



WASHINGTON
Essential Academic Learning Requirements—Mathematics
Benchmark 2—Grade 7
***Mathematics: Applications and Concepts Course 3* © 2004**

BENCHMARKS	PAGE REFERENCES
1. The student understands and applies the concepts and procedures of mathematics. To meet this standard, the student will:	
1.1 Understand and apply concepts and procedures from number sense.	
Number and Numeration	
Demonstrate understanding of integers, fractions, decimals, percents, place value of decimals, and properties of the rational number system using pictures and symbols.	SE: 65 #1, 98-101, 106 #1, 111 #1, 125-129 <i>Key Concept</i> 62, 104, 116 TWE: B 62, 98
Compare and order integers, fractions, and decimals.	SE: 67-70, 109 #21-#25, 111 #25, 121 #1, 125-129, 140 #25, 150 #6 TWE: A 70 B 67 DI 68
Understand the concepts of prime and composite numbers, factors and multiples, and divisibility rules.	SE: 124 #9, 227 #7, 411 #27, 489 #4, 609, 610
Understand and apply the concepts of ratio and direct proportion.	SE: 156-159, 160-164, 169 #24, 179-180, 182 #22, 184-187, 206-209 <i>Spreadsheet Investigation</i> 165 TWE: A 159 DI 157
Computation	
Understand operations on nonnegative rational numbers.	SE: 71-75, 76-80, 82-85, 88-91, 95 #37-#40 TWE: A 75, 80, 91 DI 77, 83
Add, subtract, multiply, and divide nonnegative fractions and decimals using rules for order of operation.	SE: 71-75, 76-80, 82-85, 88-91, 95 #37-#40 TWE: A 75, 80, 91 DI 77, 83
Use mental arithmetic, pencil and paper, calculator, or computer as appropriate to the task involving nonnegative rational numbers.	SE: 80 #41, 220-223 <i>Study Tip</i> 25, 63, 73, 78, 127, 133, 160, 188
Estimation	
Identify situations involving nonnegative rational numbers in which estimation is sufficient and computation is not required.	SE: 121 #4, 172 #2, 190 #3, 226-227, 230 #3, 488-489, 600-601
Use estimation to predict computation results and to determine the reasonableness of answers involving nonnegative rational numbers, <i>for example, estimating a tip.</i>	SE: 121 #4, 172 #2, 190 #3, 226-227, 230 #3, 488-489, 600-601

BENCHMARKS	PAGE REFERENCES
1.2 Understand and apply concepts and procedures from measurement.	
Attributes and Dimensions	
Understand the concepts of and the relationships among perimeter, area, and volume and how changes in one dimension affect perimeter, area, and/or volume.	SE: 314-318, 319-323, 335-339, 342-345, 347-351, 352-355, 362 #47, 363 #10-#13 <i>Spreadsheet Investigation</i> 356-357 TWE: DI 348
Measure objects and events directly or using indirect methods <i>such as calculating and applying procedures for determining perimeter, area, and volume.</i>	SE: 170-173, 178-182, 187 #25, 188-191, 197 #28, 199 #21-#23 TWE: A 173, 182 B 188, 194
Understand the concept of rate and how to calculate rates and determine units.	SE: 188-191, 197 #28, 200 #28-#29, 201 #14, 203 #15, 209 #52, 604-605, 606-607 TWE: A 191 B 188
Approximation and Precision	
Understand that precision is related to the unit of measurement used and the calibration of the measurement tool.	SE: 358-362, 366 #38-#45, 367 #13-#15, 377 #33-#36, 383 #31 <i>Extra Practice Lesson</i> 7-9 635 TWE: B 358 DI 359
Know when to estimate and use estimation to obtain reasonable approximations, <i>for example, estimating the length and width of the playground to approximate its area.</i>	TWE: A 344 B 335 DI 185, 189, 315, 336, 343, 359
Systems and Tools	
Understand the appropriate uses of standard units of measurement for both direct and indirect measurement.	SE: 358-362, 366 #38-#45 TWE: B 358 DI 359
Understand the relationship among units within both the U.S. and metric systems.	SE: 604-605, 606-607
Select and use tools that will provide an appropriate degree of precision, <i>for example, using meters vs. kilometer.</i>	SE: 358-362, 366 #38-#45, 367 #13-#15, 377 #33-#36, 383 #31 <i>Extra Practice Lesson</i> 7-9 635 TWE: B 358 DI 359
1.3. Understand and apply concepts and procedures from geometric sense—properties and relationships and locations and transformations.	
Properties and Relationships.	
Use the properties and relationships of plane geometry to describe shapes and figures, <i>including angles, degrees in a circle, triangles, isosceles, equilateral, or quadrilateral.</i>	SE: 272-275, 282 #27-#29, 284 #1-#2, 307 #19-#20, 309 #8-#10 <i>The Game Zone</i> 285 <i>Key Concept</i> 263 TWE: A 275 B 272 DI 273

