



WASHINGTON
Essential Academic Learning Requirements—Mathematics
Benchmark 3—Grade 10
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BENCHMARKS	PAGE REFERENCES
1. The student understands and applies the concepts and procedures of mathematics.	
1.1 Understand and apply concepts and procedures from number sense.	
Number and Numeration	
Understand and use properties and symbolic representations of rational numbers, powers, and roots.	SE: 5 #5-#12, 94-99, 106 #31-#34, 119 #47-#52, 122 #8, 173 #10, 588 #3, 734-735, 744-745, 746-747, 748-749 <i>Extra Practice Lesson 2-6 757</i>
Compare and order rational numbers, powers, and roots.	SE: 122 #1
Understand concepts of and use processes involving prime and composite numbers, factors and multiples, and divisibility.	SE: 750-751
Understand and apply the concepts of ratio and both direct and inverse proportion.	SE: 282-287, 341 #1-#4 <i>Reading to Learn Mathematics 299</i> <i>Skills Practice 297-298</i> <i>Study Guide and Intervention 295-296</i>
Computation	
Understand operations on rational numbers, powers, and roots.	SE: 5 #5-#12, 94-99, 106 #31-#34, 119 #47-#52, 122 #8, 173 #10, 588 #3, 734-735, 744-745, 746-747, 748-749 <i>Extra Practice Lesson 2-6 757</i>
Compute with rational numbers, powers, and roots.	SE: 5 #5-#12, 58 #2, 106 #31-#34, 119 #47-#52, 122 #8, 173 #10, 281 #11-#13, 338 #1, 341 #9-#12, 588 #3, 593 #7-#12, 687 #11-#14, 734-735, 744-745, 746-747 <i>Extra Practice Lesson 2-6 757</i>
Use mental arithmetic, pencil and paper, calculator, or computer as appropriate to the task involving real numbers.	SE: 5 #5-#12, 58 #2, 106 #31-#34, 119 #47-#52, 122 #8, 173 #10, 281 #11-#13, 338 #1, 341 #9-#12, 588 #3, 593 #7-#12, 687 #11-#14, 734-735, 744-745, 746-747 <i>Extra Practice Lesson 2-6 757</i>
Estimation	
Identify situations involving rational numbers, powers, and roots in which estimation is sufficient and computation is not required.	SE: 22 ex 2, 25 #24-#25, 25 #27-#28, 43 #52-#55, 55 #20-#23, 351
Use estimation to predict computation results and to determine the reasonableness of answers involving real numbers, <i>for example, estimating.</i>	SE: 142 #2, 263 #2, 284 #3, 292 #1, 345 #3, 571 #2, 605 #2, 625 #3, 657 #3 <i>Geometry Software Investigation 384</i>

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1.2 Understand and apply concepts and procedures from measurement.	
Attributes and Dimensions	
Understand how changes in dimension affect perimeter, area, and volume.	SE: 599 #32-#34, 608 #51-#56, #57, 615 #52-#54, 698 #1, 710 #10, 723 #18 <i>Spreadsheet Investigation</i> 695, 708-709
Measure objects and events directly or use indirect methods <i>such as finding the volume of a cone given its height and diameter.</i>	SE: 524 ex 4, 593 #1-#6, 599 #32-#34, 604 ex 4, 605 #10-#11, 688-694, 696-701, 702-706 <i>Enrichment</i> 734, 740 <i>Skills Practice</i> 725-726, 731-732, 737-738 <i>Study Guide and Intervention</i> 723-724, 729-730, 735-736
Calculate rate and other derived and indirect measurements.	SE: 300 ex 3, 301 #9, 303 #32, 372 ex 3, 373 #7, 395 #29, 397 #23-#24, 399 #12
Approximation and Precision	
Understand that the precision and accuracy of measurement are affected by the measurement tools and calculating procedures.	SE: 14, 16 #5-#6, 17 #16-#21, 18 #43-#44 TWE: DI 14 <i>Skills Practice</i> 9-10 <i>Study Guide and Intervention</i> 7-8
Know when to estimate and use estimation to obtain reasonable approximations, <i>for example, estimating how much paint is needed to paint the walls of a classroom.</i>	SE: 142 #2, 263 #2, 284 #3, 292 #1, 345 #3, 571 #2, 605 #2, 625 #3, 657 #3 <i>Geometry Software Investigation</i> 384
Systems and Tools	
Understand the benefits of standard units of measurement and the advantages of the metric system.	SE: 730-731
Compare, contrast, and use both the U.S. system and metric system.	SE: 730-731
Select and use tools that will provide an appropriate degree of precision and accuracy for the situation, <i>for example, using kilometers vs. light years.</i>	Precision can be found on page 14.
1.3 Understand and apply concepts and procedures from geometric sense.	
Properties and Relationships	
Use geometric properties and relationships to compare, contrast, describe, and classify 2- and 3-dimensional geometric figures.	SE: 178-183, 191 #49-#51, 228 #9-#11, 231 #4-#6, 424-430, 431-437, 439-445 <i>Key Concept</i> 411 <i>Reading Mathematics</i> 199, 446 TWE: DI 180 GA 179 OEA 183 <i>Reading to Learn Mathematics</i> 187 <i>Skills Practice</i> 185-186 <i>Study Guide and Intervention</i> 183-184

