



# Algebra 1

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## STANDARDS

## PAGE REFERENCES

### Number and Operations

**Purpose:** Numbers and operations remain a cornerstone for the study of mathematics in grades K – 12. Students use numbers to quantify sets, identify location, measure, quantify the probability of an event, analyze data, and describe and interpret real-world phenomena. Having students know basic facts and having students compute fluently (i.e., accurately and efficiently) continues to be an important goal in mathematics education. However, knowing basic facts should be incorporated into a rich mathematics curriculum that builds conceptual understanding of these facts.

Through the school years, the amount of time spent on numbers and their operations will decrease and the types of numbers studied will change. As students progress through the elementary grades and into middle school, they will need to develop an in-depth conceptual understanding of fractions, decimals, and percents prior to doing algorithmic computations with these numbers. Conceptual development of integers and meaningful computation with them are also goals for middle grade students. The study of irrational numbers and the real number system will begin in eighth grade and continue through high school. Imaginary and complex numbers are introduced in advanced mathematics. It is important for students to model and represent the different types of numbers they study.

Students cannot appreciate the power of numbers unless they also understand the operations upon those numbers. Students need to recognize which operation(s) to apply to a given problem situation they encounter. They need to know what effect the various operations will have on different types of numbers. They need to know the relationships among the operations and among the operations and their properties. A deep understanding of the operations and their properties will help students make sense of computation algorithms and lead to fluency in computation. A firm understanding of numbers as well as operations and their properties will provide a good foundation for the study of algebra.

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| <p>M(N&amp;O)–HS–1 <b>Demonstrates conceptual understanding of rational numbers</b> by knowing why a real number is rational if and only if the number’s decimal expansion eventually repeats or terminates.</p>  | <p><b>Student Edition:</b><br/>P7-P10, P13-P16, P17-P19<br/><i>Study Tip</i> P8, P9, P10, P14, P15<br/><b>Teacher Edition:</b><br/>AE P7-P9, P13-P16, P17-P18; TOD P10</p>   |
| <p>M(N&amp;O)–HS–2 <b>Demonstrates understanding of the relative magnitude of real numbers</b> by solving problems that involve ordering or comparing any subset of the real numbers.</p>   | <p><b>Student Edition:</b><br/>P7-P10, P11-P12, P13-P16, 283-288, 290-295, 304-309, 310-314, 411-415<br/><i>Study Tip</i> P8, P9, P10, P14, P15, 284, 285, 291, 306, 311<br/><b>Teacher Edition:</b><br/>AE P7-P9, P11-P12, P13, 284-285, 291-292, 305-306, 311-312, 412; TOD P10</p>  |
| <p>M(N&amp;O)–10–2 <b>Demonstrates understanding of the relative magnitude of real numbers</b> by solving problems involving ordering or comparing rational numbers, common irrational numbers (e.g., <math>\sqrt{2}</math>, <math>\pi</math>), rational bases with integer exponents, square roots, absolute values, integers, or numbers represented in scientific notation using number lines or equality and inequality symbols.</p>  | <p><b>Student Edition:</b><br/>P7-P10, P11-P12, P13-P16, 103-109, 399, 401-407, 408-415, 416-422<br/><i>Problem-Solving Tip</i> 417<br/><i>Study Tip</i> P8, P9, P10, 402, 403, 404, 418<br/><b>Teacher Edition:</b><br/>AE P7-P9, P11-P12, P13, 104-105, 402-404, 412, 417-418; DI 407</p>  |
| <p>M(N&amp;O)–HS–4 <b>Accurately solves problems.</b></p> <ul style="list-style-type: none"> <li>• Interprets and computes with rational exponents and their relation to radicals, by hand in simple cases (e.g., <math>4^{3/2}</math>), and using a calculator when appropriate.</li> <li>• Interprets and computes in scientific notation with and without a calculator.</li> <li>• Solves compound interest problems using <math>A = P\left(1 + \frac{r}{n}\right)^{nt}</math>, where <math>n</math> is finite.</li> </ul> | <p><b>Student Edition:</b><br/>416-422, 429, #61-#66, 430, 438 #54, 461, 463 #7-#13 &amp; #25, 570 #56-#58, 573-577, 595, 597 #25-#26, 713 #89-#91<br/><i>Problem-Solving Tip</i> 417, 574<br/><i>Study Tip</i> 418<br/><i>Watch Out!</i> 417<br/><b>Teacher Edition:</b><br/>AE 417-418, 547-575; DI 417, 420; FMC 418; NTM 422; SQ 416; TNT 418, 419; WO 420</p> |

