by finding and interpreting slopes and *y*-intercepts.

Dave's Account

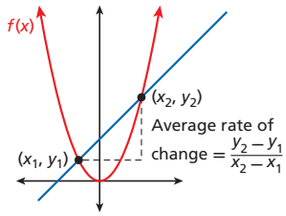
Weeks	0	1	2	3
Account Balance ($)	30	42	54	66



Reading Math

The notation [0, 20] means all *x*-values from 0 to 20, including 0 and 20.

Remember that nonlinear functions do not have a constant rate of change. One way to compare two nonlinear functions is to calculate their *average rates of change* over a certain interval. For a function $f(x)$ whose graph contains the points (x_1, y_1) and (x_2, y_2), the **average rate of change** over the interval $[x_1, x_2]$ is the slope of the line through (x_1, y_1) and (x_2, y_2).



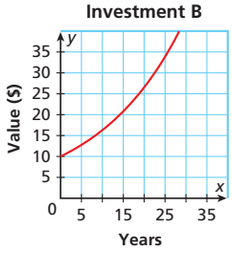
EXAMPLE 2 Comparing Exponential Functions

An investment analyst offers two different investment options for her customers. Compare the investments by finding and interpreting the average rates of change from year 0 to year 20.

Investment A

Years	Value ($)
0	10.00
5	13.38
10	17.91
15	23.97
20	32.07
25	42.92

Investment B



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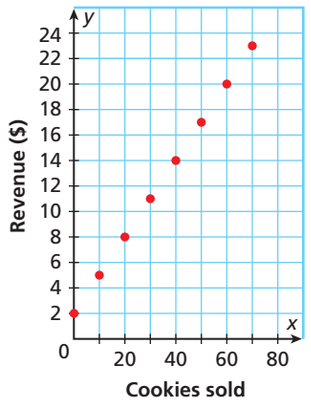
Additional Examples

Example 1

Sonia and Jackie each bake and sell cookies after school, and they each charge a delivery fee. The revenue for the sales of various numbers of cookies is shown. Compare the girls' prices by finding and interpreting the slopes and *y*-intercepts.

Sonia's Revenue	
Cookies Sold	**Revenue ($)**
24	11.00
48	17.00
72	23.00
96	29.00
120	35.00
144	41.00
168	47.00

Jackie's Revenue



Slope: Jackie charges more per cookie ($0.30) than Sonia does ($0.25); *y*-int.: Jackie's delivery fee ($2) is less than Sonia's ($5).

INTERVENTION

Questioning Strategies

EXAMPLE 1

- For a linear function, which quantity represents the rate of change, and which represents the starting value of *x*?

2 Teach

Guided Instruction

Review the function types and their properties. Explain that linear and quadratic functions have constant differences, but exponential functions have constant ratios. For each type of function, discuss the average rate of change and what it means in the situation. Show that the *y*-intercept usually represents the initial value in a situation, such as the height of an object at 0 seconds.

Reaching All Learners

Through Visual Cues

Have students discuss the rate of change of a linear function and the average rate of change of a quadratic function. Graph a line and show them that the rate of change is the slope of the line. Then graph a quadratic or exponential function, and connect two different points on the graph with a segment. Show them that the slope of the segment is the average rate of change between the two points.

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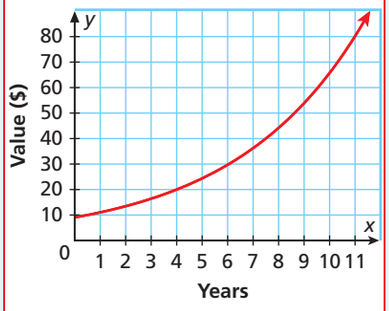
Additional Examples

Example 2

An investment analyst offers two different investment options for her customers. Compare the investments by finding and interpreting the average rates of change from year 0 to year 10.

Investment A



Investment B

Years	Value ($)
0	9.00
2	13.42
4	20.02
6	29.88
8	44.57
10	66.50
12	99.20

A increased ≈$5.60/yr; B increased $5.75/yr

Example 3

Compare the functions $y_1 = 0.35x^2 - 3x + 1$ and $y_2 = 0.3x^2 - 2x + 2$ by finding minimums, x-intercepts, and average rates of change over the x-interval [0, 10].

min.: $y_1 \approx -5.43$, $y_2 \approx -1.33$; x-int.: $y_1 \approx 0.35$, ≈ 8.22; $y_2 \approx 1.23$, ≈ 5.44; avg. rate of chg. over [0, 10]: $y_1 \approx 0.5$; $y_2 = 1$

INTERVENTION

Questioning Strategies

EXAMPLE 2

- How can you determine the average rate of change of a given function over a certain interval?

