# Student Index

This student-friendly index will help you find vocabulary, key ideas, and concepts. It is easily accessible and is designed to be a reference for you whether you are looking for a definition, a real-life application, or help with avoiding common errors.



Absolute value equation, See also Equation(s) defined, 24 real-life application, 25 solving, 24 Absolute value function, See also Function(s) defined, 234 graphing, 234–235 Absolute value inequality, See also Inequality defined, 134 real-life application, 135 Addition as inverse of subtraction, 4 polynomials, 334-339 error analysis, 338 real-life application, 337 Property of Equality, 4 of Inequality, 112 rational expressions, 580-587 error analysis, 585–586 with like denominators, 582 with unlike denominators. 583 to solve equations, 4-5 Addition Property of Equality, 4 Addition Property of Inequality, 112 Algebra tiles polynomials adding, 334 classifying, 328 difference of squares, 382 dividing, 574–575 factoring with GCF, 362-363 finding binomial factors, 368-369, 376-377 multiplying, 340-341 perfect square trinomials, 382 square of binomial pattern, 349 subtracting, 335 sum and difference pattern, 348 solving equations by completing the square, 468-469

Area formula of a rectangle, 28 using, 26 Arithmetic sequence(s), 242–247 defined, 244 equation, 245 error analysis, 248 real-life application, 246 recursive equation, 312 writing, 247 Asymptote(s) defined, 553 identifying, 553 writing, 555 Axis of symmetry, defined, 404

### ₿

Bar graph, 660 **Binomial(s)**, See also Polynomial(s) defined, 331 square of binomial pattern, 348-353 error analysis, 352 real-life application, 351 sum and difference pattern, 348-353 error analysis, 352 Box-and-whisker plot, 618-625, 660 error analysis, 623–624 five-number summary of, 620 interguartile range of, 621 quartiles, 620 skewed left, 622 skewed right, 622 symmetric, 622 writing, 623-625

# C

**Causation,** defined, 648 Choose Tools, *Throughout. For example, see:* data displays, 632 equations graphing linear equations, 43 slope, 54 solving, 7, 14 square root, 517 systems of linear and quadratic, 491

exponential decay function, 305 exponential functions, 305 factoring polynomials, 381 function notation, 231 graphing quadratic functions, 431 graphs linear equations, 43 quadratic functions, 431 scatter plots, 643 polynomials dividing, 579 factored form, 361 factoring, 381 scatter plots, 643 slope of a line, 54 square root equations, 517 systems of linear and quadratic equations, 491 Circle graph, 660 Closed set, defined, 266 Common difference, defined, 244 **Common Errors** completing the square, 471 graphing, 419 inequalities, 119 Pythagorean Theorem, 528 quadratic equations, 471 quadratic functions, 419 subtracting rational expressions, 582 Common ratio, defined, 308 Comparing functions exponential, linear, and quadratic, 434–441 graphs of, 442-443 linear and nonlinear, 236-241 graphs of exponential functions, 442 - 443of quadratic functions, 442 - 443Comparison chart, 222 Completing the square to solve quadratic equations, 468 - 473defined, 470 error analysis, 472 real-life application, 471

**Compound inequalities**, See also Inequality defined, 132 graphing, 132-135 real-life application, 135 solving, 132-133 Compound interest, defined, 297 Concept circle, 634 Conjugates, defined, 509 Constant of variation, 544 Continuous domains, See also Domain(s) defined, 210, 212 error analysis, 214 graphing, 213 Coordinate plane distance formula, 526–531 error analysis, 530 real-life application, 529 writing, 530 Correlation coefficient, defined, 647 Critical thinking, Throughout. For example, see: comparing functions, 441 data analysis, 617 scatter plots, 643 equations linear, 53-55, 63 multi-step, 15 quadratic, 483 simple, 9 exponential growth, 299 function notation, 231 functions comparing, 441 exponential, 299 geometric sequences, 310 graphing, 53 linear equations, 69 inequalities, 109, 115, 122 linear in two variables, 142 - 143irrational numbers, 267 linear equations, 63, 69 systems of, 159, 175 writing, 76 lines of fit, 643 polynomials, dividing, 579 quadratic equations, 483 rational expressions, 565 scatter plots, 643 slope of a line, 53–55 slope-intercept form, 62 solving equations, 9, 15

square root equations, 517 standard deviation, 617 Cross Products Property, 590



Data, See Data analysis and Data display(s) Data analysis, See also Data display(s) causation, 648 correlation coefficient, 647 distribution skewed left, 622, 628-633 skewed right, 622, 628-633 symmetric, 622, 626-633 uniform, 628 linear regression, 647 line of best fit, 647 line of best fit, 647 lines of fit correlation coefficient, 647 linear regression, 647 line of best fit, 647 residuals, 646-647 writing, 649 mean, 606-611 defined, 608 measures of central tendency, 606 - 611defined, 608 project, 617 measures of dispersion, 612 - 617defined, 614 range of, 614 standard deviation, 615 median, 606-611 defined, 608 mode, 606-611 defined, 608 outliers, 609, 629 project, 617 range of a data set, 614 relationship of data, 639 residuals, 646-647 scatter plots lines of fit, 644-651 relationship of data, 639 standard deviation, 615 writing, 610 Data display(s), See also Data analysis bar graphs, 660 box-and-whisker plots, 618-625, 660 error analysis, 623-624

five-number summary of, 620 interquartile range of, 621 quartiles, 620 skewed left, 622 skewed right, 622 symmetric, 622 writing, 624-625 choosing a, 658-663 circle graphs, 660 distributions, 626-633 dot plots, 606, 660 five-number summary defined, 620 histograms, 660 interquartile range defined, 621 line graphs, 660 misleading, 661 pictographs, 660 quartiles defined, 620 scatter plots, 636-643, 660 defined, 638 stem-and-leaf plots, 660 two-way tables, 652-657 defined, 654 Degree of a monomial, defined, 330 Degree of a polynomial, defined, 331 Dependent variable, defined, 204 Difference of two squares pattern, 382-387 real-life application, 385 writing, 386 Direct variation, 542–549 constant of variation for, 544 defined, 544 graphing, 546 reading, 545 Discrete domains, See also Domain(s) defined, 210, 212 error analysis, 214 graphing, 212 Discriminant defined, 477, 480 interpreting, 480 Distance formula, in a coordinate plane, 526–531 error analysis, 530 real-life application, 529 writing, 530 Distribution, 626-633 skewed left, 622, 628-633 skewed right, 622, 628-633 symmetric, 622, 626-633

uniform, 628 writing, 631 **Distributive Property** multiplying polynomials, 342 solving equations with, 13 Division as inverse of multiplication, 5 of polynomials 574-579 error analysis, 578-579 writing, 578 Property of Equality, 5 of Inequality, 116-123 of rational expressions, 568-573 error analysis, 572 writing, 572 to solve equations, 5 **Division Property of Equality**, 5 **Division Property of Inequality**, 116-123 error analysis, 121-122 Domain(s) continuous defined, 210, 212 graphing, 213 discrete, 210-215 defined, 210, 212 graphing, 212 error analysis, 214 of a function. 202-207 defined, 204 error analysis, 206 real-life application, 205 square root, 504 writing, 214 Dot plot, 660