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| <p>M(N&amp;O)–10–4 <b>Accurately solves problems involving</b> rational numbers within mathematics, across content strands, disciplines or contexts (with emphasis on, but not limited to, proportions, percents, ratios, and rates).</p>   | <p><b>Student Edition:</b><br/> P20-P22, 111-117, 118, 119-124, 125, 128-131, 132-138, 142-144, 170-177, 670-676, 714-719, 720-726<br/> <i>Algebra Lab</i> 125<br/> <i>Spreadsheet Lab</i> 118<br/> <i>Study Tip</i> P21, P22, 112, 113, 121, 671, 721, 722, 723</p> <p><b>Teacher Edition:</b><br/> AE P20-P21, 112-114, 120-121, 133-135, 171-174, 671-672, 715-716, 721-723</p>  |
| <p>M(N&amp;O)–HS–6 <b>Uses a variety of mental computation strategies to solve problems</b> (e.g., using compatible numbers, applying properties of operations, using mental imagery, using patterns) and to <b>determine the reasonableness of answers</b>.</p> <p>(IMPORTANT: <i>The intent of this GSE is to embed mental arithmetic throughout the instructional program, not to teach it as a separate unit.</i>)</p>  | <p><b>Student Edition:</b><br/> P5-P6, P7-P10, P13-P14, P18, P27, 23-29, 37 #83-84, 68-69, 128-130, 163-166, 206-207, 394-395, 416-422, 537-542, 553-557, 558-564, 566, 567-572, 573-577, 590-591, 605, 720-726<br/> <i>Preparing for Standardized Tests</i> 68-69, 206-207, 394-395<br/> <i>Problem-Solving Tip</i> 417<br/> <i>Study Tip</i> P14, P18, P27, 538, 539, 721, 722<br/> <i>Vocabulary Link</i> 721<br/> <i>Watch Out!</i> 538</p> <p><b>Teacher Edition:</b><br/> FA 591; TNT P6, 554</p> |
| <p>M(N&amp;O)–HS–7 <b>Makes estimates</b> in a given situation (e.g., tips, discounts, tax, the value of a non-perfect square root or cube root) by identifying when estimation is appropriate, selecting the appropriate method of estimation; determining the level of accuracy needed given the situation; analyzing the effect of the estimation method on the accuracy of results; evaluating the reasonableness of solutions appropriate to GSEs across content strands.</p> <p>(IMPORTANT: <i>The intent of this GSE is to embed estimation throughout the instructional program, not to teach it as a separate unit.</i>)</p> | <p><b>Student Edition:</b><br/> P5-P6, P7-P10, P13, P18, P27, 37 #83-84, 68-69, 128-130, 163-166, 206-207, 394-395, 416-422, 537-542, 553-557, 558-564, 566, 567-572, 573-577, 590-591, 605, 720-726<br/> <i>Preparing for Standardized Tests</i> 68-69, 206-207, 394-395<br/> <i>Problem-Solving Tip</i> 417<br/> <i>Study Tip</i> P18, P27, 538, 539, 721, 722<br/> <i>Vocabulary Link</i> 721<br/> <i>Watch Out!</i> 538</p> <p><b>Teacher Edition:</b><br/> FA 591; TNT P6, 554</p>                 |

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| <p><b>M(N&amp;O)–HS–8 Applies properties of numbers and field properties</b> (including determining whether a given subset of numbers is closed under a given arithmetic operation) <b>to solve problems or to simplify computations; and compares and contrasts the properties of numbers and number systems</b>; adds and multiplies numerical matrices with attention to the arithmetic properties of these operations.</p>  | <p><b>Student Edition:</b><br/> 16-22, 23-29, 30, 31-37, 369-375, 377-381, 475, 476-482<br/> <i>Study Tip</i> 17, 24, 370, 371, 377, 378, 477<br/> <i>Watch Out!</i> 478<br/> <b>Teacher Edition:</b><br/> AE 17-19, 24-26, 32-33, 370-372, 377-378, 477-479; DI 22, 29; FMC 17, 18, 24, 378, 478; TNT 27</p> |
| <b>Geometry and Measurement</b>   |   |
| <p><b>Purpose:</b> Geometry and the related area of measurement help students represent, describe, and make sense of the world in which they live. Geometry is also a natural place for students to develop their reasoning and justification skills.</p> <p>We live in a three-dimensional world. To interpret, understand, and appreciate that world, students need to develop an understanding of space. In addition, success in mathematics depends, in part, on the development of spatial abilities. Spatial skills include making and interpreting drawings, forming mental images, and visualizing changes.</p> <p>Measurement is the process of assigning a numerical value to an attribute of an object. The study of measurement provides students with techniques and tools they will need to describe and analyze their world. It also provides an opportunity to make connections within mathematics and between mathematics and other curricular areas. High school students must develop more mature insights into the essential role of measurement as a link between the abstractness of mathematics and the concreteness of the real-world.</p> <p>In both areas, geometry and measurement, students need to investigate, experiment, and explore geometric properties using both technology and hands-on materials.</p> |   |
| <p><b>M(G&amp;M)–HS–2 Creates formal proofs</b> of propositions (e.g., angles, lines, circles, distance, midpoint and polygons including triangle congruence and similarity).</p> <p><i>(IMPORTANT: It is the intent that students are creating formal proofs as articulated in the process standards, independent of the topic being studied. Furthermore, students should not be limited to any particular method of proof, but rather use a variety of strategies and those that work best for them. Some topics may be treated more formally than others.)</i></p>  | <p><b>Student Edition:</b><br/> 21 #53, 54-59, 277 #1-#3, 303, 307 #36, 634 #54, 641<br/> <i>Algebra Lab</i> 303<br/> <i>Preparing for Standardized Tests</i> 277<br/> <b>Teacher Edition:</b><br/> DI 641; WCG 303</p>   |