EXAMPLE 3

- Explain why an average rate of change may be different over two different intervals.

Calculate the average rates of change over [0, 20] by using the points whose x-coordinates are 0 and 20.

Investment A

$\frac{32.07 - 10.00}{20-0} = \frac{22.07}{20} \approx 1.10$ *Use (0, 10.00) and (20, 32.07).*

Investment B

$\frac{27 - 10}{20-0} = \frac{17}{20} = 0.85$ *Use the graph to estimate. When $x = 20$, $y \approx 27$. Use (0, 10) and (20, 27).*

From year 0 to year 20, investment A increased at an average rate of $1.10 per year, while investment B increased at an average rate of $0.85 per year.

CHECK IT OUT! **2.** Compare the same investments' average rates of change from year 10 to year 25. **A increased about $1.67/yr; B increased about $1.13/yr.**

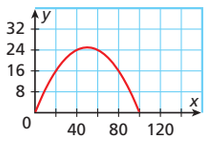
EXAMPLE 3 Comparing Quadratic Functions

Students in an engineering class were given an assignment to design a parabola-shaped bridge. Two students' models are shown at right. Compare the models by finding and interpreting maximums, x-intercepts, and average rates of change over the x-interval [0, 20].

Rosetta's Plan

$y = -0.01x^2 + 1.2x$

Marco's Plan



- The maximum is the height of the bridge at its highest point.
- The difference of the x-intercepts is the length of the bridge.
- The average rate of change over [0, 20] indicates the steepness of the bridge over the first 20 horizontal feet.

Remember!

The minimum or maximum of a quadratic function is the y-value of the vertex.

For Rosetta's plan, use the function.

Step 1 Find the maximum.

$x = -\frac{b}{2a} = -\frac{1.2}{2(-0.01)} = \frac{1.2}{0.02} = 60$ *Find the x-value of the vertex.*

$y = -0.01(60)^2 + 1.2(60)$ *Substitute 60 into the function to find the y-value of the vertex.*

$= -36 + 72 = 36$

The vertex is (60, 36) and the maximum is 36.

Step 2 Find the x-intercepts.

$-0.01x^2 + 1.2x = 0$ *Write the related equation.*

$-x(0.01x - 1.2) = 0$ *Solve for x.*

$x = 0$ or $0.01x - 1.2 = 0$

$0.01x = 1.2$

$x = 120$

The x-intercepts are 0 and 120.

Step 3 Find the average rate of change over [0, 20].

At $x = 0$, $y = -0.01(0)^2 + 1.2(0) = 0$ *Find the points whose x-coordinates are 0 and 20.*

At $x = 20$, $y = -0.01(20)^2 + 1.2(20)$

$= -4 + 24 = 20$

Use (0, 0) and (20, 20): $\frac{20 - 0}{20 - 0} = 1$

For Marco's plan, use the graph.

Step 1 Find the maximum.

The maximum is slightly greater than 24, between 24 and 32.

Step 2 Find the x-intercepts.

The x-intercepts are 0 and 100.

Step 3 Find the average rate of change over [0, 20].

Use (0, 0) and (20, 16): $\frac{16-0}{20-0} = \frac{16}{20} = 0.8$

	Rosetta's Bridge	Marco's Bridge	Interpret and Compare.
Maximum Height	36 ft	just over 24 ft	Rosetta's bridge is taller.
Length	120 – 0 = 120 ft	100 – 0 = 100 ft	Rosetta's bridge is longer.
Average Steepness Over [0, 20]	1	0.8	Rosetta's bridge is steeper over [0, 20].

3. Rosetta's new model: max ht. = 30.25 ft; length = 110 ft; avg. steepness over [0, 20] = 0.9; new bridge is taller, longer, and steeper over [0, 20] than Marco's.

CHECK IT OUT!

3. What if...? Suppose Rosetta uses $y = -0.01x^2 + 1.1x$ and Marco uses the same plan as above. Compare Marco's model with Rosetta's new model.

EXAMPLE 4 Comparing Different Types of Functions

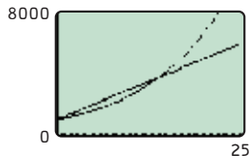
A town has approximately 1000 homes. The town council is considering plans for future development. Plan A calls for an increase of 200 homes per year. Plan B calls for a 10% increase each year. Compare the plans.

Let x be the number of years. Let y be the number of homes. Write functions to model each plan.

