



Math Connects

Concepts, Skills, and Problem Solving

Course 3

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STANDARDS	PAGE REFERENCES
<p>STANDARD 4.1 (NUMBER AND NUMERICAL OPERATIONS) ALL STUDENTS WILL DEVELOP NUMBER SENSE AND WILL PERFORM STANDARD NUMERICAL OPERATIONS AND ESTIMATIONS ON ALL TYPES OF NUMBERS IN A VARIETY OF WAYS.</p>	
<p>Building upon knowledge and skills gained in preceding grades, by the end of Grade 8, students will:</p>	
<p>4.1.8 A. Number Sense</p>	
<p>1. Extend understanding of the number system by constructing meanings for the following (unless otherwise noted, all indicators for grade 8 pertain to these sets of numbers as well):</p> <ul style="list-style-type: none"> • Rational numbers • Percents • Exponents • Roots • Absolute values • Numbers represented in scientific notation 	<p>Student Edition: 36-37, 37 #5-#11, 38 #25-#38, 84, 91-93, 126-129, 130-133, 144-147, 148-151, 252-255, 256-259 <i>Check Your Understanding</i> 37 #5-#12, 87 #1-#6, #8-#13, 128 #1-#8, 146 #1-#6, 254 #1-#9 <i>H.O.T. Problems</i> 39 #42-#47, 95 #39, 147 #39-#42 <i>Mini Lab</i> 130 #1-#3, 144 #1-#3 <i>Practice Test</i> 79 #6-#8, 139 #6-#9, 139 #14-#20, 299 #1-#8 <i>Real-World Example</i> 37, 92, 131 <i>Real-World Link</i> 82, 131 <i>Study Guide and Review</i> 76 #21-#22, 134-138, 296 #11-#25 <i>Study Tip</i> 127, 256 <i>Test Practice</i> 80 #5, 80 #7, 140 #4, 140 #7, 141 #10, 301 #10</p>

STANDARDS	PAGE REFERENCES
<p>Continued from cell above...</p> <p>1. Extend understanding of the number system by constructing meanings for the following (unless otherwise noted, all indicators for grade 8 pertain to these sets of numbers as well):</p> <ul style="list-style-type: none"> • Rational numbers • Percents • Exponents • Roots • Absolute values • Numbers represented in scientific notation 	<p>Continued from cell above...</p> <p>Teacher Edition: A 39, 89, 95, 107, 129, 133, 255; AE 36, 37, 92, 93, 127, 131, 145, 149, 253, 258; F 84; FMC 85, 92, 127, 131, 145, 253; T 84, 126, 130, 148, 256; TNT 37, 38, 107, 127, 134, 145</p>
<p>2. Demonstrate a sense of the relative magnitudes of numbers.</p>	<p>Understanding the size of a number in relation to another is a skill that can be taught along with the introduction of scientific notation and its use in both large and small numbers.</p> <p>Student Edition: 130-133</p> <p>Teacher Edition: AE 131; FM 131; T 130; TT 133</p>
<p>3. Understand and use ratios, proportions, and percents (including percents greater than 100 and less than 1) in a variety of situations.</p>	<p>Student Edition: 252-255, 254 #29-#31, 263-267, 274 #1-#4, 274 #6-#9, 274 #12-#15 <i>Check Your Understanding</i> 254 #1-#9, 258 #1-#12 <i>Mini Lab</i> 263 #1-#3 <i>Real-World Example</i> 265 <i>Study Tip</i> 252, 253, 265</p> <p>Teacher Edition: A 267; AE 253, 264, 265; FMC 264; T 252, 263; TNT 254, 266</p>
<p>4. Compare and order numbers of all named types.</p>	<p>Student Edition: 91-95, 95 #10-#29, 157, 158 #23-#28, 159 #32-#35, 256-261, 260 #46-#56 <i>Check Your Understanding</i> 93 #1-#9, 158 #7-#9, 258 #11-#12 <i>H.O.T. Problems</i> 261 #64 <i>Mid-Chapter Review</i> 160 #27-#30 <i>Practice Test</i> 183 #4 <i>Real-World Example</i> 92, 258 <i>Study Guide and Review</i> 296 #25</p> <p>Teacher Edition: AE 157, 258; T 155; TNT 258</p>

STANDARDS	PAGE REFERENCES
<p>5. Use whole numbers, fractions, decimals, and percents to represent equivalent forms of the same number.</p>	<p>Student Edition: 85-89, 252-255, 254 #20-#27, 258-261, 680 #1-#32 <i>Practice Test</i> 139 #1-#3, 299 #1-#3, #5-#7 <i>Real-World Example</i> 86, 253, 258 <i>Study Guide and Review</i> 135 #11-#16, 296 #11-#24 <i>Study Tip</i> 85, 252, 253</p> <p>Teacher Edition: A 261; AE 85, 253, 257, 258; FMC 253, 257; T 84, 256</p>
<p>6. Recognize that repeating decimals correspond to fractions and determine their fractional equivalents.</p> <ul style="list-style-type: none"> • $5/7 = 0.714285714285... = 0.714285\overline{714285}$ 	<p>Student Edition: 85, 87 #22-#27 <i>Check Your Progress</i> 86 <i>Mid-Chapter Quiz</i> 113 #3 <i>Study Guide and Review</i> 135 #17-#18, #22</p> <p>Teacher Edition: AE 85; FMC 85; TNT 88</p>
<p>7. Construct meanings for common irrational numbers, such as π (pi) and the square root of 2.</p>	<p>Student Edition: 155-156, 158 #11-#18 <i>Check Your Understanding</i> 158 #1-#4 <i>Mid-Chapter Quiz</i> 160 #21-#26 <i>Practice Test</i> 183 #8-#10 <i>Study Guide and Review</i> 181 #25-#30 <i>Study Tip</i> 156</p> <p>Teacher Edition: AE 156; FMC 149, 156; T 155; TNT 157</p>
4.1.8 B. Numerical Operations	
<p>1. Use and explain procedures for performing calculations with integers and all number types named above with:</p> <ul style="list-style-type: none"> • Pencil-and-paper • Mental math • Calculator 	<p>Student Edition: 41-45, 46-48, 51-55 <i>Check Your Understanding</i> 44 #1-#10, 48 #1-#12, 54 #1-#16 <i>Mini Lab</i> 46 <i>Real-World Example</i> 43 <i>Study Tip</i> 42, 47, 52, 127, 156, 353</p> <p>Teacher Edition: A 49, 147; AE 42, 43, 47; FMC 42, 47; T 46; TNT 43, 56, 150, 156, 353, 354</p>