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| <p>M(G&amp;M)–10–2 <b>Makes and defends conjectures, constructs geometric arguments, uses geometric properties, or uses theorems to solve problems</b> involving angles, lines, polygons, circles, or right triangle ratios (sine, cosine, tangent) within mathematics or across disciplines or contexts (e.g., Pythagorean Theorem, Triangle Inequality Theorem).</p>  | <p><b>Student Edition:</b><br/> P23-P25, P26-P28, P29-P30, P31-P32, 21 #53, 194, 277 #1-#3, 307 #36, 428 #51, 630-635, 636-641<br/> <i>Algebra Lab</i> 194, 303<br/> <i>Preparing for Standardized Tests</i> 277<br/> <i>Study Tip</i> P24, P25, P27, P30, P32<br/> <b>Teacher Edition:</b><br/> AE P23-P24, P26-P27, P29, P31</p>                                  |
| <p>M(G&amp;M)–HS–4 <b>Applies the concepts of congruency</b> by using matrices to represent reflections, translations, and rotations.</p>   | <p>Matrices are introduced on the following pages.<br/> <b>Student Edition:</b><br/> 369-371</p>  |
| <p>M(G&amp;M)–10–4 <b>Applies the concepts of congruency by solving problems</b> on or off a coordinate plane involving reflections, translations, or rotations; or solves problems using congruency involving problems within mathematics or across disciplines or contexts.</p>   | <p><b>Student Edition:</b><br/> 277 #1-#3, 407 #69, 525-535, 544-549, 557 #57-#62, 564 #66-#68, 566, 605-610, 611, 617 #62-#67<br/> <i>Graphing Technology Lab</i> 611<br/> <i>Study Tip</i> 527, 529, 545, 606<br/> <i>Watch Out!</i> 528, 546<br/> <b>Teacher Edition:</b><br/> AE 526-529, 545-546, 606-608; FMC 546; TNT 547</p>                                |
| <p>M(G&amp;M)–HS–5 <b>Applies concepts of similarity</b> to define the trigonometric functions as ratios of sides of right triangles; <b>uses the ratios of the sides of special right triangles</b> (<math>30^\circ - 60^\circ - 90^\circ</math> and <math>45^\circ - 45^\circ - 90^\circ</math>) to determine the sine, cosine and tangent of <math>30^\circ</math>, <math>45^\circ</math>, and <math>60^\circ</math>; and solves related problems.</p> | <p><b>Student Edition:</b><br/> 230 #45, 268 #63, 642-647, 648, 649-655, 662-663, 705 #62, 839, 854 #9-#10<br/> <i>Algebra Lab</i> 648<br/> <i>Preparing for Standardized Tests</i> 662-663<br/> <i>Study Tip</i> 643, 650<br/> <b>Teacher Edition:</b><br/> AE 643-644, 650-651; DI 647; FMC 644; TNT 643; TT 648; WCG 648; WO 643, 647</p>                        |
| <p>M(G&amp;M)–10–5 <b>Applies concepts of similarity by solving problems</b> within mathematics or across disciplines or contexts.</p>  | <p><b>Student Edition:</b><br/> 113-117, 119-124, 642-647, 648, 655 #60-#63, 660, 661, 662-663, 705 #62, 839, 854 #9-#10<br/> <i>Algebra Lab</i> 648<br/> <i>Preparing for Standardized Tests</i> 662-663<br/> <i>Study Tip</i> 643<br/> <b>Teacher Edition:</b><br/> AE 113-114, 120-121, 643-644; DI 117, 647; FMC 644; TNT 643; TT 648; WCG 648; WO 643, 647</p> |

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| <p>M(G&amp;M)–HS–6 <b>Applies trigonometric formulas</b> (e.g., Law of Sines, Law of Cosines, <math>A = \frac{1}{2} ab \sin C</math>) to find angles, lengths and areas of polygons.</p>  | <p><b>Student Edition:</b><br/>648, 649-655, 660, 661, 676 #61-#63, 683 #53-#58, 755 #43-#45, 839, 854 #11<br/><i>Algebra Lab</i> 648<br/><i>Study Tip</i> 650<br/><i>Watch Out!</i> 650<br/><b>Teacher Edition:</b><br/>AE 650-651; FMC 651; SQ 649; TWT 651; WO 655</p>   |
| <p>M(G&amp;M)–10–6 <b>Solves problems involving perimeter, circumference, or area</b> of two-dimensional figures (including composite figures) or <b>surface area or volume</b> of three-dimensional figures (including composite figures) within mathematics or across disciplines or contexts.</p>    | <p><b>Student Edition:</b><br/>P23-P25, P26-P28, P29-P30, P31-P32, 80 #53, 99, 414 #60, 427-428, 449-450, 456-457, 461 #36, 462 #58, 502 #44, 535 #76, 582 #34<br/><i>Study Tip</i> P24, P25, P27, P30, P32<br/><b>Teacher Edition:</b><br/>AE P23-P24, P26-P27, P29, P31</p>   |
| <p>M(G&amp;M)–HS–7 <b>Applies informal concepts of successive approximation, upper and lower bounds, and limits in measurement situations</b> (e.g., use successive approximation to find the area of a pond); and <b>uses measurement conversion strategies</b> (e.g., unit/dimensional analysis).</p> | <p><b>Student Edition:</b><br/>128-130, 464-465, 692-693, 696-697, 709-712, 722-725, 731 #27-#28, 732-733, 785-786<br/><i>Graphing Technology Lab</i> 785-786<br/><i>Preparing for Standardized Tests</i> 464-465, 732-733<br/><i>Study Tip</i> 128, 723<br/><b>Teacher Edition:</b><br/>AE 128, 465, 693, 709, 722-723, 733; TT 785; WCG 785</p>                     |
| <p>M(G&amp;M)–10–7 <b>Uses units of measure appropriately and consistently when solving problems across content strands; makes conversions within or across systems and makes decisions concerning an appropriate degree of accuracy in problem situations</b> involving measurement in other GSEs.</p> | <p><b>Student Edition:</b><br/>128-130, 464-465, 692-693, 696-697, 709-712, 722-725, 731 #27-#28, 732-733<br/><i>Preparing for Standardized Tests</i> 464-465, 732-733<br/><i>Study Tip</i> 128, 723<br/><b>Teacher Edition:</b><br/>AE 128, 465, 693, 709, 722-723, 733; WO 128</p>  |
| <p>M(G&amp;M)–10–9 <b>Solves problems on and off the coordinate plane</b> involving distance, midpoint, perpendicular and parallel lines, or slope.</p>   | <p><b>Student Edition:</b><br/>103-108, 169, 170-178, 179, 180-186, 237-243, 244, 277 #1-#3, 279 #12, 636-641, 659<br/><i>Algebra Lab</i> 169<br/><i>Preparing for Standardized Tests</i> 277<br/><i>Study Tip</i> 105, 171, 172, 174, 239, 637<br/><i>Watch Out!</i> 173, 638<br/><b>Teacher Edition:</b><br/>AE 105, 171-174, 181-182, 238-239, 637-638; DI 243</p> |