# E

Equation(s) absolute value, 24-25 defined, 24 real-life application, 25 solving, 24 writing, 25 arithmetic sequence, 245 direct variation, 542-549 graphing, 545 reading, 545 exponential solving, 292–293 extraneous solutions, 513 geometric sequences, 309 graphing, 42-47 error analysis, 46, 62 real-life application, 45, 61 slope, 48-55

in slope-intercept form, 58-63 solution points, 42 inverse variation, 542-549 error analysis, 548 graphing, 545 reading, 545 real-life application, 546 linear defined, 44 error analysis, 46 graphing, 42–47 real-life applications, 45, 88 - 89slope, 48-55 literal defined, 28 error analysis, 30 real-life application, 29 rewriting, 26-31 multi-step, 10–15 error analysis, 14 real-life application, 13 parabola, 413 parallel line, 84 perpendicular line, 85 in point-slope form, 78-83 real-life application, 81 writing, 82 polynomial, See Polynomial equation(s) quadratic choosing a solution method, 484 - 485defined, 456 error analysis, 460, 466, 472, 481-482 real-life applications, 458, 465, 471, 479 solutions, 456-457 solving by completing the square, 468–473 solving by graphing, 454-461 solving by the quadratic formula, 476-483 solving using square roots, 462-467 writing, 459, 467 rational defined, 590 real-life application, 591 solving, 588-593 writing, 592 rewriting, 26-31 error analysis, 30 real-life application, 29 sequences arithmetic, 312

geometric, 312 slope defined, 48, 50 error analysis, 54 project, 54 in slope-intercept form, 58-63 error analysis, 62, 76 real-life applications, 61, 75 solving by addition, 4-5 with Addition Property of Equality, 4, with Cross Products Property, 590 with Distributive Property, 13 by division, 5 by graphing, 182-183 with least common denominator, 591 with like terms, 12 multi-step, 10-15 by multiplication, 5 project, 91 rational, 588-593 real-life problems, 86-93 simple, 2-9 by subtraction, 4-5with Subtraction Property of Equality, 4 with variables on both sides. 18 - 23writing, 592 square root defined, 512 error analysis, 515-516 extraneous solutions of, 513 real-life application, 514 solving, 510-517 writing, 515-516 squaring both sides of, 512-517 in standard form, 64-69 real-life application, 67 systems of linear defined, 154, 156 error analysis, 159, 165, 173-174, 180 number of solutions, 176-181 reading, 156 real-life applications, 157, 163, 172 solving by elimination, 168 - 175solving by graphing, 154-159 solving by substitution, 160-165 with variables on both sides, 18 - 23

error analysis, 22 real-life application, 21 writing, 22–23 writing, 14 of parallel line, 84 of perpendicular line, 85 in point-slope-form, 78-83 real-life problems, 86–93 in slope-intercept form, 72–77 using two points, 81 Error analysis, Throughout. For example, see: arithmetic sequences, 248 box-and-whisker plots, 623-624 common differences, 248 data displays box-and-whisker plots, 623 - 624distance formula, 530 domains, 214 equations graphing, 46 inverse variation, 548 multi-step, 14 quadratic, 460, 466, 472, 481-482 rewriting, 30 simple, 8 slope, 54 in slope-intercept form, 62, 76 square root, 515-516 systems of linear and quadratic, 491 with variables on both sides, 22 writing, 76 evaluating a function, 229 exponential growth, 298 exponents, 273-274 rational, 280 expressions, 274 adding, 585-586 dividing, 572 simplifying, 564 factoring perfect square trinomial, 386 polynomials, 360, 366, 373-374 trinomials, 373-374 function notation, 229 functions arithmetic sequences, 248 domain and range, 206 domains, 214 exponential, 289, 298 quadratic, 408, 420, 429, 440 rational, 556 square root, 507

geometry distance formula, 530 Pythagorean Theorem, 524 graphs box-and-whisker plots, 623 - 624inequalities, 121–122 graphing, 114 linear in two variables, 142 multi-step, 130 writing, 108 inverse variation, 548 linear equations, 159 in slope-intercept form, 62, 76 systems of, 165, 173 writing, 76 polynomials, 332 adding, 338 dividing, 578-579 factoring, 360, 366, 373-374, 380, 386 multiplying, 345-346 sum and difference pattern, 352 Pythagorean Theorem, 524 quadratic equations solving by completing the square, 472 solving by graphing, 460 solving by the quadratic formula, 481-482 solving using square roots, 466 systems of linear and, 491 quadratic formula, 481–482 quadratic functions, 408 axis of symmetry, 429 difference and ratios of, 440 graphing, 408, 414, 420 rational expressions, 564 adding, 585-586 dividing, 572 rational functions, 556 slope, 54 square root equations, 515-516 square root functions, 507 square roots, 264 systems of linear equations number of solutions, 180 solving by elimination, 173 - 174solving by graphing, 159 solving by substitution, 165 systems of linear and quadratic equations, 491 systems of linear inequalities, 190

triangles right, 524 trinomials, 373-374, 380 Example and non-example chart, 566 Excluded value, defined, 552 Exponent(s), 268–275 properties of, 268-275 error analysis, 273 Power of a Power, 270 Power of a Product, 271 Power of a Ouotient, 271 Product of Powers, 270 Quotient of Powers, 270 real-life application, 272 using, 270-271 writing a rule for, 268-269 rational, 276-281 error analysis, 280 real-life application, 279 writing, 280-281 Exponential decay, 300-305 defined. 302 real-life application, 303 writing, 304 Exponential decay function, defined, 302 Exponential equations, 292-293 Exponential function(s), 284-291 compared with linear and quadratic, 434-441 defined, 286 differences and ratios of, 437 simplifying error analysis, 289 geometric sequences, 306-311 equation for, 309 error analysis, 310 real-life application, 309 recursive equation for, 312 writing, 310 graphing rates of change, 442-443 growth, 294-299 compound interest, 297 error analysis, 298 real-life application, 297 modeling, 285 rates of change, 442-443 real-life application, 288 Exponential growth, 294-299 compound interest, 297 defined, 296 error analysis, 298 function, 296-299 defined, 296 real-life application, 297