STANDARDS	PAGE REFERENCES
<p>2. Use exponentiation to find whole number powers of numbers.</p>	<p>Student Edition: 126, 545-548 <i>Check Your Understanding</i> 128 #1-#5, #8-#9 <i>Practice Test</i> 139 #14 <i>Real-World Example</i> 546 <i>Study Guide and Review</i> 138 #57-#65</p> <p>Teacher Edition: A 548; AE 127, 546; FMC 127, 546</p>
<p>3. Find square and cube roots of numbers and understand the inverse nature of powers and roots.</p>	<p>Student Edition: LA12-LA14 <i>Check Your Understanding</i> LA14 #1-#7</p> <p>Teacher Edition: A LA14; AE LA13; FMC LA13; T LA12</p>
<p>4. Solve problems involving proportions and percents.</p>	<p>Student Edition: 210-214, 263-267, 279-283 <i>Check Your Understanding</i> 212 #1-#5, 282 #1-#7 <i>Mid-Chapter Quiz</i> 215 #14-#19, 274 #12-#16 <i>Mini Lab</i> 263 #1-#3 <i>Practice Test</i> 247 #5-#6, 299 #17-#21 <i>Real-World Example</i> 211, 265 <i>Study Guide and Review</i> 244 #17-#21, 296 #26-#29, 298 #42-#45 <i>Study Tip</i> 280</p> <p>Teacher Edition: A 214, 267, 283; AE 211, 212, 264, 265, 280, 281; FMC 211, 264, 280; T 210, 263, 279; TNT 211, 266, 280</p>
<p>5. Understand and apply the standard algebraic order of operations, including appropriate use of parentheses.</p>	<p>Student Edition: 29-34, 32 #11-#24 <i>Check Your Understanding</i> 32 #1-#7 <i>H.O.T. Problems</i> 33 #45-#47 <i>Mini Lab</i> 29 #1-#2 <i>Study Tip</i> 30</p> <p>Teacher Edition: AE 30, 31; FMC 30; T 29</p>

STANDARDS	PAGE REFERENCES
4.1.8 C. Estimation	
1. Estimate square and cube roots of numbers.	<p>Student Edition: 148-151, 150 #8-#15, #18-#20, 155-159, LA12-LA14 <i>Check Your Understanding</i> 150 #1-#6, 158 #1-#6, LA14 #1-#7 <i>Practice Test</i> 183 #5-#7 <i>Mid-Chapter Quiz</i> 160 #10-#15 <i>Mini Lab</i> 148 #1-#3 <i>Study Guide and Review</i> 180 #14-#21</p> <p>Teacher Edition: A 151, LA14; AE 149, LA13, 156, 157; FMC 149, LA13, 156; T LA12; TNT 150, 156</p>
2. Use equivalent representations of numbers such as fractions, decimals, and percents to facilitate estimation.	<p>Student Edition: 148-151, 275-278 <i>Check Your Understanding</i> 277 #1-#7 <i>Practice Test</i> 299 #14-#15 <i>Real-World Example</i> 149, 276 <i>Study Guide and Review</i> 297 #37-#41 <i>Study Tip</i> 276</p> <p>Teacher Edition: AE 149, 276; FMC 149; T 148, 275; TNT 150, 276</p>
3. Recognize the limitations of estimation and assess the amount of error resulting from estimation.	<p>Student Edition: 155-159 <i>Check Your Understanding</i> 158 #1-#10 <i>Concepts and Skills Bank</i> 736 <i>Real-World Example</i> 157</p> <p>Teacher Edition: AE 156; TNT 156, 157</p>

STANDARDS	PAGE REFERENCES
<p>STANDARD 4.2 (GEOMETRY AND MEASUREMENT) ALL STUDENTS WILL DEVELOP SPATIAL SENSE AND THE ABILITY TO USE GEOMETRIC PROPERTIES, RELATIONSHIPS, AND MEASUREMENT TO MODEL, DESCRIBE AND ANALYZE PHENOMENA.</p>	
<p>Building upon knowledge and skills gained in preceding grades, by the end of Grade 8, students will:</p>	
<p>4.2.8 A. Geometric Properties</p>	
<p>1. Understand and apply concepts involving lines, angles, and planes.</p> <ul style="list-style-type: none"> • Complementary and supplementary angles • Vertical angles • Bisectors and perpendicular bisectors • Parallel, perpendicular, and intersecting planes • Intersection of plane with cube, cylinder, cone, and sphere 	<p>Student Edition: 306-311, 368, 371 #9-#11 <i>Check Your Understanding</i> 309 #1-#9, 370 #1-#4 <i>Geometry Lab</i> 312-313 <i>H.O.T. Problems</i> 372 #25 <i>Mini Lab</i> 306 #1-#4</p> <p>Teacher Edition: A 311, 313; AE 307, 308; FMC 307; RM 386b; T 306, 312</p>
<p>2. Understand and apply the Pythagorean theorem.</p>	<p>Student Edition: 162-166, 167-171 <i>Check Your Understanding</i> 164 #1-#7, 169 #1-#4 <i>Geometry Lab</i> 172 <i>H.O.T. Problems</i> 166 #29-#32 <i>Mini Lab</i> 162 #1-#2 <i>Real-World Example</i> 167 <i>Study Tip</i> 164</p> <p>Teacher Edition: A 166, 171; AE 163, 164, 168; FMC 163, 168; T 162, 167; TNT 164, 169</p>
<p>3. Understand and apply properties of polygons.</p> <ul style="list-style-type: none"> • Quadrilaterals, including squares, rectangles, parallelograms, trapezoids, rhombi • Regular polygons • Sum of measures of interior angles of a polygon • Which polygons can be used alone to generate a tessellation and why 	<p>Student Edition: 316-319 <i>Check Your Understanding</i> 317 #1-#4 <i>Concepts and Skills Bank</i> 737-738 <i>H.O.T. Problems</i> 318 #20-#21 <i>Mini Lab</i> 316 #1-#2 <i>Practice Test</i> 347 #3-#5 <i>Study Guide and Review</i> 344 #19-#23</p> <p>Teacher Edition: A 319; AE 317; FMC 317; T 316</p>