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| <p>M(G&amp;M)–HS–10 <b>Demonstrates conceptual understanding of spatial reasoning and visualization</b> by sketching or using dynamic geometric software to generate three-dimensional objects from two-dimensional perspectives, or to generate two-dimensional perspectives from three-dimensional objects, and by solving related problems; perform and justify constructions with a compass and straightedge or dynamic geometric software.</p>   | <p><b>Student Edition:</b><br/>14 #58, 71 #12, 294 #41, 407 #69, 697 #52</p>  |
| <b>Functions and Algebra</b>  |   |
| <p><b>Purpose:</b> Algebra is the language through which much of mathematics is communicated. Students in Kindergarten begin to explore algebraic concepts using informal representations (e.g., words, physical models, tables, graphs). In later years students progress to more abstract representations. The study of patterns is one of the central themes of algebraic thinking and leads to an understanding of relations and functions. Students at all grade-levels should recognize, describe, and generalize patterns and build mathematical models to describe, interpret, and predict the behavior of real-world phenomenon. Algebraic processes are important tools that students can use throughout their lives.</p> |   |
| <p>M(F&amp;A)–HS–1 <b>Identifies arithmetic and geometric sequences</b> and finds the <math>n</math>th term; then <b>uses the generalization</b> to find a specific term.</p>   | <p><b>Student Edition:</b><br/>187-192, 193-200, 204, 573-577, 578-583, 584-589, 590-591<br/><i>Graphing Technology Lab</i> 590-591<br/><i>Study Tip</i> 188, 189, 574, 579<br/><i>Watch Out!</i> 580, 585, 586<br/><b>Teacher Edition:</b><br/>AE 188-190, 194-195, 574-575, 579-580, 585-586;<br/>DI 193; FA 591; FMC 189; TNT 188</p>  |
| <p>M(F&amp;A)–10–1 <b>Identifies, extends, and generalizes a variety of patterns</b> (linear and nonlinear) represented by models, tables, sequences, or graphs in problem solving situations.</p>  | <p><b>Student Edition:</b><br/>170-178, 180, 181-186, 187-192, 193-200, 203-204, 567-572, 573-577, 578-583, 584-589, 590-591, 595-596, 597<br/><i>Graphing Technology Lab</i> 590-591<br/><i>Study Tip</i> 188, 189, 574, 579<br/><i>Watch Out!</i> 580, 585, 586<br/><b>Teacher Edition:</b><br/>AE 188-190, 194-195, 568-569, 574-575, 579-580, 585-586; DI 193; FA 591; FMC 189; TNT 188</p> |

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| <p><b>M(F&amp;A)–HS–2 Demonstrates conceptual understanding of linear and nonlinear functions and relations.</b></p> <ul style="list-style-type: none"> <li>Analyzes characteristics of classes of functions (polynomial, rational, and exponential) to include domain, range, intercepts, increasing and decreasing intervals and rates of change.</li> <li>Understands one-to-one (injective) functions and that a function that is one-to-one has a converse that is also a function; and finds inverses algebraically and graphically.</li> <li>Graphs polynomial, rational and exponential functions, including vertical and horizontal shifts, stretches, and compressions as well as reflections across vertical and horizontal axes.</li> <li>Applies knowledge of functions to interpret and understand situations, design mathematical models, and solve problems in mathematics as well as in the natural and social sciences.</li> </ul> | <p><b>Student Edition:</b><br/> 38-44, 45-52, 53, 180-186, 187-193, 195-199, 202-204, 222-223, 261-268, 269, 525-535, 536, 537-542, 544-549, 567-572, 573-577, 578-583, 584-589, 590-591, 605-610, 611<br/> <i>Algebra Lab</i> 536<br/> <i>Graphing Technology Lab</i> 53, 222-223, 269, 590-591, 611<br/> <i>Problem-Solving Tip</i> 182, 569<br/> <i>Review Vocabulary</i> 526<br/> <i>Study Tip</i> 39, 47, 48, 181, 188, 189, 196, 197, 263, 527, 529, 538, 539, 545, 568, 569, 574, 579, 606<br/> <i>Watch Out!</i> 528, 546, 580, 585, 586</p> |
| <p><b>M(F&amp;A)–10–2 Demonstrates conceptual understanding of linear and nonlinear functions and relations</b> (including characteristics of classes of functions) through an analysis of constant, variable, or average rates of change, intercepts, domain, range, maximum and minimum values, increasing and decreasing intervals and rates of change (e.g., the height is increasing at a decreasing rate); describes how change in the value of one variable relates to change in the value of a second variable; or works between and among different representations of functions and relations (e.g., graphs, tables, equations, function notation).</p>  | <p><b>Student Edition:</b><br/> 45-52, 53, 66, 153-160, 161-166, 167-168, 169, 170-178, 179, 180-186, 187-193, 195-200, 214-221, 237-243, 525-535, 536, 537-542, 549<br/> <i>Algebra Lab</i> 169, 536<br/> <i>Graphing Technology Lab</i> 167-168, 653<br/> <i>Study Tip</i> 47, 48<br/> <b>Teacher Edition:</b><br/> AE 46-48</p>   |