Exponential growth function, 296-299 defined, 296 **Expressions** rational adding, 580-587 defined, 562 dividing, 568–573 error analysis, 564, 572, 585 - 586multiplying, 568-573 real-life applications, 563, 584 simplest form of, 562 simplifying, 560-565 subtracting, 580-587 writing, 564, 572, 585 simplifying, 560-565 error analysis, 274, 564 real-life application, 563 writing, 564 **Extraneous solution** defined, 513

```
identifying, 514
```

Factor(s) greatest common, 364 Factored completely, See also Polynomial(s), 389 Factored form, defined, 358 Factoring polynomials, 356-361, 368-381 completely, 389 difference of two squares, 382-387 error analysis, 360, 366, 373-374, 380, 386 by grouping, 388 perfect square trinomials, 382-387 prime, 389 real-life applications, 359, 365, 372, 385 trinomials, 368-381 using greatest common factor, 362-367 writing, 366 Zero-Product Property, 358 Factoring by grouping, See also Polynomial(s), 388 Five-number summary, defined, 620 Focus of a parabola defined, 412

error analysis, 414 real-life application, 413 writing, 414 FOIL Method, defined, 343 Formula(s) for area of a rectangle, 28 distance, 528 period of a pendulum, 514 rewriting, 26–31 real-life application, 29 simple interest, 28 slope, 48, 50 for surface area of a cone, 28 of a cylinder, 28 temperature conversion, 29 using, 26-27 for volume of a cylinder, 9 of a sphere, 31 Four square, 124 Function(s) absolute value, 234-235 defined, 234 comparing, 434-441 exponential, linear, and quadratic, 434–441 comparing graphs of, 442-443 defined. 204 differences and ratios of, 437 error analysis, 440 direct variation, 542-549 graphing, 545 reading, 545 domain, 202-207 continuous, 210-215 discrete, 210-215 error analysis, 206, 214 real-life application, 205 even, 549 exponential, 284–291 defined, 286 error analysis, 289 geometric sequences, 306-311 modeling, 285 real-life applications, 288, 297, 303 writing, 304 exponential decay, 302-305 defined. 302 exponential growth, 294-299 defined, 296 graphing, 402-421, 424-443 error analysis, 408, 414, 420, 429, 507, 556

properties of, 426 quadratic, 402-415, 424-443 rational, 550-557 real-life applications, 406, 413, 419, 505, 554 square root, 502-507 writing, 414, 420, 555 input-output tables and, 201 - 205inverse, 558-559 defined, 559 reading, 559 inverse variation, 542-549 error analysis, 548 graphing, 545 reading, 545 real-life application, 546 linear arithmetic sequences, 242 - 249defined, 218 patterns, 216-221 real-life applications, 219, 239, 246 nonlinear compared to linear, 236-241 defined, 238 real-life application, 239 notation, 224-231 error analysis, 229 odd, 549 piecewise, 232-233 defined, 232 quadratic, 402-415 defined, 404 error analysis, 408, 414, 420, 429 graphing, 402-415, 424-443 maximum value of, 427-428 minimum value of, 427-428 parabola, 404 real-life applications, 406, 413, 419, 428 vertex form of, 432 writing, 407, 420 zero of, 419 range, 202-207 error analysis, 206 real-life application, 205 rates of change, 442-443 rational defined, 552 error analysis, 556 graphing, 550-557 real-life application, 554

relations, 208–209 defined, 208 square root defined, 504 domain of, 504 error analysis, 507 graphing, 502–507 real-life application, 505 step, 233 Vertical Line Test, 209 zero of, 419, 458 **Function notation**, 224–231 defined, 224, 226 error analysis, 229 reading, 226

#### G

Geometric sequences, 306–311 common ratio, 308 equation for, 309 error analysis, 310 extending, 308 graphing, 308 real-life application, 309 recursive equation for, 312 Geometry Pythagorean Theorem, 520-531 converse of, 528 defined, 522 distance formula and, 526-531 error analysis, 524, 530 real-life applications, 523, 529 using, 526-531 triangles, *See* Triangle(s) Graph of an inequality, See also Inequality defined, 107 error analysis, 114 Graph of a linear inequality, See also Inequality defined, 136, 138 Graph of a system of linear inequalities, See also Systems of linear inequalities defined, 186 Graphic organizers comparison chart, 222 concept circle, 634 example and non-example chart, 566 four square, 124 idea and examples chart, 354 information frame, 282 information wheel, 474 notetaking organizer, 166

process diagram, 70 summary triangle, 422 word magnet, 518 Y chart, 16 Graphing arithmetic sequences, 245 direct variation, 545 distance formula, 526-531 error analysis, 530 real-life application, 529 equations direct variation, 545 error analysis, 46, 62, 460 exponential, 293 inverse variation, 545 real-life applications, 45, 61 in slope-intercept form, 58-63 exponential functions, 287 real-life application, 288 functions error analysis, 408, 414, 420, 429, 507, 556 rational, 550-557 real-life application, 554 writing, 555 geometric sequences, 308 inequalities, 104-109 compound, 132–133, 135 half-plane, 138 linear systems of, 186-187 linear in two variables. 136-143 inverse variations, 545-546 real-life application, 546 linear equations, 42-47, 182-183 error analysis, 62, 68 process diagram, 70 real-life applications, 61, 67, 183 in slope-intercept form, 58-63 to solve, 182-183 in standard form, 64-69 linear functions, 216-221 linear inequalities in one variable, 139 in two variables, 139 quadratic equations, 454-461 error analysis, 460 real-life application, 458 writing, 459 quadratic functions, 402-421, 424 - 443axis of symmetry, 404, 426 error analysis, 408, 414, 420, 429 focus, 412 maximum value of, 427-428 minimum value of, 427-428

parabola, 404 real-life applications, 406, 413, 419, 428 vertex, 404, 426 vertex form of, 432 writing, 407, 414, 420 zero of, 419 rates of change of functions, 442-443 rational functions, 550-557 asymptotes, 553 error analysis, 556 real-life application, 554 writing, 555 slope, 48-55 formula, 48, 50 negative, 50, 52 positive, 50, 52 project, 54 rise, 50 run, 50 undefined, 51–52 zero, 51-52 solution points, 42, 44 square root functions, 502-507 error analysis, 507 real-life application, 505 systems of linear equations, 154 - 159error analysis, 159 real-life application, 157 Vertical Line Test, 209 vertical translations, 227, 287, 504 Graphs bar, 660 box-and-whisker plot, 618-625 error analysis, 623-624 five-number summary of, 621 interquartile range of, 621 quartiles of, 620 skewed left, 622 skewed right, 622 symmetric, 622 writing, 623-625 circle, 660 histogram, 660 line, 660 pictograph, 660 scatter plot, 636-643 defined, 638 lines of fit, 640, 644-651 Greatest common factor (GCF), 364 factoring polynomials, 362-367 error analysis, 366

