



WASHINGTON
Essential Academic Learning Requirements—Mathematics
Benchmark 2—Grade 7
MathScape: Seeing and Thinking Mathematically
Course 2 © 2005

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: 16-17, 26-27, 28-29, 30-31, 38, 42, 43, 44, 96-97, 102-103, 124, 127, 162-163, 177 TG: 3E, 3G, 24, 25, 93E, 93G
Compare and order integers, fractions, and decimals.	SE: 16-17, 28-29, 38, 43, 54-55, 60-61, 82, 84 TG: 3G, 4
Understand the concepts of prime and composite numbers, factors and multiples, and divisibility rules.	SE: 116-117, 118-119, 120-121, 122-123, 132, 133, 134 TG: 93E, 114, 115, 116A, 118A, 119A
Understand and apply the concepts of ratio and direct proportion.	SE: 16-17, 18-19, 20-21, 22-23, 39, 40, 41, 140-141, 142-143, 144-145, 168-170 TG: 14, 15, 16A, 20A, 138, 139
Computation	
Understand operations on nonnegative rational numbers.	SE: 6-7, 26-27, 30-32, 34, 42, 78-79, 91, 98-99, 100-101, 102-103, 124, 125, 126, 127, 156-157, 175, 294-295, 296-297, 298-299, 310-312 TG: 93G, 94, 95, 156A
Add, subtract, multiply, and divide nonnegative fractions and decimals using rules for order of operation.	SE: 58-59, 78-79, 83, 91, 98-99, 100-101, 102-103, 106-107, 126-128, 156-157, 175, 190-191, 196-197, 215, 217, 238-239, 262 TG: 93G, 94, 95, 102A, 103A
Use mental arithmetic, pencil and paper, calculator, or computer as appropriate to the task involving nonnegative rational numbers.	SE: 10-11, 12-13, 26-27, 30-31, 42, 96-97, 98-99, 124, 125, 127, 131, 236-237, 238-239, 240-241, 261-262 TG: 26A, 27A, 28A, 94, 95, 98A, 225E, 237A, 238A
Estimation	
Identify situations involving nonnegative rational numbers in which estimation is sufficient and computation is not required.	SE: 10-11, 12-13, 26-27, 36, 37, 42, 146-147, 154-155, 160-161, 162-163, 171, 176, 177, 298-299, 312 TG: 26A, 27A, 146A, 161A, 162A

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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: 10-11, 12-13, 26-27, 36, 37, 42, 146-147, 160-161, 162-163, 171, 176, 177 TG: 26A, 146A, 161A, 162A
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: 140-141, 146-147, 154-155, 168, 170, 171, 174, 178 #9-#10, 296-297, 311, 313 #10 TG: 137G, 141A, 296A
Measure objects and events directly or using indirect methods <i>such as calculating and applying procedures for determining perimeter, area, and volume.</i>	SE: 140-141, 142-143, 154-155, 160-161, 164-165, 168, 169, 174, 176, 178 TG: 137E, 138, 139, 140A, 158, 159
Understand the concept of rate and how to calculate rates and determine units.	SE: 6-7, 8-9, 10-11, 12-13, 34, 35, 36, 37 TG: 3A, 4, 5
Approximation and Precision	
Understand that precision is related to the unit of measurement used and the calibration of the measurement tool.	SE: 140-141, 142-143, 144-145, 146-147, 168-171, 199-200, 218 #17, 274-275, 302 TG: 137E, 138, 139, 147A, 158, 159, 272, 273, 274A
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>	SE: 146-147, 156-157, 162-163, 164-165, 166-167, 171, 175, 177-179 TG: 137H, 138, 139, 146A, 159, 162A
Systems and Tools	
Understand the appropriate uses of standard units of measurement for both direct and indirect measurement.	SE: 140-141, 144-145, 164-165, 168, 170, 173, 178, 198-199, 212 #20, 217 #16, 218 TG: 158, 159
Understand the relationship among units within both the U.S. and metric systems.	SE: 140-141, 168 TG: 137E
Select and use tools that will provide an appropriate degree of precision, <i>for example, using meters vs. kilometer.</i>	SE: 140-141, 142-143, 144-145, 146-147, 168-170, 198-199, 212 #20, 217 #16, 218 TG: 137E
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: 150-151, 152-153, 172, 173, 274-275, 276-277, 284-285, 286-287, 294-295, 296-297, 298-299, 302, 303, 306, 307, 310, 311, 312 TG: 271G, 272, 273, 274A, 284A, 292, 293
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: 140-141, 142-143, 164-165, 166-167, 168, 169, 178, 179, 300-301, 306 #14, 309 (<i>Making Connections</i>), 313 TG: 137G, 138, 139, 271G, 271H, 300A, 301A