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| <p><b>M(F&amp;A)–HS–3 Demonstrates conceptual understanding of algebraic expressions.</b></p> <ul style="list-style-type: none"> <li>• Manipulates, evaluates, and simplifies algebraic and numerical expressions.</li> <li>• Adds, subtracts, multiplies and divides polynomials and rational expressions.</li> <li>• Factors quadratic and higher degree polynomials.</li> <li>• Understands properties of logarithms and converts between logarithmic and exponential forms.</li> <li>• Manipulates, evaluates, and simplifies expressions involving rational exponents and radicals and converts between expressions with rational exponents and expressions with radicals.</li> <li>• Understands the effect of simplifying rational expressions on the domain of the related functions (e.g., <math>x^2/x = x</math> for <math>x \neq 0</math>).</li> </ul> | <p><b>Student Edition:</b><br/> 10-15, 16-22, 23-29, 30, 63-64, 431-432, 433-438, 439-444, 445-446, 447-452, 453-458, 485-491, 493-498, 499-504, 505-512, 677, 684-690, 691, 692-698, 700-705, 706-713, 714-719, 728-730<br/> <i>Algebra Lab</i> 431-432, 445-446, 677<br/> <i>Graphing Technology Lab</i> 691</p> |
| <p><b>M(F&amp;A)–10–3 Demonstrates conceptual understanding of algebraic expressions</b> by solving problems involving algebraic expressions, by simplifying expressions (e.g., simplifying polynomial or rational expressions, or expressions involving integer exponents, square roots, or absolute values), by evaluating expressions, or by translating problem situations into algebraic expressions.</p>  | <p><b>Student Edition:</b><br/> P7-P9, 5-9, 10-15, 16-22, 23-29, 30, 63-64, 401-407, 408-415, 433-438, 439-444, 447-452, 453-458, 612-617, 618, 619-623, 629, 684-690, 691, 692-698, 699, 700-705, 706-713, 714-719<br/> <i>Graphing Technology Lab</i> 618, 691<br/> <i>Study Tip</i> 6, 11</p>                   |

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| <p><b>M(F&amp;A)–HS–4 Demonstrates conceptual understanding of equality.</b></p> <ul style="list-style-type: none"> <li>• Factors, completes the square, uses the quadratic formula, and graphs quadratic functions to solve quadratic equations.</li> <li>• Solves equations involving polynomial, rational, and radical expressions. Graphs and interprets the solutions.</li> <li>• Understands extraneous solutions.</li> <li>• Finds approximate solutions to equations by graphing each side as a function using technology. Understands that any equation in <math>x</math> can be interpreted as the equation <math>f(x) = g(x)</math> and interpret the solutions of the equation as the <math>x</math>-value(s) of the intersection point(s) of the graphs of <math>y = f(x)</math> and <math>y = g(x)</math>.</li> <li>• Solves <math>2 \times 2</math> and <math>3 \times 3</math> systems of linear equations and graphically interprets the solutions.</li> <li>• Solves systems of linear and quadratic inequalities.</li> <li>• Solves systems of equations involving nonlinear expressions and graphically interprets the solutions.</li> <li>• Translates problem situations into inequalities; and solves linear and nonlinear inequalities (symbolically and graphically).</li> </ul> | <p><b>Student Edition:</b><br/> 283-288, 289, 290-295, 296-301, 302, 304-309, 315-320, 321, 333-339, 340-341, 342-347, 348-354, 355-360, 362-367, 382-386, 387, 476-482, 485-491, 493-498, 499-504, 505-512, 525-535, 537-542, 543, 550-551, 552-557, 558-564, 565, 624-628, 720-726<br/> <i>Algebra Lab</i> 289<br/> <i>Graphing Technology Lab</i> 321, 340-341, 387, 543, 550-551, 565</p> |
| <p><b>M(F&amp;A)–10–4 Demonstrates conceptual understanding of equality</b> by solving problems involving algebraic reasoning about equality; by translating problem situations into equations; by solving linear equations (symbolically and graphically) and expressing the solution set symbolically or graphically, or provides the meaning of the graphical interpretations of solution(s) in problem-solving situations; or by solving problems involving systems of linear equations in a context (using equations or graphs) or using models or representations.</p>  | <p><b>Student Edition:</b><br/> 31-37, 75-80, 81-82, 83-89, 90, 91-96, 97-102, 113-117, 119-124, 126-131, 132-138, 140-144, 153-160, 161-166, 167-168, 180-186, 214-221, 222-223, 224-230, 231-236, 333-339, 340-341, 342-347, 348-354, 355-360, 361, 362-367, 376-381<br/> <i>Algebra Lab</i> 81-82, 90<br/> <i>Graphing Technology Lab</i> 167-168, 222-223, 340-341</p>                    |