Plan A: $y = 200x + 1000$

Plan B: $y = 1000(1.10)^x$

Use your calculator to graph both functions.



The graphs show that under plan A, there will be more homes built than under plan B in early years.

But by the end of the 15th year, the number of homes built under plan B exceeds the number of homes built under plan A. From that point on, plan B results in more homes than plan A by ever-increasing amounts every year.

4. A: $y = 100x + 850$; B: $y = 850\ (1.08)^x$; school A's enrollment will exceed school B's enrollment at first, but school B will have more students by the end of the 11th yr. After that, school B's enrollment exceeds school A's enrollment by ever-increasing amts each yr.

CHECK IT OUT!

4. Two neighboring schools use different models for anticipated growth in enrollment: School A has 850 students and predicts an increase of 100 students per year. School B also has 850 students, but predicts an increase of 8% per year. Compare the models.

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Additional Examples

Example 4

A town has approximately 500 homes. The town council is considering plans for future development. Plan A calls for an increase of 50 homes per year. Plan B calls for a 5% increase each year. Compare the plans. More homes will be built under plan A up to the end of the 26th yr. After that, more homes will be built under plan B, and plan B results in more homes than plan A by ever-increasing amounts each yr.

INTERVENTION

Questioning Strategies

EXAMPLE 4

- When comparing functions, what are the important characteristics to compare?

Teaching Tip

Reading Math If students confuse quadratic and exponential functions, remind them that a *square* is a *quadrilateral*, and that the variable is *squared* in a *quadratic* function. In an *exponential* function, the variable is in the *exponent*.

3 Close

Summarize

Review how data in real-world situations can be compared using different functions and representations. Remind students that the rate of change of a linear function is the same for any interval. For other functions, the average rate of change will vary depending on the interval.

ONGOING ASSESSMENT and INTERVENTION

***Diagnose Before* the Lesson**
11-4A Warm Up, TE p. CC31

***Monitor During* the Lesson**
Check It Out! Exercises, SE pp. CC35–CC37
Questioning Strategies, TE pp. CC35–CC37

***Assess After* the Lesson**
11-4A Lesson Quiz, TE p. CC41
Alternative Assessment, TE p. CC41

Answers to *Think and Discuss*

1. Rates of change for quadratic and exponential functions are variable, but rates of change for linear functions are constant.
2. Using an equation, you can find exact values. Using a graph, you can quickly see how variables are related.
3. See Additional Answers.

11-4a Exercises

Assignment Guide

Assign *Guided Practice* exercises as necessary.

If you finished Examples **1–2**
Basic 5, 6, 10
Average 5, 6, 9, 10
Advanced 5–6, 9, 10, 12

If you finished Examples **1–4**
Basic 5–10, 13–14, 16–30
Average 5–10, 12–14, 16–30
Advanced 5–30

Homework Quick Check
Quickly check key concepts.
Exercises: 5, 6, 7, 8, 10

Teaching Tip **Reading Math** Remind students to verify that the data provided is in the units the problem requests. For **Exercise 2**, the question asks for bacteria per hour, so students should verify that the data is given in hours.

THINK AND DISCUSS

1. Explain why you need to use the word *average* when comparing rates of change for quadratic or exponential functions, but not for linear functions.
2. A function can be represented by an equation or a graph. Describe a possible advantage of each representation.
3. **GET ORGANIZED** Copy and complete the graphic organizer. Complete the sentence in each column by writing important values to compare.

Comparing Functions			
Linear to Linear	**Exponential to Exponential**	**Quadratic to Quadratic**	**Linear to Quadratic**
Compare…	Compare…	Compare…	Compare…

11-4A Exercises

GUIDED PRACTICE

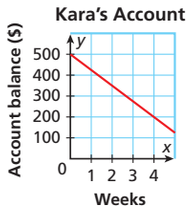
SEE EXAMPLE 1 p. CC34

1. **Personal Finance** Fay and Kara each withdraw money from their savings accounts weekly, as shown. Compare the accounts by finding and interpreting slopes and *y*-intercepts.

Fay's Account

Weeks	0	1	2	3
Account Balance ($)	425	375	325	255

Kara's Account



Slope: Kara is withdrawing at a higher rate ($75/wk) than Fay ($50/wk); y-int.: Kara started with more money ($500) than Fay ($425).

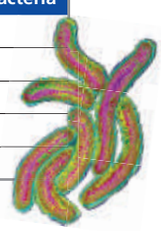
SEE EXAMPLE 2 p. CC35

2. **Biology** A biologist tracked the hourly growth of two different strains of bacteria in the lab. Her data are shown below. Compare the number of bacteria by finding and interpreting the average rates of change from hour 0 to hour 4.