STANDARDS	PAGE REFERENCES
<p>4. Understand and apply the concept of similarity.</p> <ul style="list-style-type: none"> Using proportions to find missing measures Scale drawings Models of 3D objects 	<p>Student Edition: 218-223, 222 #9-#12, 223 #13-#14, 236-241, 399-404 <i>Check Your Understanding</i> 222 #1-#3, 239 #1-#5, 402 #1-#3 <i>Geometry Lab</i> 224 <i>Mini Lab</i> 218 #1-#3 <i>Practice Test</i> 247 #9-#10, #15, 409 #14-#16 <i>Real-World Problem</i> 236, 237, 238 <i>Spreadsheet Lab</i> 397-398 <i>Study Guide and Review</i> 245 #25-#28, 246 #33-#35, 408 #28</p> <p>Teacher Edition: A 223, 241, 404; AE 219, 220, 221, 237, 238, 400, 401; FMC 219, 237, 400; T 218, 236, 399; TNT 219, 220, 238, 399</p>
<p>5. Use logic and reasoning to make and support conjectures about geometric objects.</p>	<p>Student Edition: <i>Mini Lab</i> 316 #1-#2 <i>Problem-Solving Investigation</i> 314-315</p> <p>Teacher Edition: A 315; AE 315; P 315; T 314; TNT 314</p>
<p>6. Perform basic geometric constructions using a variety of methods (e.g., straightedge and compass, patty/tracing paper, or technology).</p> <ul style="list-style-type: none"> Congruent angles or line segments Midpoint of a line segment 	<p>Student Edition: <i>Concepts and Skills Bank</i> 732-735</p>
<p>7. Create two-dimensional representations (e.g., nets or projective views) for the surfaces of three-dimensional objects.</p>	<p>Student Edition: 386-391 <i>Check Your Understanding</i> 389 #1-#5 <i>Measurement Lab</i> 385, 392 <i>Mini Lab</i> 386 #1-#4</p> <p>Teacher Edition: AE 389; FMC 387; T 385, 392; TNT 388, 389</p>

STANDARDS	PAGE REFERENCES
4.2.8 B. Transforming Shapes	
<p>1. Understand and apply transformations.</p> <ul style="list-style-type: none"> Finding the image, given the pre-image, and vice-versa Sequence of transformations needed to map one figure onto another Reflections, rotations, and translations result in images congruent to the pre-image Dilations (stretching/shrinking) result in images similar to the pre-image 	<p>Student Edition: 225-230, 327-331, 332-336, 337-341 <i>Check Your Understanding</i> 228 #1-#6, 329 #1-#3, 334 #1-#3, 339 #1-#5 <i>H.O.T. Problems</i> #17-#19 <i>Mini Lab</i> 225, 327 #3-#5 <i>Practice Test</i> 347 #12, #14-#16 <i>Spreadsheet Lab</i> 231 <i>Study Guide and Review</i> 345-346 #27-#39</p> <p>Teacher Edition: A 230, 331, 336, 341; AE 226, 227, 328, 329, 333, 334, 338, 339; FMC 226, 328, 338; T 225, 231, 327, 332, 337; TNT 338</p>
<p>2. Use iterative procedures to generate geometric patterns.</p> <ul style="list-style-type: none"> Fractals (e.g., the Koch Snowflake) Self-similarity Construction of initial stages Patterns in successive stages (e.g., number of triangles in each stage of Sierpinski’s Triangle) 	<p>Students will recognize and learn about iterative geometric patterns in the following examples.</p> <p>Student Edition: 317 #4, 318 #17-#18, 319 #23 <i>Get Ready</i> 337 <i>Mini Lab</i> 373 <i>Problem-Solving Investigation</i> 360</p> <p>Teacher Edition: 316b, 360b; T 360</p>
4.2.8 C. Coordinate Geometry	
<p>1. Use coordinates in four quadrants to represent geometric concepts.</p>	<p>Student Edition: 173-178, 178 #43-#44 <i>Check Your Understanding</i> 176 #1-#13 <i>Real-World Example</i> 175 <i>Study Tip</i> 174, 175</p> <p>Teacher Edition: A 178; AE 174, 175; FMC 175</p>
<p>2. Use a coordinate grid to model and quantify transformations (e.g., translate right 4 units).</p>	<p>Student Edition: 333-336, 335 #4-#9, 337-341, 340 #6-#9 <i>Check Your Understanding</i> 334 #1-#3, 339 #1-#5 <i>H.O.T. Problems</i> 336 #17-#19, 341 #16-#17</p> <p>Teacher Edition: A 336, 341; AE 333, 334, 338, 339; FMC 338; T 332, 337; TNT 338</p>