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| <b>Data, Statistics, and Probability</b>  |   |
| <p><b>Purpose:</b> Collecting, organizing, and displaying data, as well as interpreting and analyzing the information to make decisions and predictions, have become very important in our society. Statistical instruction should be carried out in a spirit of investigation and exploration so students can answer and formulate questions about data. Probability should be studied in familiar contexts. Students need to investigate fairness, chances of winning, and uncertainty. Technology should be used as a tool throughout the investigation process.</p> |   |
| <p><b>M(DSP)–HS–1 Interprets a given representation(s)</b> (e.g., regression function including linear, quadratic, and exponential) to analyze the data to make inferences and to formulate, justify, and critique conclusions.</p> <p>(IMPORTANT: Analyze data consistent with concepts and skills in M(DSP)–HS–2).</p>  | <p><b>Student Edition:</b><br/>           245-251, 252, 253-260, 268 #65-#69, 273, 275, 585-589, 590-591, 596, 610 #57-#60 &amp; #65<br/> <i>Algebra Lab</i> 252<br/> <i>Graphing Technology Lab</i> 590-591<br/> <i>Reading Math</i> 247<br/> <i>Study Tip</i> 246, 255</p> <p><b>Teacher Edition:</b><br/>           AE 246-247, 254-255; DI 249, 258; FCA 591; FMC 247, 254; TNT 255; TT 590; WCG 252</p>  |
| <p><b>M(DSP)–10–1 Interprets a given representation(s)</b> (e.g., box-and-whisker plots, scatter plots, bar graphs, line graphs, circle graphs, histograms, frequency charts) to make observations, to answer questions, to analyze the data to formulate or justify conclusions, critique conclusions, make predictions, or to solve problems within mathematics or across disciplines or contexts (e.g., media, workplace, social and environmental situations).</p> <p>(IMPORTANT: Analyzes data consistent with concepts and skills in M(DSP)–10–2.)</p>            | <p><b>Student Edition:</b><br/>           P37-P39, P40-P43, P45 #69-#71, 245-251, 252, 253-260, 268 #65-#69, 273, 275, 585-589, 590-591, 596, 610 #57-#60 &amp; #65, 739<br/> <i>Algebra Lab</i> 252, 739<br/> <i>Graphing Technology Lab</i> 590-591<br/> <i>Reading Math</i> 247<br/> <i>Study Tip</i> P38, P39, P42, P43, 246, 255</p> <p><b>Teacher Edition:</b><br/>           AE P40-P42, P37-P38, 246-247, 254-255; DI 249, 258; FCA 591; FMC 254; TNT 255; WCG 252, 739</p> |
| <p><b>M(DSP)–HS–2 Analyzes patterns, trends, or distributions in data in a variety of contexts by determining or using</b> measures of dispersion (standard deviation, variance, and percentiles).</p>  | <p><b>Student Edition:</b><br/>           125, 756-762, 763, 770 #44-#47, 785-786, 795-796, 797<br/> <i>Algebra Lab</i> 125<br/> <i>Review Vocabulary</i> 757<br/> <i>Study Tip</i> 759</p> <p><b>Teacher Edition:</b><br/>           AE 757-759; DI 758, 762; FMC 757; SQ 756; TT 125; WCG 125</p>   |

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| <p>M(DSP)–10–2 <b>Analyzes patterns, trends, or distributions in data in a variety of contexts</b> by determining, using, or analyzing measures of central tendency (mean, median, or mode), dispersion (range or variation), outliers, quartile values, estimated line of best fit, regression line, or correlation (strong positive, strong negative, or no correlation) to solve problems; and solve problems involving conceptual understanding of the sample from which the statistics were developed.</p> | <p><b>Student Edition:</b><br/> P37-P39, P40-P43, P45 #65-#70, 245-251, 252, 253-260, 268 #69, 273, 275, 585-589, 590-591, 596, 610 #57-#60 &amp; #65, 739, 747-755<br/> <i>Algebra Lab</i> 252, 739<br/> <i>Graphing Technology Lab</i> 590-591<br/> <i>Reading Math</i> 247<br/> <i>Study Tip</i> P38, P39, P42, P43, 246, 255<br/> <b>Teacher Edition:</b><br/> DI 249, 258; FMC 747</p>     |
| <p>M(DSP)–HS–3 <b>Organizes and displays one- and two-variable data using a variety of representations</b> (e.g., box-and-whisker plots, scatter plots, bar graphs, line graphs, circle graphs, histograms, frequency charts, linear, quadratic, and exponential regression functions) to analyze the data to formulate or justify conclusions, make predictions, or to solve problems with or without using technology.</p>  | <p><b>Student Edition:</b><br/> P40-P43, P45 #69-#71, 245-251, 253-260, 273, 275, 585-589, 590-591, 596, 610 #57-#60 &amp; #65, 739, 747-755<br/> <i>Algebra Lab</i> 739<br/> <i>Graphing Technology Lab</i> 590-591<br/> <i>Reading Math</i> 247<br/> <i>Study Tip</i> P42, P43, 246, 255<br/> <b>Teacher Edition:</b><br/> AE P40-P42, 246-247, 254-255; DI 249, 258; FMC 747; YN P43</p>     |
| <p>M(DSP)–10–3 <b>Identifies or describes representations or elements of representations that best display a given set of data or situation</b>, consistent with the representations required in M(DSP)–10–1.</p>   | <p><b>Student Edition:</b><br/> P40-P43, P45 #65-#70, 245-251, 253-260, 590-591, 746-755<br/> <i>Graphing Technology Lab</i> 590-591<br/> <i>Reading Math</i> 247<br/> <i>Study Tip</i> P42, P43, 246, 255<br/> <b>Teacher Edition:</b><br/> AE P40-P42, 246-247, 254-255, 747-749; DI 258; FA 591; FCA 591; FMC 747; WCG 590; YN P43</p>   |
| <p>M(DSP)–HS–4 <b>Uses counting techniques to solve problems</b> in context involving combination or permutations using a variety of strategies (e.g., <math>nCr</math>, <math>nPr</math>, or <math>n!</math>); and finds unions, intersections, and complements of sets.</p>   | <p><b>Student Edition:</b><br/> P33-P36, 60-61, 304-309, 310-314, 764-770, 771-778, 779-784, 787-792, 795-796, 797<br/> <i>Algebra Lab</i> 60-61<br/> <i>Reading Math</i> 765<br/> <i>Study Tip</i> P34, 306, 311, 765, 766<br/> <i>Watch Out!</i> 767, 774<br/> <b>Teacher Edition:</b><br/> AE P33-P35, 305-306, 311-312, 765-767, 772-774, 780-781; DI 766, 770; FMC 765, 766; WCG 60-61</p> |