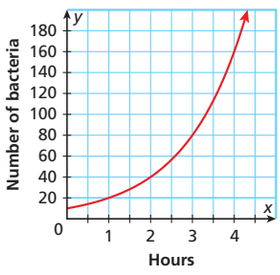
2. A: increased 100 bacteria/h; B: increased about 37.5 bacteria/h.

Bacteria A

Hours	Number of Bacteria
0	5
1	15
2	45
3	135
4	405



Bacteria B



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11-4A READING STRATEGIES

Functions can be compared in several ways.

Engineering students were given an assignment to design an arch. Two models are organized in a table so they can be compared. Find and interpret their maximums, *x*-intercepts, and average rates of change over the *x*-interval [0, 10].

	Model 1 $y=-0.2x^2+4x$	Model 2 $y=-0.02x^2+x$	Interpret and Compare.
Maximum height of arch	$x=-\frac{b}{2a}=-\frac{4}{2(-0.2)}=\frac{4}{0.4}=10$ $y=-0.2(10)^2+4(10)=60$ The maximum height is 60 ft.	$x=-\frac{b}{2a}=-\frac{1}{2(-0.02)}=\frac{1}{0.04}=25$ $y=-0.02(25)^2+25=12.5$ The maximum height is 12.5 ft.	The arch in model 1 is taller because the function has a greater maximum value.
Width of arch	*x*-intercepts: $-0.2x^2+4x=-x(0.2x-4)$ $x=0$ or $0.2x-4=0$ $x=0$ or 20 The width is 20 ft.	*x*-intercepts: $-0.02x^2+x=-x(0.02x-1)$ $x=0$ or $0.02x-1=0$ $x=0$ or 50 The width is 50 ft.	The arch in model 2 is wider because the difference of the *x*-intercepts is greater.
Average rate of change over [0, 10]	At $x=0$, $y=0$. At $x=10$, $-0.2x^2+4x=-0.2(10)^2+4(10)=20$ Use (0, 0) and (10, 20): $\frac{20-0}{10-0}=2$	At $x=0$, $y=0$. At $x=10$, $-0.02x^2+x=-0.02(10)^2+10=8$ Use (0, 0) and (10, 8): $\frac{8-0}{10-0}=0.8$	The arch in model 1 is steeper than the arch in model 2 because the average rate of change is greater.

1. Look at the equation used to find the maximum height of the arch. Which variable represents the maximum height? *y*
2. Look at the equations used to find the average rate of change. Why is finding the average rate of change important? *The greater avg. rate of chg. indicates a steeper arch.*

11-4A RETEACH

Function Types

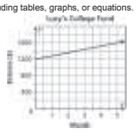
	Linear	Quadratic	Exponential
Equation	$y=mx+b$	$y=ax^2+bx+c$ $a\neq 0$	$y=ab^x$ $a\neq 0$, $b\neq 1$, $b>0$
Rate of change	Constant	Variable	Variable

You can compare functions in different representations, including tables, graphs, or equations.

Compare the accounts at right by finding slopes and *y*-intercepts and interpreting those values in the context of the situation.

Evie's College Fund

Month	Balance ($)
0	1000
1	1100
2	1200
3	1300
4	1400
5	1500

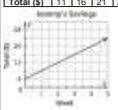


Evie	Lucy	Interpret and Compare
Slope: Use (0, 1000) and (5, 1500): $\frac{1500-1000}{5-0}=100$	Slope: Use (0, 1200) and (5, 1600): $\frac{1600-1200}{5-0}=80$	The slope is the rate of change. Evie is saving at a higher rate.
(0, 1000) is in the table *y*-intercept = 1000	(0, 1200) is on the graph. *y*-intercept = 1200	The *y*-intercept is the beginning account balance. Lucy started with more money.

1. Jon and Jeremy each save money weekly from their allowances, as shown. Compare the accounts by finding and interpreting slopes and *y*-intercepts.

Jon's Savings

Week	0	1	2	3	4
Total ($)	11	16	21	26	31



a. Slopes: Jon: 5; Jeremy: 4
b. Interpret and compare: Jon is saving at a faster rate.
c. *y*-intercepts: Jon: $11, Jeremy: $4.
d. Interpret and compare: Jon started with more money.