writing, 366

G

Half-plane, defined, 138 Histogram, 660 Hypotenuse, defined, 522



Idea and examples chart, 354 Independent variable, defined, 204 Inequality absolute value, 134-135 defined, 134 real-life application, 135 Addition Property of, 110–115 reading, 113 compound, 132-133 defined, 132 graphing, 132-133 real-life application, 135 writing, 132 defined, 106 Division Property of, 116-123 graph of a linear, 136–143 defined, 136, 138 in two variables, 136-143 graphing, 104-109 defined, 107 error analysis, 114 real-life application, 140 linear in one variable, 139 graphing, 139 linear in two variables, 136–143 defined, 138 error analysis, 142 graphing, 139 half-plane, 138 real-life application, 140 multi-step, 126–131 error analysis, 130 real-life application, 129 writing, 130 Multiplication Property of, 116-123 error analysis, 121 project, 123 solution of, 106 solution of linear, 138 solution set, 106 solving absolute value, 134-135 compound, 132-133 error analysis, 108, 114, 121-122, 130 multi-step, 126-131 reading, 113, 138

real-life applications, 113, 129, 135, 140 using addition and subtraction, 110–115 using multiplication and division, 116-123 using a table, 116–117 Subtraction Property of, 110–115 symbols of, 106 reading, 106 systems of linear, 184–191 error analysis, 190 graphing, 186-187 real-life application, 188 writing, 188 Triangle inequality, 105 writing, 104–109 error analysis, 108 project, 123 Information frame, 282 Information wheel, 474 Interquartile range, defined, 621 Inverse function(s), 558-559 defined, 559 reading, 559 Inverse operations, 4, 7 addition and subtraction, 4 multiplication and division, 5,118 Inverse relation, defined, 558 Inverse variation, 542-549 constant of variation for, 544 defined, 544 error analysis, 548 graphing, 545 reading, 545 real-life application, 546 Irrational number(s), 266-267

J

Joint frequency, defined, 654



Least common denominator defined, 583 solving rational equations with, 591 Legs, of a right triangle, 522 Like terms combining to solve equations, 12 Line(s) asymptote, 553 graphing, 48–55 parallel, 56, 84 equation for, 84

perpendicular, 85 defined, 57 equation for, 85 slope defined, 48, 50 error analysis, 54 formula, 50 project, 54 Vertical Line Test, 209 *x*-intercept of defined, 60 *y*-intercept of defined, 60 Line of best fit, defined, 647 Line of fit, 636-651 analyzing, 644-651 correlation coefficient, 647 defined. 640 line of best fit, 647 linear regression, 647 residuals, 646-647 writing, 641, 649 Line graph, 660 Linear equation(s), See also Equation(s) defined, 44 graphing, 42-47, 182-183 error analysis, 46, 62 real-life application, 45 slope, 48-55 in slope-intercept form, 58 - 63solution points, 42 in standard form, 64-69 in point-slope form real-life application, 81 writing, 78-83 real-life problems, 88-89 project, 91 slope, 48-55 defined, 48, 50 error analysis, 54 negative, 50, 52 positive, 50, 52 project, 54 rise, 50 run. 50 undefined, 51-52 zero, 51–52 in slope-intercept form, 58-63 error analysis, 62, 76 real-life applications, 61, 75 writing, 72–77 solution of defined, 44 solving by graphing, 182–183 real-life application, 183

in standard form, 64-69 error analysis, 68 real-life application, 67 systems of, 154-159 defined, 156 error analysis, 159, 165, 173-174, 180 number of solutions, 176-181 reading, 156 real-life applications, 157, 163, 172 solving by elimination, 168 - 175solving by graphing, 154–159 solving by substitution, 160 - 165writing of parallel line, 84 of perpendicular line, 85 in point-slope form, 78-83 real-life problems, 86-93 in slope-intercept form, 72 - 77using two points, 81 Linear function(s) arithmetic sequences, 242-249 defined, 244 error analysis, 248 real-life application, 246 recursive equation for, 312 writing, 247 compared with exponential and quadratic, 434-441 defined, 218 differences and ratios of, 437 graphing rates of change, 442-443 nonlinear compared to, 236-241 real-life application, 239 patterns, 216-221 real-life application, 219 rates of change, 442-443 Linear inequality in two variables. See also Inequality defined, 138 error analysis, 142 graphing, 139 reading, 138 real-life application, 140 Linear regression, defined, 647 line of best fit, 647 Literal equation(s) See also Equation(s) defined, 28 error analysis, 30 real-life application, 29 rewriting, 26-31

Logic, Throughout. For example, see: box-and-whisker plots, 624 data displays box-and-whisker plots, 624 domains, 215 equations graphing, 42 linear systems of, 175 quadratic, 467 simple, 9 slope-intercept form, 59 solving, 42 exponential functions, 290 exponents, 281 factoring trinomials, 375 formulas. 31 functions exponential, 290 quadratic, 409, 421 graphing, 42 quadratic functions, 409, 421 graphs box-and-whisker plots, 624 inequalities, 109 linear equations in standard form, 69 systems of, 175 polynomials, 333 factoring, 375 quadratic equations, 467 radicals, 281 rational expressions, 587 systems of linear equations, 175 number of solutions, 181

# M

Marginal frequency, defined, 654 Maximum value, of a quadratic function, 427-428 defined, 427 Mean, 606-611 defined, 608 Meaning of a Word linear equations, 42 Measures of central tendency, 608 - 611defined, 608 mean defined, 608 median defined, 608 mode defined, 608 Measures of dispersion, 612–617 defined, 614

project, 617 range of a data set, 614 standard deviation, 615 Median, 606-611 defined, 608 Minimum value, of a quadratic function, 427-428 defined, 427 Mode, 606-611 defined, 608 Modeling, Throughout. For example, see: box-and-whisker plots, 625 data analysis lines of fit, 651 data displays box-and-whisker plots, 625 distribution, 633 equations polynomial, 367 quadratic, 461 square root, 517 functions linear vs. nonlinear, 241 quadratic, 409 rational. 557 graphs box-and-whisker plots, 625 inequalities, 115 absolute value, 135 linear in two variables, 142 linear equations in standard form, 69 systems of, 159 lines of fit, 651 polynomials, 339 factors, 367 quadratic equations, 461 quadratic functions, 409 rational functions, 557 square root equations, 517 square roots, 265 systems of linear equations, 159 Monomial(s), See also Polynomial(s) defined, 330 degree of, 330 Multi-step equation(s), See also Equation(s) error analysis, 14 real-life application, 13 solving, 10-15 combining like terms, 12 with Distributive Property, 13 two-step, 12-13 Multi-step inequalities, See Inequality