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| <p>M(DSP)–10–4 <b>Uses counting techniques to solve problems</b> in context involving combinations or permutations using a variety of strategies (e.g., organized lists, tables, tree diagrams, models, Fundamental Counting Principle, or<sup>sc</sup> others).</p>  | <p><b>Student Edition:</b><br/> P33-P36, 60-61, 764-770, 771-778, 779-784, 787-792, 795-796, 797<br/> <i>Algebra Lab</i> 60-61<br/> <i>Study Tip</i> P34, P36, 765, 766<br/> <i>Watch Out!</i> 767, 774</p> <p><b>Teacher Edition:</b><br/> AE P33-P35, 765-767, 772-774, 780-781; DI 766; FMC 765, 766; WCG 60-61</p>  |
| <p>M(DSP)–HS–5 <b>For a probability event in which the sample space may or may not contain equally likely outcomes, predicts</b> the theoretical probability of an event and tests the prediction through experiments and simulations; compares and contrasts theoretical and experimental probabilities; finds the odds of an event and understands the relationship between probability and odds.</p> | <p><b>Student Edition:</b><br/> P33-P36, 767-770, 771-778, 779-784, 785-786, 787-792, 795-796, 797, 798-799<br/> <i>Graphing Technology Lab</i> 786-786<br/> <i>Preparing for Standardized Tests</i> 798-799<br/> <i>Problem-Solving Tip</i> 772<br/> <i>Reading Math</i> 774, 789<br/> <i>Study Tip</i> P34, P34, P36, 773, 780<br/> <i>Watch Out!</i> 774</p> <p><b>Teacher Edition:</b><br/> AE P33-P35, 767, 772-774, 780-781, 788-789, 799</p> |
| <p>M(DSP)–10–5 <b>Solves problems involving experimental or theoretical probability.</b></p>  | <p><b>Student Edition:</b><br/> P33-P36, 767-770, 771-778, 779-784, 785-786, 787-792, 795-796, 797, 798-799<br/> <i>Graphing Technology Lab</i> 786-786<br/> <i>Preparing for Standardized Tests</i> 798-799<br/> <i>Problem-Solving Tip</i> 772<br/> <i>Reading Math</i> 774, 789<br/> <i>Study Tip</i> P34, P34, P36, 773, 780<br/> <i>Watch Out!</i> 774</p> <p><b>Teacher Edition:</b><br/> AE P33-P35, 767, 772-774, 780-781, 788-789, 799</p> |

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| <p>M(DSP)–HS–6 <b>In response to a teacher or student generated question or hypothesis</b> decides the most effective method (e.g., survey, observation, research, experimentation) and sampling techniques (e.g., random sample, stratified random sample) to collect the data necessary to answer the question; collects, organizes, and appropriately displays the data; analyzes the data to draw conclusions about the questions or hypotheses being tested while considering the limitations of the data that could effect interpretations; and when appropriate makes predications, asks new questions, or makes connections to real-world situations.</p> <p>(IMPORTANT: <i>Analyzes data consistent with concepts and skills in M(DSP)–10–2.</i>)</p> | <p><b>Student Edition:</b><br/> 740-745, 746-755, 762, 763, 785-786, 787-792, 794, 796, 797, 801 #18<br/> <i>Graphing Technology Lab</i> 786-786<br/> <i>Reading Math</i> 789<br/> <i>Study Tip</i> 741, 758, 759<br/> <i>Watch Out!</i> 774</p> <p><b>Teacher Edition:</b><br/> AE 741-742, 747-749, 788-789; DI 745, 752, 755; FMC 741, 747; WO 751</p>                                    |
| <b>Problem Solving, Reasoning, and Proof</b>   |  |
| <p><b>Purpose:</b> Problem solving should serve as the organizing feature of the mathematics curriculum (as well as other areas of study) and be applied to everyday activities. Thus, problem solving approaches should be used to investigate and understand new mathematical content, with students working sometimes independently and sometimes in groups. Students should have many experiences in posing and solving problems from their world using data that are meaningful to them and performing mathematical investigations. Students should build a positive disposition toward problem solving, including the confidence needed to explore unique problems and increasingly complex tasks.</p>   |  |
| <p>M(PRP)–HS–1 <b>Students will use problem-solving strategies to investigate and understand increasingly complex mathematical content</b> and be able to:</p> <ul style="list-style-type: none"> <li>• Expand the repertoire of problem-solving strategies and use those strategies in more sophisticated ways.</li> <li>• Use technology whenever appropriate to solve real-world problems (e.g., personal finance, wages, banking and credit, home improvement problems, measurement, taxes, business situations, purchasing, and transportation).</li> <li>• Formulate and redefine problem situations as needed to arrive at appropriate conclusions.</li> </ul>  | <p><b>Student Edition:</b><br/> P5-P6, 54-59, 76, 118, 125, 132-138, 161-166, 317, 368, 584-589, 590-591, 722-723, 759-761, 785-786, 804-814, 845-856<br/> <i>Algebra Lab</i> 125<br/> <i>Graphing Technology Lab</i> 590-591, 785-786<br/> <i>Problem-Solving Tip</i> 25, 133, 182, 317, 486, 646, 672, 772<br/> <i>Spreadsheet Lab</i> 118, 368<br/> <i>Study Tip</i> 55, 56, 133, 135</p> |