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Understand symmetry, congruence, and similarity.	SE: 140-141, 168, 278-279, 280-281, 288-289, 290-291, 304, 305, 308, 309 TG: 149, 279A, 281A, 282, 283, 288A, 290A, 291A
Perform geometric constructions using a variety of tools and technologies <i>such as paper folding, computer software, straightedge, compass.</i>	SE: 140-141, 142-143, 152-153, 164-165, 166-167, 168, 169, 173, 178, 179, 274-275, 300-301, 302, 313 TG: 137G, 271G, 271H
Locations and Transformations.	
Identify and describe location of objects on coordinate grids in any of the four quadrants.	SE: 288-289, 290-291, 300-301, 308, 309, 313 TG: 289A, 301A
Understand and apply simple geometric transformations using combinations of translations (slides), or reflections (flips), or rotations (turns).	SE: 280-281, 288-289, 290-291, 300-301, 305, 308, 309, 313 TG: 273, 283
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: 50-51, 52-53, 54-55, 58-59, 60-61, 62-63, 66-67, 70-71, 80, 81, 82, 83, 84, 88 TG: 47A, 47B, 47G, 48, 49, 52A, 53A, 56, 57, 58A, 60A, 64, 65, 71A
Understand procedures for counting outcomes to determine probabilities.	SE: 52-53, 54-55, 66-67, 68-69, 70-71, 74, 75, 76, 77, 89, 90 TG: 52A, 54A, 56, 57, 72A, 73, 74A, 78A
Know how to conduct experiments and simulations and to compare results with mathematical expectations.	SE: 52-53, 54-55, 66-67, 70-71, 74-75, 76-77, 78-79, 89-91 TG: 48, 49, 64, 65, 67A, 72-73, 74A, 75A, 76A
Statistics	
Collect a random sample of data that represents a described population.	SE: 43 #11, 302 #17, #18
Organize and display data in appropriate forms <i>such as frequency tables, circle graphs, and stem-and-leaf plots.</i>	SE: 8-9, 28-29, 32-33, 43, 52-53, 74-75, 81, 89, 248-249, 266 TG: 8A, 9A, 24, 25, 28A, 49, 242, 243, 248A
Calculate and appropriately use range and measures of central tendency to describe data.	SE: 74-75, 76-77, 89, 90, 132 #16, 162-163, 177
Identify how statistics can be used to support different points of view.	SE: 6-7, 8-9, 10-11, 34, 35, 36, 50-51, 74-75, 80, 89 TG: 4, 5, 8A
Prediction and Inference	
Predict outcomes of experiments and simulations and compare the predictions to experimental results.	SE: 52-53, 54-55, 60-61, 66-67, 74-75, 78-79, 81, 84, 85, 89-91 TG: 47G, 52A, 56, 57, 64, 65, 72, 73, 74A
Understand and make inferences based on analysis of experimental results, statistical data, and simple graphical representations.	SE: 35 #1-#5, 43 #10, 52-53, 54-55, 76-77, 78-79, 89 TG: 48, 49, 54A