BENCHMARKS	PAGE REFERENCES
Identify, describe, or draw objects in the surrounding environment in geometric terms, <i>for example, producing a simple scale drawing of a classroom.</i>	SE: 184-187, 191 #21-#24, 197 #29, 200 #24-#27, 201 #2, 202 #6 TWE: A 187 B 184 DI 185 TNT 186
Understand symmetry, congruence, and similarity.	SE: 279-282, 286-289, 294 #33-#37, 299 #20, 303 #22-#23, 307 #21-#24, 308 #25-#28 TWE: A 289 DI 280, 287
Perform geometric constructions using a variety of tools and technologies <i>such as paper folding, computer software, straightedge, compass.</i>	SE: <i>Hands-On Lab</i> 261, 266, 271, 283
Locations and Transformations.	
Identify and describe location of objects on coordinate grids in any of the four quadrants.	SE: 142
Understand and apply simple geometric transformations using combinations of translations (slides), or reflections (flips), or rotations (turns).	SE: 290-294, 296-299, 300-303, 308 #29-#34, 309 #17-#19, 311 #16 <i>Hands-On Lab</i> 304-305 TWE: A 294, 299, 303
1.4. Understand and apply concepts and procedures from probability and statistics.	
Probability	
Know how to calculate numerical measures of chance for simple events.	SE: 374-377, 383 #27-#30, 387 #38-#41, 394 #3-#8, 410 #9-#15, 413 #3-#5, 414 #5 TWE: A 377 B 374 DI 375
Understand procedures for counting outcomes to determine probabilities.	SE: 380-383, 384-387, 388-391, 399 #30-#33 <i>Hands-On Lab</i> 392-393 TWE: A 387 B 380, 384 DI 381, 385
Know how to conduct experiments and simulations and to compare results with mathematical expectations.	SE: 400-403, 409 #24, 412 #42-#45 <i>Graphing Calculator Investigation</i> 404-405 TWE: A 403 DI 400
Statistics	
Collect a random sample of data that represents a described population.	SE: 406-409, 412 #46-#49, 413 #20, 424 #26, 429 #16 <i>Extra Practice Lesson 8-7</i> 637
Organize and display data in appropriate forms <i>such as frequency tables, circle graphs, and stem-and-leaf plots.</i>	SE: 420-424, 426-429, 430-433, 446-449, 450-453, 539-542 <i>Graphing Calculator Investigation</i> 425, 573 <i>Hands-On Lab</i> 434 TWE: A 429

BENCHMARKS	PAGE REFERENCES
Calculate and appropriately use range and measures of central tendency to describe data.	SE: 435-438, 442-445, 449 #24, 459 #15-#21, 461 #7-#9, 656 #6-#7 <i>Spreadsheet Investigation</i> 439 TWE: A 437 B 435 DI 436
Identify how statistics can be used to support different points of view.	SE: 406-409, 412 #46-#49, 413 #2, 414 #7 TWE: A 409 DI 407
Prediction and Inference	
Predict outcomes of experiments and simulations and compare the predictions to experimental results.	SE: 400-404, 409 #24, 412 #42-#45, 413 #17-#19, 424 #27, 655 #13-#14 <i>Extra Practice Lesson 8-6</i> 637 <i>Graphing Calculator Investigation</i> 404-405 TWE: A 403 DI 400
Understand and make inferences based on analysis of experimental results, statistical data, and simple graphical representations.	SE: 424 #23, 425 #3, 428 #3 <i>Spreadsheet Investigation</i> 434 TWE: A 429, 433
1.5 Understand and apply concepts and procedures from algebraic sense.	
Patterns	
Recognize, extend, and create patterns and sequences.	SE: 512-513, 520 #29-#31, 525 #32, 552 #9-#13, 555 #3-#5, 556 #4 <i>Extra Practice Lesson 11-1</i> 642 <i>Hands-On Lab</i> 516 TWE: A 515 B 512
Represent and describe patterns with tables, graphs, and rule.	SE: 166-169, 522-525, 529 #27-#29, 533-536, 547 #39-#41 <i>Spreadsheet Investigation</i> 165 TWE: A 536 B 166 DI 167, 523
Representations	
Represent equalities and inequalities symbolically using =, >, <, ≤, ≥.	SE: 18 ex 3-ex 4, 20 #6-#8, 27 #48-#51, 32 #6-#8, 55 #20-#21, 57 #6-#8, 68 ex 2, 69 #12-#23, 70 #37, 75 #37-#40
Use variables to write simple expressions, equations, and inequalities, for example, $3x > 18$.	SE: 39-42, 49 #49-#50, 56 #42-#45, 58 #7, 471 ex 9, 473 #50-#53 TWE: A 42, 473 B 39 TNT 40
Operations	
Evaluate expressions and formulas.	SE: 12 ex 2-ex 3, 14 #28-#40, 29 ex 5-ex 6, 30 #34-#41, 32 #5, 36 ex 7, 38 #49-#56, 57 #3-#5, 73 ex 4, 74 #24-#27