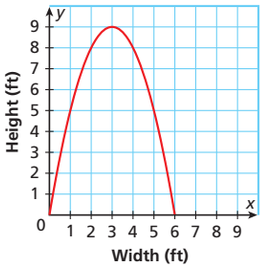
SEE EXAMPLE 3
p. CC36

3. Architecture An architect designs arch-shaped passageways in the form of a parabola. Models for two of his designs are shown at right. Compare the designs by finding and interpreting maximums, x-intercepts, and average rates of change over the interval [0, 2].

Design A

$y = -2x^2 + 8x$

Design B



SEE EXAMPLE 4
p. CC37

4. Business A bicycle store has approximately 200 bicycles in stock. The store owner is considering plans for expanding his inventory. Plan A calls for an increase of 30 bicycles per year. Plan B calls for a 10% increase each year. Compare the plans.

PRACTICE AND PROBLEM SOLVING

5. Slope: Darius is hiking faster (2.2 mi/h) than Kevin (2 mi/h); y-int.: Kevin started farther from camp (1.5 mi) than Darius (1 mi).

6. A: 6.3 people/mi²; B: about 5.25 people/mi²

7. A: x-int. = 0, 5; max = 100; avg. rate of chg. over [0, 2] = 48; B: x-int. = 0, 4; max = 64; avg. rate of chg. over [0, 2] = 32. A is faster, will go higher, and covers more horiz. dist. than B.

5. Recreation Kevin and Darius each hiked a mountain trail at different rates, as shown below. Compare the hikes by finding and interpreting slopes and y-intercepts.

Kevin's Hike

Time (h)	0	1	2	3
Distance from Camp (mi)	1.5	3.5	5.5	7.5

Darius's Hike

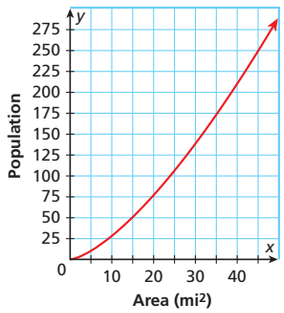
$y = 2.2x + 1$

6. Anthropology An archeologist used these functions to model the changing populations of two ancient cities as they grew in size. Compare the populations by finding and interpreting the average rates of change over the interval [0, 40].

City A

Area (mi²)	Population
0	0
10	31
20	89
30	164
40	252
50	353

City B



7. Physics Rhea's science teacher launched two model rockets straight up into the air. The functions that model the heights of the rockets are shown below. Compare the functions by finding and interpreting maximums, x-intercepts, and average rates of change over the x-interval [0, 2].

Rocket A

$y = -16x^2 + 80x$

Rocket B

Time (s)	0	1	2	3	4
Height (ft)	0	48	64	48	0

COMMON ERROR ALERT

In **Exercise 7**, students may forget to find and interpret both x-intercepts. Remind them that the rocket starts on the ground, so the value at $x = 0$ is also an x-intercept.

Teaching Tip **Visual** For **Exercises 5–7**, show students each of the functions in both table and graph format. Students may be more comfortable comparing the functions if they are presented in the same format. Ask students to explain how comparing functions in the same format is different than comparing the functions given in different formats.

Answers

3. A: x-int. = 0, 4; max. = 8; avg. rate of chg. over [0, 2] = 4; B: x-int. = 0, 6; max. = 9; avg. rate of chg. over [0, 2] = 4; B is taller and wider. Both are equally steep over [0, 2].

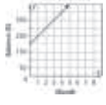
4. Plan A will result in more bicycles at first, but plan B surpasses plan A by the end of the 8th yr. After that, B exceeds A by ever-increasing amounts each yr.

11-4A PROBLEM SOLVING

1. George and Julie each deposit money into their savings accounts monthly. Compare the accounts by finding slopes and y-intercepts.

George's Account

Month	0	1	2	3
Balance ($)	125	175	225	275

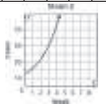


Slope: Both are saving at the same rate ($50/mo); y-int.: George started with more money ($125) than Julie ($200).

2. Miguel tracked the weekly spread of two strains of flu virus. His data are shown below. Compare the number of cases of flu by finding and interpreting average rates of change from week 0 to week 4.

Strain 1

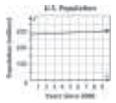
Week	0	1	2	3	4	5
Cases	15	25	40	60	85	115



Strain 1: 17.5 cases/wk; Strain 2: −15.25 cases/wk

The table and graph below show functions used to model the population in millions of the United States. Use the table or graph to select the best answers for 3 and 4.