STANDARDS	PAGE REFERENCES
4.2.8 D. Units of Measurement	
1. Solve problems requiring calculations that involve different units of measurement within a measurement system (e.g., 4'3" plus 7'10" equals 12'1").	Student Edition: <i>Concepts and Skills Bank</i> 742-743
2. Use approximate equivalents between standard and metric systems to estimate measurements (e.g., 5 kilometers is about 3 miles).	Student Edition <i>Concepts and Skills Bank</i> 744-745
3. Recognize that the degree of precision needed in calculations depends on how the results will be used and the instruments used to generate the measurements.	Student Edition: 155-159, 351 #8-#12, 352-357, 364 Example 1, 366 #7, #8, 374 Example 3, 376 #10, #11, #14-#15, #17, 381, 382 Example 3, 383 #14-#17, #23 <i>Check Your Understanding</i> 158 #1-#10, 355 #1-#7, 365 #2-#3, 375 #3-#4 <i>H.O.T. Problems</i> 367 #18 <i>Measurement Lab</i> 385 #1-#7 <i>Mid-Chapter Quiz</i> 379 #1-#2, #6, #11 <i>Mini Lab</i> 352 #1-#4 <i>Real-World Example</i> 157, 354 Teacher Edition: A 357; AE 156, 157, 353, 354, 375, 382; FMC 156; T 352; TNT 157
4. Select and use appropriate units and tools to measure quantities to the degree of precision needed in a particular problem-solving situation.	Student Edition: 99 #24-#27, 100 #41-#43, 214 #27, 375 Example 4 <i>Check Your Understanding</i> 99 #10-#11, 375 #5 <i>Geometry Lab</i> 224 #1-#5 <i>Real-World Example</i> 98 Teacher Edition: AE 98, 375; T 224
5. Recognize that all measurements of continuous quantities are approximations.	Student Edition: 155-159 <i>Check Your Understanding</i> 158 #1-#10 <i>Real-World Example</i> 157 Teacher Edition: AE 156, 157; FMC 156; TNT 157

STANDARDS	PAGE REFERENCES
<p>6. Solve problems that involve compound measurement units, such as speed (miles per hour), air pressure (pounds per square inch), and population density (persons per square mile).</p>	<p>Student Edition: 190-193, 194-197, 198-203, 198 Example 1, 199 Example 2 <i>Check Your Understanding</i> 192 #1-#7, 195 #1-#4 <i>Mid-Chapter Quiz</i> 215 #4-#13 <i>Practice Test</i> 247 #1-#8 <i>Study Guide and Review</i> 243 #7-#14, 244 #15-#16</p> <p>Teacher Edition: A 193, 197; AE 191, 195; FMC 191; TNT 192, 197</p>
4.2.8 E. Measuring Geometric Objects	
<p>1. Develop and apply strategies for finding perimeter and area.</p> <ul style="list-style-type: none"> Geometric figures made by combining triangles, rectangles and circles or parts of circles Estimation of area using grids of various sizes Impact of a dilation on the perimeter and area of a 2-dimensional figure 	<p>Student Edition: 363-367 <i>Check Your Understanding</i> 365 #1-#4 <i>Measurement Lab</i> 362 #1-#5 <i>Real-World Example</i> 364</p> <p>Teacher Edition: A 367; AE 364, 365; FMC 364; LLR 225b; T 363</p>
<p>2. Recognize that the volume of a pyramid or cone is one-third of the volume of the prism or cylinder with the same base and height (e.g., use rice to compare volumes of figures with same base and height).</p>	<p>Student Edition: 380-384 <i>Check Your Understanding</i> 382 #1-#9 <i>Practice Test</i> 409 #9, #12-#13 <i>Real-World Example</i> 381 <i>Study Guide and Review</i> 407 #21-#24</p> <p>Teacher Edition: AE 381, 382; FMC 381; TNT 381</p>
<p>3. Develop and apply strategies and formulas for finding the surface area and volume of a three-dimensional figure.</p> <ul style="list-style-type: none"> Volume - prism, cone, pyramid Surface area - prism (triangular or rectangular base), pyramid (triangular or rectangular base) Impact of a dilation on the surface area and volume of a three-dimensional figure 	<p>Student Edition: 373-378, 380-384, 386-391, 393-396 <i>Check Your Understanding</i> 375 #1-#5, 382 #1-#9, 389 #1-#5, 395 #1-#3 <i>Measurement Lab</i> 385 <i>Mini Lab</i> 380 #1-#3, 386 #1-#4</p> <p>Teacher Edition: A 378, 384, 391, 396; AE 374, 375, 381, 382, 387, 388, 389, 394; FMC 374, 381, 387, 394; T 373, 380, 386, 393; TNT 381, 386, 388, 395</p>
<p>4. Use formulas to find the volume and surface area of a sphere.</p>	<p>Student Edition: <i>Concepts and Skills Bank</i> 741</p> <p>Teacher Edition: LLR 363b</p>