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| <p><b>M(PRP)–HS–2 Students will use mathematical reasoning and proof</b> and be able to:</p> <ul style="list-style-type: none"> <li>Expand the repertoire of proof techniques and use those techniques in more sophisticated ways.</li> <li>Use informal and formal reasoning and proof to explain and justify conclusions.</li> <li>Formalize mathematical arguments through the use of deductive reasoning.</li> <li>Use the principle of mathematical induction.</li> <li>Use reasoning and proof throughout classroom discussions independent of the mathematical topic being studied.</li> <li>Recognize how reasoning and proof influence the structure of mathematics.</li> </ul>  | <p><b>Student Edition:</b><br/> P5-P6, 21 #53, 51 #54, 54-59, 66, 70 #2, 130 #36-#37, 177 #48-#52, 185 #46-#49, 194, 303, 307 #36<br/> <i>Algebra Lab</i> 194, 303<br/> <i>Study Tip</i> 55, 56</p> <p><b>Teacher Edition:</b><br/> AE P5-P6, 55-56; FMC 56; TT 194; WCG 194, 303</p>    |
| <b>Communication, Connections, and Representations</b>  |  |
| <p><b>Purpose:</b> Reading, writing, talking, listening, and modeling provide students with the opportunity to develop deeper mathematical understanding and to integrate the language of mathematics into their world. Actively exploring, investigating, describing, and explaining mathematical ideas promote communication which leads to a greater comprehension of mathematical concepts.</p> <p>Representing ideas and connecting the representations to mathematics lies at the heart of understanding mathematics. Representations make mathematical ideas more concrete and available for reflection, and they help students recognize the common mathematical nature of different situations. Students can develop and deepen their understanding of mathematical concepts and relationships as they create, compare, and use various representations.</p> <p>Mathematical topics, ideas, and procedures must be connected to each other and to the students' everyday experiences, both in and out of school. In particular, mathematics must be connected to all other curriculum areas. Mathematical connections will help students become aware of the usefulness of mathematics, serve to bridge the concrete and the abstract, and enable deeper understanding of important ideas.</p> |  |
| <p><b>M(CCR)–HS–1 Students will communicate their understanding of mathematics</b> and be able to:</p> <ul style="list-style-type: none"> <li>Explain and justify their thinking and develop increasingly sophisticated questions for given problem-situations.</li> <li>Critique and follow the logic of arguments presented within mathematics and across disciplines.</li> </ul>   | <p><b>Student Edition:</b><br/> 14 #59-#64, 21 #53-#60, 54-59, 66, 70 #2, 194, 303, 609 #45-#52, 616 #52-#57, 622 #36-#39, 627, 634 #50-#54<br/> <i>Algebra Lab</i> 194, 303<br/> <i>Study Tip</i> 55, 56</p> <p><b>Teacher Edition:</b><br/> AE 55-56; FMC 56; TT 194; WCG 194, 303</p> |

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| <p><b>M(CCR)–HS–2 Students will create and use representations to communicate mathematical ideas and to solve problems</b> and be able to:</p> <ul style="list-style-type: none"> <li>Choose appropriate representations and mathematical language (e.g., spreadsheets, geometric models, algebraic symbols, tables, graphs, matrices) to present ideas clearly and logically for a given situation.</li> <li>See a common structure in mathematical phenomena that come from very different contexts (e.g., the sum of the first <math>n</math> odd natural numbers, the areas of square gardens, and the distance traveled by a vehicle that starts at rest and accelerates at a constant rate can be represented by functions of the form <math>f(x) = ax^2</math>).</li> <li>Find representations that model essential features of a mathematical situation (e.g., cost of postage can be modeled by a step-function).</li> <li>Use representations as a primary means for expressing and understanding more abstract mathematical concepts.</li> </ul> | <p><b>Student Edition:</b><br/> 91-96, 119-124, 132-138, 237-243, 261-268, 269, 274, 275, 300 #42-#43, 584-589, 590-591, 670-676<br/> <i>Graphing Technology Lab</i> 269, 590-591, 671, 672<br/> <i>Review Vocabulary</i> 262<br/> <i>Study Tip</i> 133, 135, 263</p> <p><b>Teacher Edition:</b><br/> AE 92-93, 133-135, 238-239, 262-263, 585-586, 671-672</p>    |
| <p><b>M(CCR)–HS–3 Students will recognize, explore, and develop mathematical connections</b> and be able to:</p> <ul style="list-style-type: none"> <li>Explain in oral or written form how mathematics connects to other disciplines, to daily life, careers, and society (e.g., geometry in art and literature, data analysis in social studies, and exponential growth in finance).</li> <li>Explain multiple approaches that lead to equivalent results when solving problems.</li> </ul>   | <p><b>Student Edition:</b><br/> P34, 97-102, 161-166, 255, 300 #54, 363, 368, 377, 567-572, 573-578, 590-591, 773<br/> <i>Graphing Technology Lab</i> 590-591<br/> <i>Spreadsheet Lab</i> 368<br/> <i>Study Tip</i> P34, 98, 255, 363, 377, 569, 574, 575, 773<br/> <i>Test-Taking Tip</i> 99</p> <p><b>Teacher Edition:</b><br/> AE 98, 162-163, 569, 574-595</p> |