Year (2000 = 0)	Population (millions)
0	282
2	288
4	293
6	298
8	304



3. What is the rate of change in the table from the year 2000 to the year 2008?
A 1.75 million C 22 million
B 2.75 million D 73.25 million
B

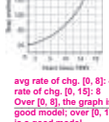
4. What is the rate of change in the graph from the year 2000 to the year 2008?
F about 7.5 million people/year
G about 3.5 million people/year
H about 3 million people/year
J about 2.5 million people/year
J

11-4A CHALLENGE

Exponential functions are often used to model population growth. Real data gathered over time can be used to generate a population model.

1. A conservationist collected the data shown in the table for the population of gray wolves in Yellowstone National Park. Is the graph an accurate model of the data? Compare the table and the graph by finding and interpreting the average rates of change over the interval [0, 8] and [0, 15].

Year (1995 = 0)	Gray Wolves
0	14
1	31
3	112
5	119
8	174
12	171
13	124
15	128



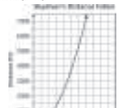
avg. rate of chg. [0, 8]: 20; avg. rate of chg. [0, 15]: 7.6

avg. rate of chg. [0, 8]: 4.75; avg. rate of chg. [0, 15]: 8
Over [0, 8], the graph is not a good model; over [0, 15], the graph is a good model.

Quadratic functions can be used to model applications involving parabolic motion.

2. The distance d in feet that a skydiver falls without air resistance before her parachute opens can be modeled by the equation $d = 16t^2$, where t is the time in seconds. Compare the actual measured distances (with wind resistance) in the table to the graph by finding and interpreting the average rates of change over the interval [0, 15].

Time (s)	Distance (ft)
0	0
1	16
3	128
5	375
10	1250
15	2550
20	4200
25	5250
30	5800

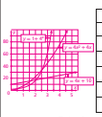


avg. rate of chg. [0,15]: 170 ft/s

avg. rate of chg. [0, 15]: 700 ft/s
The graph is not a good model (because it does not account for wind resistance).

11-4A PRACTICE B

1. Three functions are given below. Complete the tables and find the rate of change over [0, 3] for each function. Then graph all three functions on the same coordinate plane.



$y = 4x + 10$	
x	y
0	10
1	14
2	18
3	22
4	26

$y = 1 + 4^x$	
x	y
0	2
1	5
2	17
3	65
4	257

$y = 4x^2 + 4x$	
x	y
0	0
1	8
2	24
3	48
4	80

Rate of change	4	21	16

a. Compare the rates of change. The linear function has the least rate of change and the exponential function has the greatest rate of change.

b. How do the y-values at $x = 0$ and $x = 3$ relate to the rates of change over [0, 3]?

2. An engineer designs headlight reflectors. Equations for the shapes of two of his designs are shown below. Complete the tables for each function. Compare the designs by finding and comparing average rates of change, minimums, and maximums over the interval [0, 3].

b. The function with the greatest rate of change has the greatest difference between the y-values at $x = 0$ and $x = 3$.

Design A: $y = 5x^2 + 5x$	
x	y
0	0
1	10
2	30
3	60
4	100

Design B: $y = 5 + 5^x$	
x	y
0	6
1	10
2	30
3	130
4	630

Rate of change	20	$41\frac{1}{3}$
Minimum value on [0, 3]	0	6
Maximum value on [0, 3]	60	130

MULTI-STEP TEST PREP In **Exercise 13**, students who selected **C** found the amount of money that Tanya would save under plan A after 10 years. The result was not compared to the savings from plan B.

Journal

Have students write about the difference between a constant rate of change and an average rate of change.

ALTERNATIVE ASSESSMENT

Give students a quadratic function and ask them to represent it graphically and in table form. Then ask students to find a linear function with the same average rate of change over the interval [0, 3].

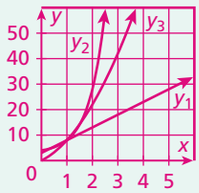
Answers

9. Possible tables:

$y_1 = 5x + 30$	
x	y
0	30
1	35
2	40
3	45
4	50
rate of chg. over [0, 4] = 5	

$y_3 = 3x^2 + 5x$	
x	y
0	0
1	8
2	22
3	42
4	68
avg. rate of chg. over [0, 4] = 17	

$y_2 = 3 + 5^x$	
x	y
0	4
1	8
2	28
3	128
4	628
avg. rate of chg. over [0, 4] = 156	



- y_1 is lin. It has the greatest y-value/ highest graph at $x = 0$. But y_1 has the least rate of chg. over [0, 4], so it has the shallowest graph and the least y-value/ lowest graph at $x = 4$.
- y_2 is exp., has the greatest rate of chg. over [0, 4], increases the most quickly, and has the steepest graph. Its graph is above the others at $x \approx 2.5$; after this pt., its graph is above the others by ever-increasing amts.
- y_3 is quad. At $x = 0$, $y_3 < y_1$ (its graph is below the graph of y_1). But y_3 has the greater rate of chg., so $y_3 > y_1$ at $x \approx 3.5$; after this pt., the graph of y_3 is steeper and higher than that of y_1 by ever-increasing amts. But y_3 does not grow as quickly as y_2. The graph of y_3 is below that of y_2 and is not as steep.