Multiplication as inverse of division, 5 polynomials, 340–347 error analysis, 345–346 real-life application, 344 Property of Equality, 5 of Inequality, 116–123 rational expressions, 568–573 writing, 572 to solve equations, 5 Multiplication Property of Equality, 5 Multiplication Property of Inequality, 116–123

#### N

Nonlinear function(s) defined. 238 linear compared to, 236-241 real-life application, 239 Notetaking organizer, 166 nth root, 276-278 defined, 278 writing, 280 Number(s) irrational, 266-267 nonzero, 330 rational, 266–267 real, 266-267 scientific notation, 272 sets, closed, 266 Number Sense, Throughout. For example, see: absolute value inequality, 135 arithmetic sequences, 248 box-and-whisker plots, 623 correlation coefficient, 649 data displays box-and-whisker plots, 623 exponential equations, 292 exponential growth, 299 expressions, 572 factoring difference of two squares, 387 trinomials, 375 functions arithmetic sequences, 248 exponential, 290, 299 linear vs. nonlinear, 241 quadratic, 420 graphing quadratic functions, 420 graphs box-and-whisker plots, 623 lines of fit, 649

perfect square trinomial pattern, 473 polynomials, 333 dividing, 578 factoring, 375 multiplying, 347 rational expressions, 572 systems of linear equations, 164–165 solving by elimination, 173

# 0

Open-Ended, Throughout. For example, see: arithmetic sequences, 249 common differences, 249 data analysis mode, 610 data displays, 642 choosing a, 662 two-way tables, 656 equations, 14 rational, 592 simple, 9 slope, 53 in slope-intercept form, 62 solving, 592 square root, 516 with variables on both sides. 22 exponential functions, 289 exponents, 274 functions quadratic, 414 square root, 507 graphing quadratic functions, 414 rational functions, 556 square root functions, 507 histograms, 662 inequalities, 121 in two variables, 141 mode, 610 negative slope, 90 polynomials, 332, 346 factoring, 367 sum and difference pattern, 352 trinomial, 373 rational equations, 592 rational expressions, 565 with like denominators, 586 rational functions, 556 simple equations, 9 slope of a line, 53 slope-intercept form, 62

square root equations, 516 square root functions, 507 trinomials, 332 two-way tables, 656 Operations closed set, 266 inverse, 7 addition and subtraction, 4 multiplication and division, 5,118 Ordered pairs, 44 solution points, 42 solution of a system of linear equations, 156 solution of a system of linear inequalities, 186 Outlier, defined, 609

## P

Parabola(s) axis of symmetry, 404 defined, 404 equation, 413 focus, 410-415 defined, 412 error analysis, 414 real-life application, 413 writing, 414 properties, 426 vertex, 404 Parallel line equation of, 84 slope of, 56 Patterns difference of two squares, 382-387 perfect square trinomial, 382-387 square of a binomial, 348–353 sum and difference, 348–353 Perfect square trinomial pattern, 382-387 error analysis, 386 writing, 472 Perimeter formulas, 26 **Perpendicular line** defined, 57 equation of, 84-85 slope of, 57 Pictograph, 660 **Piecewise function(s)**, See also Function(s) defined. 232 graphing, 232-233 writing, 233

**Student Index** 

**Point-slope form** defined. 80 real-life application, 81 writing equations in, 78-83 Polynomial(s), 328-333 adding, 334-339 error analysis, 338 real-life application, 337 binomial, 331 error analysis, 352 real-life application, 351 square of binomial pattern, 348-353 sum and difference pattern, 348-353 classifying, 328, 331 defined, 331 degree of, 331 difference of two squares pattern, 382-387 writing, 386 dividing, 574-579 error analysis, 578-579 writing, 578 error analysis, 332, 338, 345-346, 352, 373-374 factoring completely, 389 difference of two squares, 382 - 387error analysis, 366, 373-374, 380, 386 by grouping, 388 perfect square trinomials, 382 - 387prime, 389 real-life applications, 372, 385 trinomials, 368-381 using greatest common factor, 362-367 writing, 366, 373, 380, 386 FOIL Method, 343 monomials, 330 multiplying, 340-347 error analysis, 345-346 real-life application, 344 using Distributive Property, 342 using FOIL Method, 343 perfect square trinomial pattern, 382 - 387error analysis, 386 real-life applications, 331, 337, 344,351 square of binomial pattern, 348 - 353error analysis, 352

real-life application, 351 subtracting, 334-339 error analysis, 338 real-life application, 337 sum and difference pattern, 348 - 353error analysis, 352 trinomials defined, 331 error analysis, 373-374 factoring, 368-381 real-life application, 372 writing, 373, 380 writing, 332, 338, 345, 373, 380 Zero-Product Property, 358 Polynomial equation(s), See also Polynomial(s) factored form, 356-361 defined, 358 error analysis, 360, 366 real-life applications, 359, 365 using greatest common factor, 362-367 writing, 360, 366 Zero-Product Property, 358 Power of a Power Property, 270 Power of a Product Property, 271 Power of a Quotient Property, 271 Precision, Throughout. For example, see: data displays, 657 direct and inverse variation, 549 equations direct and inverse variation. 549 graphing, 42, 46 quadratic, 473 solving, 23 systems of linear, 181 writing, 76 exponents, 275 FOIL Method, 347 functions domains and range, 207 linear vs. nonlinear, 241 square root, 507 geometric sequences, 311 graphing quadratic functions, 430 square root functions, 507 graphs, 42 inequalities, 123 polynomials, 347 Pythagorean Theorem, 525 quadratic equations, 473 right triangles, 525

systems of linear equations, 181 Prime polynomial, See also Polynomial(s), 389 Problem Solving, Throughout. For example, see: equations graphing, 47 linear, 47, 175 multi-step equations, 15 in point-slope form, 83 quadratic, 483 exponents, 275, 281 expressions, 565 graphs, 47 inequalities, 114 linear in two variables, 143 linear equations, 175 linear functions, 221 perfect square trinomial, 387 polynomials, 339 factoring, 387 quadratic equations, 483 quadratic functions, 421 rational expressions, 565 square root functions, 507 Process diagram, 70 Product of Powers Property, 270 Product Property of Square Roots, 262 Properties Addition Property of Equality, 4 Addition Property of Inequality, 112 Cross Products Property, 590 **Distributive Property**, 13 **Division Property of Equality**, 5 Division Property of Inequality, 118 Multiplication Property of Equality, 5 Multiplication Property of Inequality, 118 Power of a Power Property, 270 Power of a Product Property, 271 Power of a Quotient Property, 271 Product of Powers Property, 270 Product Property of Square Roots, 262 **Ouotient of Powers Property, 270 Quotient Property of Square** Roots, 262 Subtraction Property of Equality, 4 Subtraction Property of Inequality, 112 Zero-Product Property, 358

slope, 76

Pythagorean Theorem, 520–531 converse of, 528 defined, 522 distance formula and, 526–531 error analysis, 530 writing, 530 error analysis, 524, 530 real-life applications, 523, 529 using, 526–531 distance formula, 526–531 real-life application, 529