BENCHMARKS	PAGE REFERENCES
Solve single-variable equations.	SE: 45-49, 50-53, 56 #46-#58, 57 #23-#28, 92-95, 107 #47-#50 TWE: A 49, 53, 85 B 50
2. The student uses mathematics to define and solve problems. To meet this standard, the student will:	
2.1 Investigate situations.	
Search systematically for patterns in simple situations.	SE: 6-10 <i>Problem-Solving Strategy</i> 96-97 TWE: A 97 DI 96
Develop and use a variety of strategies and approaches.	SE: <i>Problem-Solving Strategy</i> 43-44, 96-97, 123-124, 176-177, 226-227, 324, 325, 378-379, 418-419, 488-489, 588-589
Identify missing or extraneous information.	SE: 6-10 <i>Problem-Solving Strategy</i> 378-379 TWE: DI 7
Recognize the need to modify or abandon an unproductive approach.	SE: 6-10 <i>Problem-Solving Strategy</i> 488-489
2.2 Formulate questions and define the problem.	
Identify questions to be answered in new situations.	SE: 6-10 <i>Problem-Solving Strategy</i> 324
Define problems in new situations.	SE: 6-10 <i>Problem-Solving Strategy</i> 324
Identify the known and unknown in new situations.	SE: 6-10 <i>Problem-Solving Strategy</i> 378 TWE: DI 7
2.3 Construct solutions.	
Organize relevant information from multiple sources.	SE: <i>WebQuest</i> 2-3, 152-153, 252-253, 464-465 TWE: MH 153 MLA 253 MLS 3 MSS 3, 253 MTE 153
Select and use appropriate mathematical tools.	SE: <i>Graphing Calculator Investigation</i> 404, 425, 534, 543, 564 <i>Spreadsheet Investigation</i> 165, 245, 356, 439
Apply viable strategies and appropriate concepts and procedures to construct a solution.	SE: <i>Problem-Solving Strategy</i> 43-44, 96-97, 123-124, 176-177, 226-227, 324, 325, 378-379, 418-419, 488-489, 588-589

BENCHMARKS	PAGE REFERENCES
3. The student uses mathematical reasoning. To meet this standard, the student will:	
3.1 Analyze information.	
Compare, contrast, and interpret information from a variety of sources.	SE: <i>WebQuest</i> 2-3, 152-153, 252-253, 464-465 TWE: MH 153 MLA 253 MLS 3 MSS 3, 253 MTE 153
Validate thinking and mathematical ideas using models, known facts, patterns, relationships, and counter-examples.	SE: 13 ex 5, 15 #51-#54, 21 #59-#61, 27 #45, 31 #46-#47, 38 #62-#64, 57 #1, 128 #1, 182 #18-#19, 276
3.2 Predict results.	
Make conjectures based on analysis of new problem situations.	SE: 7 ex 1, 9 #8-#9, 10 #18, 27 #45, 31 #46-#47, 38 #62-#64, 129 #51, 182 #18-#19, 183 #2, 219 #38
3.3 Draw conclusions and verify results.	
Test conjectures and explain why they are true or false.	SE: 13 ex 5, 14 #12-#13, 15 #51-#54, 21 #59-#61, 27 #45, 31 #46-#47, 38 #62-#64, 57 #1, 128 #1, 276
Support arguments and justify results using evidence.	SE: 189 #2, 218 #3, 239 #4, 317 #3, 328 #2, 337 #2 TWE: A 214, 223, 329, 355
Check for reasonableness of results.	SE: 121 #4, 172 #2, 190 #3, 226-227, 230 #3, 488-489, 600-601
Reflect on and evaluate procedures and results in new problem situations.	SE: 88-91, 137-140, 326-329
4. The student communicates knowledge and understanding in both everyday and mathematical language. To meet this standard, the student will:	
4.1 Gather information.	
Develop and follow a plan for collecting information.	SE: <i>WebQuest</i> 2-3, 152-153, 252-253, 464-465 TWE: MH 153 MLA 253 MLS 3 MSS 3, 253 MTE 153
Use reading, listening, and observation to access and extract mathematical information from multiple sources <i>such as pictures, diagrams, physical models, oral narratives, and symbolic representations.</i>	SE: <i>Reading Math</i> 8 <i>Study Skill</i> 215
Choose appropriate available technology to browse, select, and retrieve relevant mathematical information from a variety of sources.	SE: <i>WebQuest</i> 2-3, 152-153, 252-253, 464-465 TWE: MH 153 MLA 253 MLS 3 MSS 3, 253 MTE 153