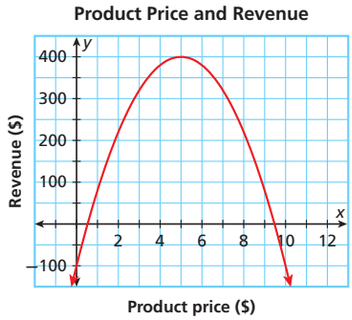
8. Proposal A will result in more boats over the first several years, but B surpasses A by the end of the 12th yr. After that, B exceeds A by ever-increasing amounts each yr.

8. Recreation A summer boating camp has 75 boats. The camp director is considering two proposals for increasing the number of boats to match the increase in the number of campers. Proposal A recommends increasing the number of boats by 5 boats per year. Proposal B recommends a 5% increase each year. Compare the proposals.

9. Three functions are given below. Make a table of values for each function using nonnegative coordinates. Then graph all 3 functions on the same coordinate plane. Compare and interpret the tables, graphs, and rates of change over [0, 4].

$y = 5x + 30$ $y = 3 + 5^x$ $y = 3x^2 + 5x$

10. Business The revenue of a company based on the price of its product is modeled by the function below.



a. Estimate the average rate of change over [0, 4]. **about 120**

b. What price that will yield the maximum revenue? **$5**

11a. Plan B results in more students in the first few years, but plan A exceeds plan B by year 7, after which A continues to exceed B by ever-increasing amounts each year.

b. B; B will double enrollment in 6 yrs, while A will take slightly longer.

c. A; A will triple enrollment in 9–10 yrs, while B will take 12–13 yrs.

11. Critical Thinking A karate center has 120 students. The director wants to set a goal to motivate her instructors to increase student enrollment. Under plan A, the goal is to increase the number of students by 12% each year. Under plan B, the goal is to increase the number of students by 20 each year.

a. Compare the plans.

b. Which plan should the director choose to double the enrollment in the shortest amount of time? Explain.

c. Which plan should she use to triple the enrollment in the shortest amount of time? Explain.

12. Write About It Compare the characteristics of linear, quadratic, and exponential functions, including any of the following that are applicable: rate of change, x-intercept, and maximum/minimum. Explain how to decide which type of function is being shown on a graph and in a table.

TEST PREP

13. Tanya has $2000 in her savings account. She wants to save more money. She is considering two savings plans. Under plan A, she will increase her account balance by $1000 per year. Under plan B, she will increase her account balance by 20% each year. How much more will she save with plan B after 10 years? Round your answer to the nearest dollar.

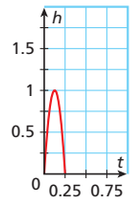
Ⓐ $383 Ⓒ $12,000

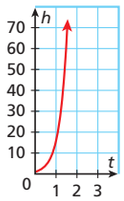
Ⓑ $9,562 Ⓓ $12,383

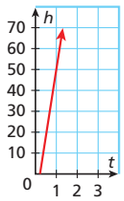
Answers

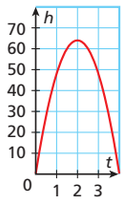
12. Linear: graph is a line; constant rate of chg.; 0 or 1 x-int.; no min. or max.; constant 1st differences. Quadratic: graph is a parabola; variable rate of chg.; 0, 1, or 2 x-int.; has min. or max. at vertex; constant 2nd differences. Exponential: variable rate of chg.; no x-int.; no min. or max.; constant ratios

14. The equation for the motion of a model rocket fired straight up with an initial velocity of 64 feet per second is $h = 64t - 16t^2$. Which could be the graph of this function?

Ⓕ 

Ⓖ 

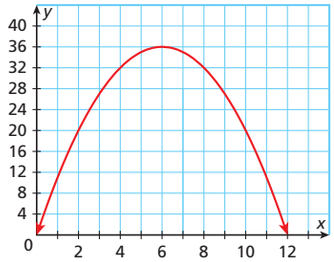
Ⓗ 

Ⓙ 

CHALLENGE AND EXTEND

15. Two functions are shown below.

Function A



Function B

$y = 12 - 2^x$

a. Estimate the average rate of change over the intervals [0, 4], [0, 6], [4, 6], [7, 10], and [8, 12] for both functions.

b. Explain how the average rate of change varies for each function.

c. What if...? For function B, if y is doubled while x remains the same, what is the effect on the rate of change over [0, 4]?