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Construct geometric models and scale drawings using tools as appropriate, <i>for example, building a model of a bridge.</i>	SE: 636-642, 643-649 TWE: DI 644, 656 TT 637, 645 <i>Enrichment</i> 666, 672 <i>Skills Practice</i> 663-664, 669-670, 675-676 <i>Study Guide and Intervention</i> 661-662, 667-668
Understand and use properties of symmetry, congruence, and similarity.	SE: 192-198, 200-206, 207-213, 289-297, 298-306, 315 #49-#53, 316-323 TWE: DI 300 OEA 297 <i>Reading to Learn Mathematics</i> 199, 305 <i>Skills Practice</i> 197-198, 303-304 <i>Study Guide and Intervention</i> 195-196, 301-302
Perform complex geometric constructions using a variety of tools and technologies, <i>such as paper folding, computer software, straightedge, compass.</i>	SE: 314 #40-#41 <i>Construction</i> 15, 24, 31, 33, 151, 200, 202, 207, 311, 425, 433 <i>Geometry Activity</i> 32, 44, 236-237
Locations and Transformations	
Understand and use coordinate grids.	SE: 47 ex 3, 139-143, 148 #27-#34, 154 #11, 156 #38, 161 ex 3, 180 ex 4, 194 ex 2, 196 #22-#25, 201 ex 2, 241 ex 3, 352 ex 3, 359 ex 4, 728-729, 741
Understand and apply multiple geometric transformations using combinations of translations, reflections, and/or rotations.	SE: 468 #38-#39, 469 #49, 471 ex 2-ex 3, 474 #28, 478 ex 2, 479 #5-#6, 480 #19-#21, 509 #12, 510 #39-#42, 516 #46-#47, 517 #10-#12 <i>Geometry Software Investigation</i> 477
1.4 Understand and apply concepts and procedures from probability and statistics.	
Probability	
Understand the properties of dependent and independent events.	This objective can be found in Algebra: Concepts and Applications on pages 224 and 406. It can also be found in Pre-Algebra on pages 650-655.
Understand and use appropriate counting procedures to determine probabilities.	SE: 265 #48-#49, 278 #4 TWE: DI 624
Use both experimental and theoretical methods to determine probabilities.	SE: 164 #35, 549 #7, 550 #31-#34 TWE: DI 624 OEA 627
Statistics	
Collect data using appropriate methods and technology.	TWE: OEA 627
Organize and display data in appropriate forms, <i>such as tables, graphs, scatter plots, and box and whisker plots.</i>	SE: 791 #2-#4 <i>WebQuest</i> 23
Calculate and use the different measures of central tendency, variability, and range as appropriate to describe data.	SE: 114 #45, 183 #45, 245 #35-#36, 254 #60