STANDARDS	PAGE REFERENCES
<p>STANDARD 4.3 (PATTERNS AND ALGEBRA) ALL STUDENTS WILL REPRESENT AND ANALYZE RELATIONSHIPS AMONG VARIABLE QUANTITIES AND SOLVE PROBLEMS INVOLVING PATTERNS, FUNCTIONS, AND ALGEBRAIC CONCEPTS AND PROCESSES.</p>	
<p>Building upon knowledge and skills gained in preceding grades, by the end of Grade 8, students will:</p>	
<p>4.3.8 A. Patterns</p>	
<p>1. Recognize, describe, extend, and create patterns involving whole numbers, rational numbers, and integers.</p> <ul style="list-style-type: none"> • Descriptions using tables, verbal and symbolic rules, graphs, simple equations or expressions • Finite and infinite sequences • Arithmetic sequences (i.e., sequences generated by repeated addition of a fixed number, positive or negative) • Geometric sequences (i.e., sequences generated by repeated multiplication by a fixed positive ratio, greater than 1 or less than 1) • Generating sequences by using calculators to repeatedly apply a formula 	<p>Student Edition: 24-25, 27 #1, #4-#5, 28 #10-#11, 33 #39-#40, 61 #30, 127, 545, 556 <i>Mini Lab</i> 29, 316 <i>Problem-Solving Investigation</i> 124, 125 #3-#5 Teacher Edition: AE 124; T 24</p>
<p>4.3.8 B. Functions and Relationships</p>	
<p>1. Graph functions, and understand and describe their general behavior.</p> <ul style="list-style-type: none"> • Equations involving two variables • Rates of change (informal notion of slope) 	<p>Student Edition: 475-479, 481-486, 487-492 <i>Geometry Lab</i> 493 Teacher Edition: 487a; AE 482, 483, 488; DI 477, 483; T 475, 481</p>
<p>2. Recognize and describe the difference between linear and exponential growth, using tables, graphs, and equations.</p>	<p>Student Edition: 528-533, 534-537 <i>Graphing Calculator Lab</i> 500-501 Teacher Edition: 528a, 534a; AE 529, 530; FM 528, 535; PA 531; T 528; TT 530</p>
<p>4.3.8 C. Modeling</p>	
<p>1. Analyze functional relationships to explain how a change in one quantity can result in a change in another, using pictures, graphs, charts, and equations.</p>	<p>Student Edition: 470-471 Example 4, 472 #19-#20, 475-479, 481-482, 487-491 <i>Get Ready</i> 469 Teacher Edition: 475a; AE 476, 477, 488; R 469, 487</p>

STANDARDS	PAGE REFERENCES
<p>2. Use patterns, relations, symbolic algebra, and linear functions to model situations.</p> <ul style="list-style-type: none"> Using concrete materials (manipulatives), tables, graphs, verbal rules, algebraic expressions/equations/inequalities Growth situations, such as population growth and compound interest, using recursive (e.g., NOW-NEXT) formulas (cf. science standard 5.5 and social studies standard 6.6) 	<p>Student Edition: 24-25, 27-28, 119-122, 469-473, 475-479 <i>Algebra Lab</i> 479 <i>Graphing Calculator Lab</i> 500-501 <i>Problem-Solving Investigation</i> 124-125</p> <p>Teacher Edition: 124a; AE 470, 476, 477</p>
4.3.8 D. Procedures	
<p>1. Use graphing techniques on a number line.</p> <ul style="list-style-type: none"> Absolute value Arithmetic operations represented by vectors (arrows) (e.g., “-3 + 6” is “left 3, right 6”) 	<p>Student Edition: 35-38, 41-42 Example 1-Example 3, 51, 156-157 Example 4-Example 6, 450, 452 #30-#35 <i>Study Guide and Review</i> 457 8-6</p> <p>Teacher Edition: 41a; AE 37; TT 450</p>
<p>2. Solve simple linear equations informally and graphically.</p> <ul style="list-style-type: none"> Multi-step, integer coefficients only (although answers may not be integers) Simple literal equations (e.g., $A = lw$) Using paper-and-pencil, calculators, graphing calculators, spreadsheets, and other technology 	<p>Student Edition: 422-426, 434-437 <i>Algebra Lab</i> 432-433 <i>Problem-Solving Investigation</i> 438</p> <p>Teacher Edition: 422a, 427a; AE 432, 435; TT 423</p>
<p>3. Solve simple linear inequalities.</p>	<p>Student Edition: 441-444, 445-448, 449-453</p> <p>Teacher Edition: 441a; AE 442, 446, 450, 451; T 441, 445</p>
<p>4. Create, evaluate, and simplify algebraic expressions involving variables.</p> <ul style="list-style-type: none"> Order of operations, including appropriate use of parentheses Distributive property Substitution of a number for a variable Translation of a verbal phrase or sentence into an algebraic expression, equation or inequality, and vice versa 	<p>Student Edition: 416-421, 422-426, 427-431, 434-437 <i>Algebra Lab</i> 432-433</p> <p>Teacher Edition: 416a, 427a; AE 417, 418, 428; PA 418, 435; T 427</p>

STANDARDS	PAGE REFERENCES
<p>5. Understand and apply the properties of operations, numbers, equations, and inequalities.</p> <ul style="list-style-type: none"> Additive inverse Multiplicative inverse Addition and multiplication properties of equality Addition and multiplication properties of inequalities 	<p>Student Edition: 43, 65-69, 70-73, 102-107, 156, 441-444, 445, 449 <i>Get Ready</i> 119</p> <p>Teacher Edition: FM 66, 71; PA 69, 71; T 119</p>
<p>STANDARD 4.4 (DATA ANALYSIS, PROBABILITY, AND DISCRETE MATHEMATICS) ALL STUDENTS WILL DEVELOP AN UNDERSTANDING OF THE CONCEPTS AND TECHNIQUES OF DATA ANALYSIS, PROBABILITY, AND DISCRETE MATHEMATICS, AND WILL USE THEM TO MODEL SITUATIONS, SOLVE PROBLEMS, AND ANALYZE AND DRAW APPROPRIATE INFERENCES FROM DATA.</p>	
<p>Building upon knowledge and skills gained in preceding grades, by the end of Grade 8, students will:</p>	
<p>4.4.8 A. Data Analysis</p>	
<p>1. Select and use appropriate representations for sets of data, and measures of central tendency (mean, median, and mode).</p> <ul style="list-style-type: none"> Type of display most appropriate for given data Box-and-whisker plot, upper quartile, lower quartile Scatter plot Calculators and computer used to record and process information. Finding the median and mean (weighted average) using frequency data. Effect of additional data on measures of central tendency 	<p>Student Edition: 45 #49, 510-515, 576-580, 582-588, 605-610, 612-616 <i>Check</i> 15 <i>Concepts and Skills Bank</i> 749 <i>Graphing Calculator Lab</i> 516-517, 581, 611 <i>Problem-Solving Investigation</i> 574-575 <i>Spreadsheet Lab</i> 589-590 <i>Study Guide and Review</i> 522 9-9</p>
<p>2. Make inferences and formulate and evaluate arguments based on displays and analysis of data sets.</p>	<p>Student Edition: 510-515, 576-577, 579 #15-#18, 583-585, 603 Example 3, 617-621 <i>Problem-Solving Investigation</i> 508 <i>Spreadsheet Lab</i> 589</p> <p>Teacher Edition: 574a; AE 511, 577, 583, 607</p>