15a.

	A	B
[0, 4]	8	−3.75
[0, 6]	6	−10.5
[4, 6]	2	−24
[7, 10]	−5	−298.7
[8, 12]	−8	−960

b. A: rate of chg. is pos. and decreasing until (6, 36), when it becomes neg. and decreasing. B has ever-decreasing neg. rate of chg.

c. It is halved.

SPIRAL REVIEW

Solve each equation. Check your answers. *(Lessons 2-1 and 2-4)*

16. $10 = -8 + x$ **18** **17.** $-15 + y = 2$ **17** **18.** $-7 = p - 5$ **−2** **19.** $1.5 = n + 3$ **−1.5**

20. $\frac{x}{3} = 7$ **21** **21.** $-3 = \frac{w}{9}$ **−27** **22.** $1.2 = \frac{b}{4}$ **4.8** **23.** $8m = 120$ **15**

24. $4x = -2$ **−0.5** **25.** $\frac{z}{5} = 10$ **50** **26.** $14 = \frac{x}{2}$ **28** **27.** $5.1x = 45.9$ **9**

Solve each inequality and graph the solutions. *(Lesson 3-4)*

28. $-10 > -2x + 4$ **$x > 7$** **29.** $2x + 1 \leq 7$ **$x \leq 3$** **30.** $\frac{3}{4}x - 7 > 20$ **$x > 36$**

31. $13 \geq 2x - 7$ **$x \leq 10$** **32.** $12 - 4x < 24$ **$x > -3$** **33.** $\frac{13 - 5x}{8} \geq -4$ **$x \leq 9$**

Answers

28.


29.


30.


31.


32.


33.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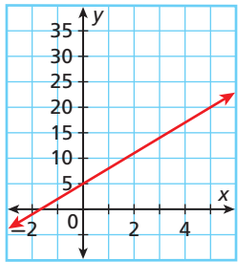
11-4A Lesson Quiz

1. Find the average rates of change over the interval [2, 5] for the functions shown.

Function A



A: 3; B: ≈47.01

Function B

x	y
0	1
1	2.72
2	7.39
3	20.09
4	54.60
5	148.41

2. Compare $y = x^2$ and $y = -x^2$ by finding minimums/maximums, x-intercepts, and average rates of change over the interval [0, 2]. Both have x-int. 0, which is also the max. of $y = x^2$ and the min. of $y = x^2$. The avg. rate of chg. for $y = x^2$ is 2, which is the opp. of the avg. rate of chg. for $y = x^2$.

3. A car manufacturer has 40 cars in stock. The manufacturer is considering two proposals. Proposal A recommends increasing the inventory by 12 cars per year. Proposal B recommends an 8% increase each year. Compare the proposals. Under proposal A, more cars will be manufactured for the first 29 yrs. After the 29th yr, more cars will be manufactured under proposal B.

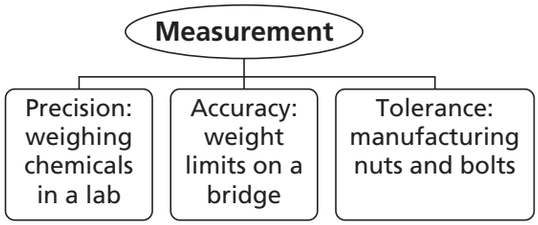
Graphic Organizer Answers

Possible answers given.

Chapter 3

Lesson 2-8A

3.



Chapter 5

Lesson

2. Possible answer:

***r*-value**	−0.9	−0.4	0	0.4	0.9
Scatter Plot					
Description of Correlation	Strong negative	Week negative	none	Week positive	Strong positive

Chapter 9

Lesson 9-9A

System of Equations	Number of Solutions			
	0	1	2	infinite
Linear			not possible	
Linear/Quadratic				not possible

Chapter 11

Lesson 11-4A

3. Possible answer:

Comparing Functions			
Linear to Linear	**Exponential to Exponential**	**Quadratic to Quadratic**	**Linear to Quadratic**
Compare… slopes and *y*-intercepts	Compare… rates of change over different intervals	Compare… maximums or minimums, lengths, and average steepness over the interval	Compare… the graphs of the functions

Additional Answers