## Q

Quadratic equation(s) defined, 456 roots, 456 solutions of choosing a method, 484-485 no real solutions, 457 one real solution, 456 two real solutions, 456 using a discriminant, 480 solving by completing the square, 468-473, 484 defined, 470 error analysis, 472 real-life application, 471 solving by factoring, 484 solving by graphing, 454–461, 484 error analysis, 460 real-life application, 458 solving by the quadratic formula, 476-484 error analysis, 481-482 real-life application, 479 solving using square roots, 462-467,484 error analysis, 466 real-life application, 465 systems of linear and, 486-491 error analysis, 491 writing, 490 writing, 459, 467 **Quadratic formula** defined, 478 discriminant and, 480 interpreting, 480 using to solve quadratic equations, 476-483 error analysis, 481-482 real-life application, 479 **Ouadratic function(s)** characteristics axis of symmetry, 404 vertex, 404

compared to linear and exponential, 434-441 defined, 404 differences and ratios of, 437 error analysis, 440 error analysis, 408, 414, 429 graphing, 402-421, 424-443 axis of symmetry, 404, 426 error analysis, 408, 414, 420, 429 focus, 412 parabola, 404, 410-415 rates of change, 442-443 real-life applications, 406, 413, 419, 428 vertex, 404, 426 vertex form of, 432 writing, 407, 414, 420 maximum value of, 427–428 real-life application, 428 minimum value of, 427-428 rates of change, 442-443 real-life applications, 406, 428 vertex form of, 432-433 writing, 407 zero of, 419, 458 Quartile, defined, 620 **Quotient of Powers Property, 270** Quotient Property of Square Roots, 262

## R

Radical(s), 276-281 *n*th root, 276–278 reading, 278 Radical expression(s), 508-509 rationalizing the denominator defined, 508 simplest form of, 508 simplifying, 508-509 conjugates and, 509 real-life application, 509 Range of a function, 202-207 defined, 204 error analysis, 206 real-life application, 205 Range (of a data set) defined, 614 project, 617 Rate of change, 442-443 **Rational equation(s)** defined, 590 solving, 588–593 real-life application, 591 using Cross Products Property, 590

using least common denominator, 591 writing, 592 Rational exponent(s), See also Exponent(s) error analysis, 280 real-life application, 279 writing, 280-281 Rational expression(s) adding, 580-587 error analysis, 585-586 real-life application, 584 with like denominators, 582 with unlike denominators, 583 defined. 562 dividing, 568–573 error analysis, 572 writing, 572 excluded values of, 552, 570 least common denominator of. 583 defined, 583 writing, 585 multiplying, 568-573 writing, 572 simplest form of, 562 writing, 564-565 simplifying, 560-565 error analysis, 564 real-life application, 563 subtracting, 580-587 with like denominators, 582 with unlike denominators, 584 **Rational function(s)** defined, 552 graphing, 550-557 asymptotes, 553 error analysis, 556 excluded values, 552 real-life application, 554 writing, 555 Rational number(s), 266-267 Rationalizing the denominator, defined, 508 Reading direct variation, 545 function notation, 226 inequality, 113 linear with two variables, 138 symbols, 106 inverse functions, 559 inverse variation, 545 radical sign, 278 systems of linear equations, 156 Real number(s) operations, 266-267 square of, 464

Real-life applications, Throughout. For example, see: arithmetic sequences, 246 equations absolute value, 25 graphing, 45 inverse variation, 546 multi-step, 13 quadratic, 458, 465, 479 rational, 591 rewriting, 29 simple, 6 in slope-intercept form, 61, 75 square root, 514 in standard form, 67 systems of linear, 157 with variable(s) on both sides, 21 exponential decay, 303 exponential growth, 297 exponents, 272 rational, 279 expressions, 584 simplifying, 563 factoring difference of two squares, 385 polynomials, 365 functions arithmetic sequences, 246 domain and range, 205 exponential, 288, 297 linear, 219 linear vs. nonlinear, 239 maximum value of, 428 quadratic, 413, 419, 428 rational, 554 square root, 505 geometry Pythagorean Theorem, 523, 529 graphing exponential functions, 288 linear equations, 45 quadratic functions, 406, 413, 419 rational functions, 554 square root functions, 505 inequalities, 113 absolute value, 135 compound, 135 linear in two variables, 140 multi-step, 129 inverse variation, 546 linear equations point-slope form, 81 slope-intercept form, 61, 75 solving by graphing, 183

standard form, 67 parabolas, 413 polynomials, 331, 337, 344 factoring, 359, 365, 385 square of binomial pattern, 351 Pythagorean Theorem, 523, 529 quadratic equations solving by completing the square, 471 solving by graphing, 458 solving by the quadratic formula, 479 solving using square roots, 465 quadratic formula, 479 rational equations, 591 rational expressions, 563 adding, 584 rational functions, 554 simple equations, 6 slope-intercept form, 61 square root functions, 505 square roots, 263 systems of linear equations solving by elimination, 172 solving by graphing, 157 solving by substitution, 163 systems of linear inequalities, 188 x-intercepts, 61 *y*-intercepts, 61 Real-life problems solving, 86-93 writing, 86-93 Reasoning, Throughout. For example, see: data analysis distribution, 633 lines of fit, 643 measures of central tendency, 611 measures of dispersion, 616-617 standard deviation, 616-617 data displays choosing, 662-663 scatter plots, 643 two-way tables, 657 direct variation, 548 distance formula in a coordinate plane, 531 domains, 215, 249 of a function, 408, 556 of a square root function, 506 - 507equations direct variation, 548-549

exponential, 292 inverse variation, 549 linear, 63, 68 point-slope form, 85 quadratic, 430, 460-461, 467, 473, 483, 491 rational, 593 real solutions of, 466 real-life problems, 91 rewriting, 31 slope, 53, 55 slope-intercept form, 63 square root, 516 exponential equations, 292 exponential functions, 290-291, 299 rates of change, 443 exponential growth, 299 exponents, 274-275 expressions adding, 585 dividing, 573 multiplying, 586 factoring, 432 perfect square trinomial, 386 polynomials, 360, 366, 381 FOIL Method, 346 formulas, 31 functions, 209 absolute value, 235 arithmetic sequences, 249 differences and ratios of, 440 domains, 249, 506 exponential, 290-291, 299, 443 linear, 208, 220-221, 443 piecewise, 232 quadratic, 408, 415, 419-421 rates of change, 443 rational, 549, 556, 564 square root, 506-507 zero of, 421 graphs, 68, 290-291 comparing, 432 focus of a parabola, 415, 421 quadratic functions, 415, 419-421, 431 scatter plots, 643 indirect variation, 549 inequalities, 108, 114-115 linear in two variables, 141.143 multi-step, 131 systems of linear, 189-190 intercepts, 90 inverse variation, 549 linear equations, 209 systems of, 159, 180-181