STANDARDS	PAGE REFERENCES
3. Estimate lines of best fit and use them to interpolate within the range of the data.	Student Edition: 511 Example 3-4, 512 Example 5, #3-#4, 513 #10-#11, #13-#14, 514 #21, #24 <i>Graphing Calculator Lab</i> 517 Activity 2 Teacher Edition: AE 512
4. Use surveys and sampling techniques to generate data and draw conclusions about large groups.	Student Edition: 643-647, 653-657 <i>Probability Lab</i> 648-649 <i>Problem-Solving Investigation</i> 650-651 <i>Study Guide and Review</i> 661-662 Teacher Edition: 653a; AA 644, 655
4.4.8 B. Probability	
1. Interpret probabilities as ratios, percents, and decimals.	Student Edition: 637-642, 643-647, 653-658 <i>Probability Lab</i> 648-649 <i>Problem-Solving Investigation</i> 650 Teacher Edition: 632a, 637a; A 647; AE 644
2. Determine probabilities of compound events.	Student Edition: 637-642, 647 #25-#26 <i>Study Guide and Review</i> 660 12-2 Teacher Edition: 637a; AE 638, 639; PA 639; T 637
3. Explore the probabilities of conditional events (e.g., if there are seven marbles in a bag, three red and four green, what is the probability that two marbles picked from the bag, without replacement, are both red).	Student Edition: 638-642, 647 #25-#26 <i>Study Guide and Review</i> 660 12-2 Teacher Edition: AE 639; PA 639
4. Model situations involving probability with simulations (using spinners, dice, calculators and computers) and theoretical models. <ul style="list-style-type: none"> • Frequency, relative frequency 	Student Edition: 634 #1, 637 Example 1, 641 #32, 642 #36, 647 #24 <i>Probability Lab</i> 648-649 Teacher Edition: 637a; AE 638; DI 646

STANDARDS	PAGE REFERENCES
5. Estimate probabilities and make predictions based on experimental and theoretical probabilities.	Student Edition: 643-647 <i>Probability Lab</i> 648-649 <i>Study Guide and Review</i> 661 Teacher Edition: 643a; AE 644; FM 645; T 643
6. Play and analyze probability-based games, and discuss the concepts of fairness and expected value.	Student Edition: 653-658 <i>Probability Lab</i> 648-649 <i>Study Guide and Review</i> 662 12-5 Teacher Edition: 653a; AE 654, 655
4.4.8 C. Discrete Mathematics—Systematic Listing and Counting	
1. Apply the multiplication principle of counting. <ul style="list-style-type: none"> • Permutations: ordered situations with replacement (e.g., number of possible license plates) vs. ordered situations without replacement (e.g., number of possible slates of 3 class officers from a 23 student class) • Factorial notation • Concept of combinations (e.g., number of possible delegations of 3 out of 23 students) 	Student Edition: 632-636 <i>Get Ready</i> 637 <i>Problem-Solving Investigation</i> 650-651 <i>Study Guide and Review</i> 660 12-1, 662 12-4 Teacher Edition: 650a; AE 633; PA 633
2. Explore counting problems involving Venn diagrams with three attributes (e.g., there are 15, 20, and 25 students respectively in the chess club, the debating team, and the engineering society; how many different students belong to the three clubs if there are 6 students in chess and debating, 7 students in chess and engineering, 8 students in debating and engineering, and 2 students in all three?).	Student Edition: 159 #43 <i>Problem-Solving Investigation</i> 152-153 <i>Study Guide and Review</i> 180 3-3 Teacher Edition: 152a; AE 153; T 152
3. Apply techniques of systematic listing, counting, and reasoning in a variety of different contexts.	Student Edition: 159 #43, 632-636 <i>Get Ready</i> 637 <i>Problem-Solving Investigation</i> 152-153, 650-651 <i>Study Guide and Review</i> 180 3-3, 660 12-1, 662 12-4 Teacher Edition: 152a, 650 a; AE 153, 633; PA 633; T 152

STANDARDS	PAGE REFERENCES
4.4.8 D. Discrete Mathematics—Vertex-Edge Graphs and Algorithms	
<p>1. Use vertex-edge graphs to represent and find solutions to practical problems.</p> <ul style="list-style-type: none"> • Finding the shortest network connecting specified sites • Finding a minimal route that includes every street (e.g., for trash pick-up) • Finding the shortest route on a map from one site to another • Finding the shortest circuit on a map that makes a tour of specified sites • Limitations of computers (e.g., the number of routes for a delivery truck visiting n sites is $n!$, so finding the shortest circuit by examining all circuits would overwhelm the capacity of any computer, now or in the future, even if n is less than 100) 	<p>Student Edition: 633-635</p> <p>Teacher Edition: PA 633; T 632</p>
STANDARD 4.5 (MATHEMATICAL PROCESSES) ALL STUDENTS WILL USE MATHEMATICAL PROCESSES OF PROBLEM SOLVING, COMMUNICATION, CONNECTIONS, REASONING, REPRESENTATIONS, AND TECHNOLOGY TO SOLVE PROBLEMS AND COMMUNICATE MATHEMATICAL IDEAS.	
At each grade level, with respect to content appropriate for that grade level, students will:	
4.5 A. Problem Solving	
<p>1. Learn mathematics through problem solving, inquiry, and discovery.</p>	<p>Student Edition: 26 Example 2, 49 #45, 203 #24, #26, 310 #37, 341 #16, 391 #18-#21, 403 #18, 468 #36, 499 #31, 587 #21, 596 #19, 615 #10-#19</p> <p>Teacher Edition: SQ 29; TT 56</p>
<p>2. Solve problems that arise in mathematics and in other contexts.</p> <ul style="list-style-type: none"> • Open-ended problems • Non-routine problems • Problems with multiple solutions • Problems that can be solved in several ways 	<p>Student Edition: 29, 84-85, 144-145, 219, 263-264, 306-307, 416-417</p> <p><i>Reading to Solve Problems</i> 90, 154, 262</p> <p>Teacher Edition: 304E Study Skills; 449a</p>
<p>3. Select and apply a variety of appropriate problem-solving strategies (e.g., “try a simpler problem” or “make a diagram”) to solve problems.</p>	<p>Student Edition: 94 #35-#36, 115 Test Example</p> <p><i>Problem-Solving Investigation</i> 124, 216, 272, 273 #6-#13, 360</p> <p>Teacher Edition: 275a, 320a; TT 140</p>