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Use statistics to support different points of view, <i>for example, in a debate or a position paper.</i>	SE: 20, 245 #35-#38, 296 #58 TWE: T 20
Prediction and Inference	
Predict outcomes and design and conduct experiments to verify or disprove predictions.	SE: 164 #35, 404 <i>Geometry Activity 406</i> <i>Spreadsheet Investigation 288</i> TWE: GA 406
Understand and make inferences based on the analysis of experimental results, statistical data, and graphical representations.	SE: 296 #56-#58, 626 #20-#23, 653 #34-#36 <i>WebQuest 65</i> TWE: TS 401
1.5 Understand and apply concepts and procedures from algebraic sense.	
Patterns	
Recognize, extend, and create complex patterns and sequences.	SE: 62 ex 1, 74 #56-#61, 143 #39-#41, 327, 404 <i>Geometry Activity 406</i> <i>Spreadsheet Investigation 288</i> TWE: DI 407 GA 406 TNT 406
Generalize and express rules describing patterns and sequences.	SE: 62 ex 1, 74 #56-#61, 143 #39-#41, 327, 404 <i>Geometry Activity 406</i> <i>Spreadsheet Investigation 288</i> TWE: DI 407 GA 406 TNT 406
Representations	
Translate among tabular, symbolic, and graphical representations of relations using =, ≠, >, <, ≥, ≤.	SE: 27 #58, 66 #44, 74 #55, 99 #38, 146 ex 3, 147 ex 5, 164 #39-#43, 173 #15, 404
Use variables to write expressions, equations, and inequalities.	SE: 58 #6, 147 ex 5, 149 #45-#51, 173 #14, 232 #3, 338 #2, 399 #10, 459 #1, 511 #45-#46, 519 #10
Operations	
Simplify and evaluate expressions and formulas.	SE: 43 #58-#62, 61 #1-#6, 74 #70-#73, 593 #7-#12, 687 #11-#14, 725 #9, 734-735, 736, 744-745, 746-747, 748-749
Solve equations and inequalities.	SE: 23 ex 5, 27 #63-#68, 33 #9-#10, 35 #51, 36 #61-#66, 61 #7-#12, 93 #43-#48, 144 #70-#72, 253 #53, 269 ex 3, 276 #26-#27, 737-738, 739-740, 744-745, 746-747, 748-749
2. The student uses mathematics to define and solve problems.	
2.1 Investigate situations.	
Search systematically for patterns in complex situations.	SE: 62 ex 1, 74 #56-#61, 143 #39-#41, 327, 404 <i>Geometry Activity 406</i> <i>Spreadsheet Investigation 288</i> TWE: DI 407 GA 406 TNT 406
Use multiple strategies.	SE: 26 #46-#47 <i>Geometry Activity 22</i>

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Identify what information is missing or extraneous and compensate for it.	SE: 26 #46-#47, 143 #39-#41, 149 #50-#51, 173 #15, 244 #34, 287 #41, 303 #32, 310 ex 4, 339 #13, 355 #40-#43
Analyze an unproductive approach and attempt to modify it or try a new approach.	SE: 9 #3, 62-66, 82-87, 89-93, 94-100, 101-106, 107-114 <i>Enrichment</i> 62, 80 <i>Reading to Learn Mathematics</i> 61, 79 <i>Skills Practice</i> 59-60, 77-78 <i>Study Guide and Intervention</i> 57-58, 75-76
2.2 Formulate questions and define the problem.	
Identify questions to be answered in complex situations.	SE: 26 #46-#47, 143 #39-#41, 149 #50-#51, 173 #15, 244 #34, 287 #41, 303 #32, 310 ex 4, 339 #13, 355 #40-#43
Define problems in complex situations.	SE: 26 #46-#47, 143 #39-#41, 149 #50-#51, 173 #15, 244 #34, 287 #41, 303 #32, 310 ex 4, 339 #13, 355 #40-#43
Identify the information that is known and unknown in complex situations.	SE: 26 #46-#47, 143 #39-#41, 149 #50-#51, 173 #15, 244 #34, 287 #41, 303 #32, 310 ex 4, 339 #13, 355 #40-#43
2.3 Construct solutions.	
Organize and synthesize information from multiple sources.	SE: <i>WebQuest</i> 3
Select and use appropriate mathematical tools.	SE: 26 #46-#47, 143 #39-#41, 149 #50-#51, 173 #15, 244 #34, 287 #41, 303 #32, 310 ex 4, 339 #13, 355 #40-#43
Apply viable strategies and appropriate concepts and procedures to construct a solution.	SE: <i>Geometry Activity</i> 28
3. The student uses mathematical reasoning.	
3.1 Analyze information.	
Compare, contrast, interpret, and integrate information from multiple sources.	SE: <i>WebQuest</i> 3
Validate thinking and mathematical ideas using models, known facts, patterns, relationships, counterexamples, and proportional reasoning.	SE: 9 #3, 62-66, 82-87, 89-93, 94-100, 101-106, 107-114 <i>Enrichment</i> 62, 80 <i>Reading to Learn Mathematics</i> 61, 79 <i>Skills Practice</i> 59-60, 77-78 <i>Study Guide and Intervention</i> 57-58, 75-76
3.2 Predict results.	
Make and explain conjectures based on analysis of problem situations.	SE: 62 ex 1, 64 #21-#28, 74 #56-#61, 80 #58-#61, 115 #9-#11
3.3 Draw conclusions and verify results.	
Test conjectures by formulating a proof or by constructing a counterexample.	SE: 9 #3, 62-66, 82-87, 89-93, 94-100, 101-106, 107-114 <i>Enrichment</i> 62, 80 <i>Reading to Learn Mathematics</i> 61, 79 <i>Skills Practice</i> 59-60, 77-78 <i>Study Guide and Intervention</i> 57-58, 75-76