Student Index

linear functions, 219 rates of change, 443 lines of fit, 643 correlation coefficient, 651 measures of central tendency, 611 measures of dispersion, 616 mental math, 516 point-slope form, 85 polynomials dividing, 578-579 factoring, 360, 366, 381, 386 FOIL Method, 346 multiplying, 346 subtracting, 338 sum and difference pattern, 352 Pythagorean Theorem, 531 quadratic equations, 460-461, 467,483 solving by completing the square, 473 systems of linear and, 491 quadratic formula discriminant, 483 solving by, 483 quadratic functions, 408, 431 axis of symmetry, 430 graphing, 415, 419-421 vertex form of, 433 rational equations, 548, 593 rational functions, 556, 564 real-life problems, 90-91 right triangles, 531 scatter plots, 643 sequences arithmetic, 249 geometric, 310-311 simple equations, 9 slope, 53, 55, 90 solutions, 466 square root equations, 516 square root functions, 507 domain of, 506 standard deviation, 616-617 systems of linear equations, 159, 164, 174-175 number of solutions, 180-181 systems of linear inequalities, 189-190 two-way tables, 657 **Recursive rule** defined, 312 writing, 313 Recursively defined sequences, 312-315

recursive equation arithmetic sequence, 312 geometric sequence, 312 recursive rule, 312 Relation(s), defined, 208 functions and, 208-209 inverse, 557 Repeated Reasoning, Throughout. For example, see: arithmetic sequences, 248 equations linear systems of, 165 quadratic, 482 geometric sequences, 311 graphing rational functions, 557 inequalities, 109 system of linear, 191 polynomials dividing, 579 multiplying, 353 quadratic equations, 482 quadratic formula, 482 rewriting equations and formulas, 31 systems of linear equations, 165 systems of linear inequalities, 191 Residual, defined, 646 Right triangle, *See* Triangle(s) Rise, defined, 50 Root. defined. 358 Roots of numbers cube, 276 nth, 276-278 square, 504 Run, defined, 50

#### S

Scatter plot, 636-643, 660 defined, 638 lines of fit, 640-643analyzing, 644-651 correlation coefficient, 647 defined, 640 line of best fit, 647 linear regression, 647 residuals, 646-647 writing, 641 relationship of data, 639 Sequences arithmetic, 242-247 defined, 244 equation for, 245 error analysis, 248 real-life application, 246

recursive equation for, 312 writing, 247, 310 defined, 244 geometric, 306-311 common ratio, 308 equation for, 309 error analysis, 310 extending, 308 graphing, 308 real-life application, 309 recursive equation for, 312 writing, 310 recursively defined, 312-315 recursive rule, 312 Simplest form of a radical expression conjugates and, 509 defined, 508 real-life application, 509 Simplest form of a rational expression, defined, 562 Slope defined, 48, 50 error analysis, 54 formula, 50 graphing, 48-55 negative, 50, 52 parallel lines, 56, 84 perpendicular lines, 57 positive, 50, 52 project, 54 rise, 50 run, 50 undefined, 51-52 zero, 51-52 Slope-intercept form, 58-63 defined, 60 graphing equations in error analysis, 62 real-life application, 61 writing equations in, 72-77 error analysis, 76 real-life application, 75 Solution(s) extraneous, 513 of linear equations, 42, 44 of quadratic equations choosing a method of, 484 - 485no real, 457 one real, 456 two real, 456 Solution of an inequality, defined, 106 Solution of a linear inequality, See also Inequality defined, 138

Solution points, See Solution(s) Solution set of an inequality, defined, 106 Solution of a system of linear equations, See also Systems of linear equations defined, 156 Solution of a system of linear inequalities, See also Systems of linear inequalities defined, 186 Sphere, volume of, 31 Square of binomial pattern, 348-353 error analysis, 352 real-life application, 351 Square root(s), 260-265 error analysis, 264 evaluating, 262 *n*th root, 276–278 defined, 278 operations with, 261 Product Property of, 262 writing, 264 Quotient Property of, 262 writing, 264 real-life application, 263 simplifying, 262 symbol, 260 to solve quadratic equations, 462-467 error analysis, 466 real-life application, 465 writing, 467 writing, 264 Square root equation(s) defined, 512 solving, 510-517 error analysis, 515–516 extraneous solutions, 513 real-life application, 514 writing, 515-516 **Square root function(s)** defined, 504 domain of, 504 graphing, 502-507 error analysis, 507 real-life application, 505 **Standard deviation** defined, 615 project, 617 Standard form of linear equations defined. 66 error analysis, 68

real-life application, 67 Standardized Test Practice domains, 213 equations inverse variation, 546 quadratic, 489 with variables on both sides. 21 writing in slope-intercept form, 75 exponents, 272 expressions dividing, 571 factoring polynomials, 359, 379 trinomials, 379 function notation, 228 functions linear vs. nonlinear, 239 quadratic, 419 graphs of multi-step inequalities, 129 quadratic functions, 419 inequalities, 129 inverse variation, 546 polynomials, 337 factoring, 359, 379 quadratic equations systems of linear and, 489 quadratic functions, 419 rational expressions dividing, 571 simple equations, 6 slope-intercept form, 75 trinomials factoring, 379 Stem-and-leaf plot, 660 Step function(s), See also Function(s) defined, 233 Structure, Throughout. For example, see: completing the square, 473 data displays, 663 distance formula in a coordinate plane, 531 equations slope, 55 solving, 23 systems of linear, 165 exponential functions, 291 decay, 305 expressions, dividing, 573 factoring polynomials, 381 functions domain and range, 235 exponential, 291, 305