STANDARDS	PAGE REFERENCES
<p>4. Pose problems of various types and levels of difficulty.</p>	<p>Student Edition: 97 Example 3, 107 #46-#47, 268-271, 275-278 <i>Spreadsheet Lab</i> 294, 397-398, 589-590 <i>Test-Taking Tip</i> 115 Teacher Edition: 268a, 275a; A 271; AE 276; TNT 107; TT 140</p>
<p>5. Monitor their progress and reflect on the process of their problem solving activity.</p>	<p>Student Edition: 97 Example 3, 107 #46-#47, 268-271, 275-278 <i>Spreadsheet Lab</i> 294, 397-398, 589-590 <i>Test-Taking Tip</i> 115 Teacher Edition: 268a, 275a; A 271; AE 276; TNT 107; TT 140</p>
<p>6. Distinguish relevant from irrelevant information, and identify missing information.</p>	<p>Student Edition: 591-595 <i>Graphing Calculator Lab</i> 581 <i>Problem-Solving Investigation</i> 574 <i>Spreadsheet Lab</i> 589, 597 Teacher Edition: 574a; AE 592</p>
<p>4.5 B. Communication</p>	
<p>1. Use communication to organize and clarify their mathematical thinking.</p> <ul style="list-style-type: none"> • Reading and writing • Discussion, listening, and questioning 	<p>Student Edition: 579 #19-#20 <i>Geometry Lab</i> 358-359 <i>Graphing Calculator Lab</i> 500-501, 544, 581 <i>Measurement Lab</i> 362 <i>Mini Lab</i> 96, 327, 352 <i>Spreadsheet Lab</i> 294, 397-398 Teacher Edition: 475a</p>
<p>2. Communicate their mathematical thinking coherently and clearly to peers, teachers, and others, both orally and in writing.</p>	<p>Student Edition: 100 #49, 111 #41-#42, 558 #41-#42 <i>Algebra Lab</i> 474 <i>Problem-Solving Investigation</i> 314, 360, 538 Teacher Edition: 263a, 320a, 559a</p>
<p>3. Analyze and evaluate the mathematical thinking and strategies of others.</p>	<p>Student Edition: 39 #43-#45, 45 #41, 56 #63-#64, 104 Example 5, 391 #18-#20, 468 #36, 596 #19-#20 <i>Algebra Lab</i> 40 #1-#4</p>

STANDARDS	PAGE REFERENCES
4. Use the language of mathematics to express mathematical ideas precisely.	<p>Student Edition: 29, 84-85, 144-145, 219, 263-264, 306-307, 416-417 <i>Reading to Solve Problems</i> 90, 154, 262</p> <p>Teacher Edition: 304E Study Skills; 449a</p>
4.5 C. Connections	
1. Recognize recurring themes across mathematical domains (e.g., patterns in number, algebra, and geometry).	<p>Student Edition: 37 Example 6, 39 #43-#46, 60 #23, 87 #39, 207 #3-#5, 263, 275 <i>Mini Lab</i> 65</p> <p>Teacher Edition: A 289; EA 49; FM 103; PA 175</p>
2. Use connections among mathematical ideas to explain concepts (e.g., two linear equations have a unique solution because the lines they represent intersect at a single point).	<p>Student Edition: 37 Example 6, 39 #43-#46, 60 #23, 87 #39, 207 #3-#5, 263, 275, 502-515 #34 <i>Mini Lab</i> 65 <i>Problem-Solving Investigation</i> 509 #3 <i>Study Guide and Review</i> 521 9-7</p> <p>Teacher Edition: A 289; EA 49; FM 103; PA 175</p>
3. Recognize that mathematics is used in a variety of contexts outside of mathematics.	<p>Student Edition: 33 #38, 72 #31, 104, 451 Example 5, 472 #19-#20, #23-#24, 478 #6-#7, 497 #22-#27, 546 Example 3, 634 #12-#14, 644 Example 4 <i>Get Ready</i> 502 <i>Problem-Solving Investigation</i> 508</p>
4. Apply mathematics in practical situations and in other disciplines.	<p>Student Edition: 99 #10, 479 #16, 498 #28, 536 #20-#21, 548 #49, 553 #34 <i>Problem-Solving Investigation</i> 574</p> <p>Teacher Edition: A 546</p>
5. Trace the development of mathematical concepts over time and across cultures (cf. world languages and social studies standards).	Historical and cultural mathematical development can be integrated when lessons introduce new terms and concepts.