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Support arguments and justify results using inductive and deductive reasoning.	SE: 9 #3, 62-66, 82-87, 89-93, 94-100, 101-106, 107-114 <i>Enrichment</i> 62, 80 <i>Reading to Learn Mathematics</i> 61, 79 <i>Skills Practice</i> 59-60, 77-78 <i>Study Guide and Intervention</i> 57-58, 75-76
Check for reasonableness of results.	SE: 122 #8, 128 #2, 142 #2, 188 #2, 203 #2, 251 #3, 263 #2, 284 #3, 292 #1, 301 #3, 345 #3, 353 #1, 380 #1, 427 #3
Reflect on and evaluate procedures and results and make necessary revisions.	SE: 122 #8, 128 #2, 142 #2, 188 #2, 203 #2, 251 #3, 263 #2, 284 #3, 292 #1, 301 #3, 345 #3, 353 #1, 380 #1, 427 #3
4. The student communicates knowledge and understanding in both everyday and mathematical language.	
4.1 Gather information.	
Develop or select and follow an efficient system for collecting information.	TWE: DI 96, 108, 134, 141, 153, 218, 257, 300, 318, 378
Use reading, listening, and observation to access and extract mathematical information from multiple, self-selected sources <i>such as pictures, diagrams, physical models, oral narratives, and symbolic representations.</i>	SE: 156 #43, 330 #43 <i>Reading Mathematics</i> 12, 81, 199, 246, 446, 594
Integrate the use of a variety of available technologies to browse, select, and retrieve mathematical information from multiple sources.	SE: 11 #50, 156 #43, 181 #20, 246 #2-#4, 330 #43, 347 #40, 429 #37, 594 #7-#8, 654 #43, 706 #35
4.2 Organize and interpret information.	
Organize, clarify, and refine mathematical information in multiple ways – reflecting, verbalizing, discussing, or writing.	TWE: OEA 19, 66, 100, 144, 157, 191, 213, 266, 297, 315, 383, 416, 430, 451, 488
4.3 Represent and share information.	
Express complex ideas and situations using mathematical language and notation in appropriate and efficient forms.	SE: 25 #1, 71 #1, 84 #2, 147 #1, 149 #53, 164 #32, 284 #1, 296 #56-#58, 387 #2, 613 #1, 625 #1, 657 #1, 704 #1 TWE: OEA 297
Explain or represent complex mathematical ideas and information in ways appropriate for audience and purpose.	SE: 25 #1, 71 #1, 84 #2, 147 #1, 149 #53, 164 #32, 191 #46, 198 #37, 284 #1, 296 #56-#58, 369 #62, 444 #41, 625 #1, 693 #32, 704 #1
5. The student understands how mathematical ideas connect within mathematics, to other subject areas, and to real-life situations.	
5.1 Relate concepts and procedures within mathematics.	
Relate and use conceptual and procedural understandings among multiple mathematical content strands.	SE; 10 #29, 23 ex 5, 32 ex 3, 39 ex 2, 245 #35-#38, 254 #60-#61, 296 #56-#58, 653 #34-#36
Relate and use multiple equivalent mathematical models and representations.	SE: <i>Geometry Software Investigation</i> 51-52, 101, 132, 343, 384, 448, 477, 552 <i>Graphing Calculator Investigation</i> 158

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5.2 Relate mathematical concepts and procedures to other disciplines.	
Extend mathematical patterns and ideas to other disciplines.	SE: 93 #38, 330 #39-#40, 371-376, 405 ex 1, 504 #54, 579 #42, 614 #34-#35, 620 #23
Apply mathematical thinking and modeling in other disciplines.	SE: 93 #38, 330 #39-#40, 371-376, 405 ex 1, 504 #54, 579 #42, 614 #34-#35, 620 #23
Describe examples of contributions to the development of mathematics <i>such as the contributions of women, men, and different cultures.</i>	SE: 152, 289, 298, 483 <i>More About...</i> 156, 329, 637 <i>Study Tip</i> 691
5.3 Relate mathematical concepts and procedures to real-life situations.	
Identify situations in which mathematics can be used to solve problems with local, national, or international implications <i>such as calculating resources necessary for interstate highway maintenance.</i>	SE: 72 #15-#17, 113 #41, 190 #36-#38, 350, 374 #14-#15, 375 #25, 397 #24, 498, 555 #7, 694 #43
Investigate the mathematical knowledge and training requirements for occupational/career areas of interest.	SE: <i>Career Choices</i> 10, 92, 163, 209, 272, 305, 353, 422, 487, 573, 607, 658, 693

Codes Used for TWE Pages

DI	Daily Intervention
GA	Geometry Activity
OEA	Open-Ended Assessment
T	Teach
TNT	Tips for New Teachers
TS	Teaching Suggestions
TT	Teaching Tip