BENCHMARKS	PAGE REFERENCES
4.2 Organize and interpret information.	
Organize and clarify mathematical information by reflecting, verbalizing, discussing, or writing.	SE: 9 #1, 14 #1, 20 #2, 196 #2, 208 #3, 212 #3 <i>Reading Math</i> 8, 258 <i>Study Skill</i> 215 TWE: A 215
4.3 Represent and share information.	
Clearly and effectively express or present ideas and situations using both everyday and mathematical language <i>such as models, tables, charts, graphs, written reflection, or algebraic notation.</i>	SE: 14 #1, 196 #2, 208 #3, 284 #1, 292 #3, 562 #2 TWE: A 215, 282, 289 DI 280
Explain or represent mathematical ideas and information in ways appropriate for audience and purpose.	SE: 9 #1, 14 #1, 20 #2, 196 #2, 208 #3, 212 #3, 562 #2, 567 #1-#3 <i>Study Skill</i> 215 TWE: A 215
5. The student understands how mathematical ideas connect within mathematics, other subject areas, and real-life situations. To meet this standard, the student will:	
5.1 Relate concepts and procedures within mathematics.	
Relate and use conceptual and procedural understandings among a variety of mathematical content areas.	SE: 88-91, 137-140, 143, 144 #1, 148 #42-#45, 149 #18-#19, 151 #15, 326-329 TWE: B 142
Relate and use different mathematical models and representations of the same situation.	SE: 143, 144 #1, 148 #42-#48, 544-547, 551 #29-#32, 554 #39-#44, 555 #18 TWE: B 142, 544 DI 545
5.2 Relate mathematical concepts and procedures to other disciplines.	
Identify mathematical patterns and ideas in other disciplines.	SE: 9 #4-#6, 21 #49-#51, 26 #29-#32, 38 #48, 49 #42-#43, 75 #29, 80 #38-#39, 91 #36-#40, 117 ex 4, 153 #42-#44
Use mathematical thinking and modeling in other disciplines.	SE: 9 #4-#6, 21 #49-#51, 26 #29-#32, 38 #48, 49 #42-#43, 75 #29, 80 #38-#39, 91 #36-#40, 117 ex 4, 153 #42-#44
Describe examples of contributions to the development of mathematics <i>such as the contributions of women, men, and different cultures.</i>	SE: 15 #55, 136 #35, 352 <i>Hands-On Lab</i> 304, 516 <i>Real-Life Math</i> 143
5.3 Relate mathematical concepts and procedures to real-life situations.	
Recognize the widespread use of mathematics in daily life and the extensive use of mathematics outside the classroom, <i>for example, in banking or sports statistics.</i>	SE: <i>Real-Life Math</i> 73, 93, 157, 167, 207, 321, 348, 389, 451, 497
Investigate the use of mathematics within several occupations/careers of interest.	SE: <i>Real-Life Careers</i> 51, 64, 127, 171, 242, 258, 316, 401, 479, 581

Codes Used for TWE Pages

A	Assessment
B	Bellringer
DI	Daily Intervention
MH	Math and Health
MLA	Math and Language Arts
MLS	Math and Life Skills
MSS	Math and Social Studies
MTE	Math and Technology Education
TNT	Tips for New Teachers