graphing, 415 notation, 231 piecewise, 235 inequalities, 123 system of linear, 191 inverse variation, 549 polynomials. factoring, 381 Pythagorean Theorem, 525 distance formula and, 531 quadratic equations solving by completing the square, 473 quadratic functions, 415 rational expressions, 573 rational numbers, 267 right triangles, 525 slope, 55 systems of linear equations, 165 systems of linear inequalities, 191 Study Tips absolute value function, 234 arithmetic sequences, 246 asymptotes, 554 box-and-whisker plots, 620, 622 completing the square, 470 compound interest, 297 conjugates, 509 constant of variation, 544 data displays box-and-whisker plots, 620, 622 lines of fit, 640 scatter plots, 639 equations completing the square, 470 constant of variation, 544 factoring, 456 inverse variation, 545 linear, 66, 183 of lines of fit, 647 multi-step, 13 quadratic, 480, 484 slope, 50 in standard form, 66 writing, 74, 81 exponential functions, 287-288 compound interest, 297 decay, 302 geometric sequences, 309 growth, 296 exponents rational, 288 expressions excluded values of, 562 rational, 562 factoring equations, 456 polynomials, 364, 378-379

function notation, step, 233 functions, 438 absolute value, 234 arithmetic sequences, 246 exponential, 287, 302 inverse, 559 linear, 437 linear vs. nonlinear, 238–239 notation, 227 piecewise, 234 quadratic, 428, 437 square root, 505 geometric sequence, 309 graphing asymptotes, 554 horizontal translation, 505 square root function, 505 graphing calculator, 428 graphs box-and-whisker plots, 620, 622 lines of fit, 640 scatter plots, 639 horizontal translation, 505 inequalities, 112, 129 absolute value, 135 compound, 132–133 graphing, 129 systems of linear, 187 inverse functions, 559 inverse operations, 112 inverse variation, 545 linear functions, 437 lines of fit, 640, 648 equations of, 647 parabolas, 428 period of a pendulum, 514 piecewise function, 234 polynomials, 336-337 dividing, 576–577 factoring, 364, 378-379 sum and difference pattern, 350 Pythagorean triples, 528 quadratic equations roots of, 480 solutions of, 480, 484 quadratic functions, 428, 437 vertex form of, 433 radical expressions conjugates, 509 rationalizing the denominator, 508 radical symbol, 278 rate of change, 238 rational exponents, 288 rational expressions, 562

rationalizing the denominator, 508 right triangles, 522 scatter plots, 639 lines of fit, 640, 648 slope, 50 slope of a vertical line, 56 solutions checking for reasonableness, 465 of quadratic equations, 480 systems of linear equations solving by elimination, 170 - 171solving by graphing, 157 solving by substitution, 163 systems of linear inequalities, 187 triangles Pythagorean triples, 528 right, 522 trinomials, factoring, 378-379 variation, constant of, 544 Subtraction as inverse of addition, 4 polynomials, 334-339 error analysis, 338 real-life application, 337 Property of Equality, 4 of Inequality, 112 rational expressions, 580-587 least common denominator of. 583 with like denominators, 582 with unlike denominators. 584 to solve equations, 4-5Subtraction Property of Equality, 4 Subtraction Property of Inequality, 112 Sum and difference pattern, 348 - 353error analysis, 352 Summary triangle, 422 Surface area of a cone, 28 of a cylinder, 28 **Symbols** of inequality, 106 reading, 106 radical sign, 278 square root, 260 Systems of linear equations defined, 154, 156 number of solutions, 176-181 error analysis, 180

infinitely many, 178-179 no solution, 178 one solution, 178 writing, 180 reading, 156 solution of defined, 156 solving by elimination, 168–175 error analysis, 173–174 real-life application, 172 writing, 173 solving by graphing, 154–159 error analysis, 159 real-life application, 157 solving by substitution, 160–165 error analysis, 165 real-life application, 163 writing, 164 writing, 158, 164, 173 Systems of linear and quadratic equations solving by elimination, 486-487, 489 - 491by graphing, 486–487, 489 - 491by substitution, 486-488, 490 - 491error analysis, 491 writing, 490 Systems of linear inequalities, 184-191 defined, 186 graph of defined, 186 graphing, 186–187 solution of defined, 186 solving error analysis, 190 real-life application, 188 writing, 189 writing, 188

#### Т

Temperature conversion formula, 29 **Term of a sequence,** defined, 244 **Theorem,** defined, 520 Triangle(s) Pythagorean Theorem and, 520–531 converse of, 528 distance formula and, 526–531 error analysis, 524

real-life application, 523, 529 using, 526–531 right, 520-531 hypotenuse of, 522 identifying, 528 legs of, 522 real-life application, 529 Triangle Inequality, 105 Trinomial(s), See also Polynomial(s) defined, 331 factoring, 368-381 error analysis, 373-374, 380 real-life application, 372 writing, 373, 380 Two-way table(s), 652-657 defined, 654 joint frequencies, 654 marginal frequencies, 654 relationships in, 655

## $\mathbb{V}$

Variables dependent defined, 204 independent defined, 204 on both sides of an equation, 18 - 13error analysis, 22 real-life application, 21 writing, 22-23Variation constant of, 544 direct, See Direct variation inverse, See Inverse variation Vertex, defined, 404 Vertex form, of a quadratic function, 432-433 Vertical Line Test, defined, 209 Volume, 26 of a cylinder, 9 of a sphere, 31

# W

Word magnet, 518 Writing, *Throughout. For example, see:* arithmetic sequences, 247, 310 asymptotes, 555 box-and-whisker plots, 623–625 coordinate plane distance formula, 530 data analysis distribution, 631 lines of fit. 641 outliers, 610 data displays box-and-whisker plots, 624 - 625choosing a, 660 quartiles, 623 distance formula, 530 domains, 214 equations, 14 absolute value, 25 quadratic, 459, 467 rational, 592 square root, 515-516 systems of linear, 158 with variables on both sides. 22 - 23exponential decay, 304 exponents *n*th root, 280 rational, 281 expressions dividing, 572 least common denominator, 585 multiplying, 572 in simplest form, 564, 565 factoring difference of two squares, 386 trinomials, 373 focus of a parabola, 414 function notation, 229 functions exponential, 304 linear, 247 quadratic, 407 geometric sequences, 310 graphing quadratic equations, 459 rational functions, 555 graphs box-and-whisker plots, 623, 625 inequalities, 121, 130 multi-step, 130 systems of linear, 189 in two variables, 141 linear equations, 76 lines of fit, 641, 649 monomials, 332 outliers, 610 perfect square trinomial pattern,

polynomials, 332, 338 dividing, 578 factoring, 360, 373, 386 FOIL Method, 345 with greatest common factor, 366 quadratic equations, 459, 467 quadratic functions, 407, 414, 420 rational equations, 592 residuals, 649 square root equations, 515-516 square roots, 264 systems of linear equations number of solutions, 180 solving by elimination, 173 solving by graphing, 158 solving by substitution, 164 systems of linear and quadratic equations, 490-491 systems of linear inequalities, 189



*x*-intercept defined, 60 real-life application, 61



Y chart, 16 *y*-intercept, defined, 60

Z

Zero of a function, 418, 458 Zero-Product Property, defined, 358