STANDARDS	PAGE REFERENCES
<p>6. Understand how mathematical ideas interconnect and build on one another to produce a coherent whole.</p>	<p>Student Edition: 37 Example 6, 39 #43-#46, 60 #23, 87 #39, 207 #3-#5, 263, 275 <i>Mini Lab</i> 65 Teacher Edition: A 289; EA 49; FM 103; PA 175</p>
<p>4.5 D. Reasoning</p>	
<p>1. Recognize that mathematical facts, procedures, and claims must be justified.</p>	<p>Student Edition: 4-5, 24-27 <i>Problem-Solving Investigation</i> 124, 125 #10, #13-#14, 152, 153 #4, #7, #9, #11, 216, 217 #3, #5, #7-#10, #14, 272, 273 #3-#6, #8-#13, 315 #4, #7-#9, 438, 439 #4, #6, #10-#14, 539 #3-#6, #8-#11, 575 #8-#9, #11 Teacher Edition: AE 26, 124, 153</p>
<p>2. Use reasoning to support their mathematical conclusions and problem solutions.</p>	<p>Student Edition: 24-28, 61 #27, 98 Example 65, 99 #26-#27, 104 Example 5, 106 #37-#38, 279 <i>Measurement Lab</i> 362 <i>Problem-Solving Investigation</i> 62-63, 152, 272 <i>Study Guide and Review</i> 75 Example 1 Teacher Edition: I 26</p>
<p>3. Select and use various types of reasoning and methods of proof.</p>	<p>Student Edition: 24, 205 Example 1, 401 <i>Get Ready</i> 108, 190 <i>Mini Lab</i> 148 <i>Problem-Solving Investigation</i> 438 <i>Study Guide and Review</i> 77 Example 11 <i>Test Practice</i> 81 #14 Teacher Edition: FM 42, 175</p>
<p>4. Rely on reasoning, rather than answer keys, teachers, or peers, to check the correctness of their problem solutions.</p>	<p>Student Edition: 26 Example 2, 49 #45, 203 #24, #26, 310 #37, 341 #16, 391 #18-#21, 403 #18, 468 #36, 499 #31, 587 #21, 596 #19, 615 #10-#19 Teacher Edition: SQ 29; TT 56</p>

STANDARDS	PAGE REFERENCES
<p>5. Make and investigate mathematical conjectures.</p> <ul style="list-style-type: none"> Counterexamples as a means of disproving conjectures Verifying conjectures using informal reasoning or proofs. 	<p>Student Edition: 161, 510-515 <i>Geometry Lab</i> 312, 385, 493 <i>Problem-Solving Investigation</i> 508</p> <p>Teacher Edition: AE 511, 512; T 510</p>
<p>6. Evaluate examples of mathematical reasoning and determine whether they are valid.</p>	<p>Student Edition: 25 Example 1, 61 #27, 98 Example 65, 99 #26-#27, 104 Example 5, 106 #37-#38, 279 <i>Measurement Lab</i> 362 <i>Problem-Solving Investigation</i> 62, 152, 272 <i>Study Guide and Review</i> 75 Example 1</p> <p>Teacher Edition: I 26</p>
<p>4.5 E. Representations</p>	
<p>1. Create and use representations to organize, record, and communicate mathematical ideas.</p> <ul style="list-style-type: none"> Concrete representations (e.g., base-ten blocks or algebra tiles) Pictorial representations (e.g., diagrams, charts, or tables) Symbolic representations (e.g., a formula) Graphical representations (e.g., a line graph) 	<p>Student Edition: 53, 84-89, 91 Example 1, 95 #43, 97 Example 1, 101 #58-#60, 102-104, 114 <i>Reading to Solve Problems</i> 90 <i>Review Vocabulary</i> 97</p> <p>Teacher Edition: AE 85, 86; FM 85; PA 86; TT 84, 88</p>
<p>2. Select, apply, and translate among mathematical representations to solve problems.</p>	<p>Student Edition: 84-89, 101 #58-#60, 252-255, 256-261, 450 <i>Mid-Chapter Quiz</i> 113 #1-#3 <i>Study Guide and Review</i> 135 2-1 <i>Test Practice</i> 140 #2, #7</p> <p>Teacher Edition: 84a; A 89; AA 86, 253</p>
<p>3. Use representations to model and interpret physical, social, and mathematical phenomena.</p>	<p>Student Edition: 84, 450, LA6-LA7, LA9-LA10 <i>Geometry Lab</i> 493 <i>Graphing Calculator Lab</i> 500-501 <i>Problem-Solving Investigation</i> 538 <i>Spreadsheet Lab</i> 597</p>

STANDARDS	PAGE REFERENCES
4.5 F. Technology	
1. Use technology to gather, analyze, and communicate mathematical information.	Student Edition: 86 Example 3, 177 #41, 353 Example 1 <i>Graphing Calculator Lab</i> 500-501, 516-517, 544, 581, 611 <i>Spreadsheet Lab</i> 231, 294, 589-590, 597 <i>Study Tip</i> 127
2. Use computer spreadsheets, software, and graphing utilities to organize and display quantitative information.	Student Edition: <i>Graphing Calculator Lab</i> 500-501, 516-517, 544, 581, 611 <i>Spreadsheet Lab</i> 231, 294, 397-398, 589-590, 597 Teacher Edition: T 544
3. Use graphing calculators and computer software to investigate properties of functions and their graphs.	Student Edition: <i>Graphing Calculator Lab</i> 500-501, 516-517, 544 Teacher Edition: T 500, 516, 544
4. Use calculators as problem-solving tools (e.g., to explore patterns, to validate solutions).	Student Edition: 86 Example 3, 177 #41, 353 Example 1 <i>Graphing Calculator Lab</i> 500-501, 516-517, 581, 611 <i>Study Tip</i> 127
5. Use computer software to make and verify conjectures about geometric objects.	Student Edition: <i>Spreadsheet Lab</i> 397-398 Teacher Edition: A 398; T 397
6. Use computer-based laboratory technology for mathematical applications in the sciences (cf. science standards).	Student Edition: <i>Graphing Calculator Lab</i> 500-501, 516-517, 544, 581, 611 <i>Spreadsheet Lab</i> 231, 294, 397-398, 589-590, 597 Teacher Edition: A 398; T 397, 500, 516, 544