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1.5 Understand and apply concepts and procedures from algebraic sense.	
Patterns	
Recognize, extend, and create patterns and sequences.	SE: 39 #6, 86, 106-107, 112-113, 116-117, 120-121, 127, 204-205, 210-211, 220, 223 TG: 104, 107A, 112A, 114-115, 193
Represent and describe patterns with tables, graphs, and rule.	SE: 106-107, 108-109, 112-113, 127, 184-185, 186-187, 196-197, 198-199, 200-201, 204-205, 206-207, 208-209, 211, 213, 216, 219, 220, 222 TG: 181H, 184A, 186A, 192-193, 193B, 202, 203
Representations	
Represent equalities and inequalities symbolically using =, >, <, ≤, ≥.	SE: 184-185, 186-187, 188-189, 190-191, 213 TG: 182, 183, 183A, 186A, 187A, 215
Use variables to write simple expressions, equations, and inequalities, for example, $3x > 18$.	SE: 184-185, 186-187, 188-189, 190-191, 206-207, 208-209, 212, 213, 215, 221, 222 TG: 182, 183, 185A, 202, 207A, 208A
Operations	
Evaluate expressions and formulas.	SE: 188-189, 190-191, 214, 215, 232-233, 260 TG: 183, 202, 203
Solve single-variable equations.	SE: 204-205, 208-209, 220-222 TG: 202, 203
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: 106-107, 108-109, 112-113, 116-117, 120-121, 128, 129, 131, 133 TG: 104, 107A, 114-115
Develop and use a variety of strategies and approaches.	SE: 120-121, 122-123, 130, 134, 135, 199, 218, 236-237, 238-239, 244-245, 254-255, 261, 262, 264, 268, 300-301, 313 TG: 104, 115, 225H, 235, 243, 244A
Identify missing or extraneous information.	SE: 108-109, 112-113, 116-117, 122-123, 129, 131, 132, 135, 230-231, 232-233, 240-241, 249, 259, 260, 263 TG: 225E, 226, 227
Recognize the need to modify or abandon an unproductive approach.	SE: 108-109, 112-113, 116-117, 122-123, 129, 131, 132, 135, 228-229, 240-241, 248-249, 256-257, 258, 263, 266, 269 TG: 225E, 226, 227
2.2 Formulate questions and define the problem.	
Identify questions to be answered in new situations.	SE: 110-111, 112-113, 122-123, 130, 131, 135, 164-165, 166-167, 178, 179, 232-233, 236-237, 240-241, 260, 261, 236 #1-#5
Define problems in new situations.	SE: 108-109, 110-111, 122-123, 129 #18, 130 #18, 135, 263 #8-#10, 269 #7-#8, 304 #18, 306 #14, 308 #10

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Identify the known and unknown in new situations.	SE: 110-111, 112-113, 127 #16, #17, 128 #30, 130 #18, 131, 135 #11, 196-197, 217 #16, 228-229, 232-233, 236-237, 240-241, 258, 260, 261, 263 TG: 225E, 233A, 236A
2.3 Construct solutions.	
Organize relevant information from multiple sources.	SE: 74-75, 76-77, 78-79, 89-91, 122-123, 135 #11, 164-165, 166-167, 178, 179, 300-301, 302 #17, 313 TG: 225E, 225G, 225H
Select and use appropriate mathematical tools.	SE: 12-13, 18-19, 108-109, 129 #10, 236-237, 238-239, 240-241, 246-247, 252-253, 254-255, 261-263, 265, 267, 268 TG: 15, 137G, 225E, 225G, 225H, 235, 236A, 237A, 246A, 250, 251, 254A, 271G, 271H
Apply viable strategies and appropriate concepts and procedures to construct a solution.	SE: 120-121, 122-123, 130, 134, 135, 199, 218, 236-237, 238-239, 244-245, 254-255, 261, 262, 264, 268, 300-301, 313 TG: 104, 115, 225H, 235, 243, 244A
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: 6-7, 8-9, 28-29, 34, 35, 43, 188-189, 190-191, 198-199, 200-201, 214, 215, 218, 219, 230-231, 244-245, 246-247, 248-249, 259, 264-266 TG: 192, 193
Validate thinking and mathematical ideas using models, known facts, patterns, relationships, and counter-examples.	SE: 96-97, 98-99, 102-103, 108-109, 112-113, 124, 125, 127, 129, 131, 162-163, 164-165, 166-167, 177-179, 188-189, 198-199, 200-201, 214, 218, 219, 228-229, 236-237, 244-245, 246-247, 252-253, 258, 261, 264-266 TG: 95A, 181E, 192, 193
3.2 Predict results.	
Make conjectures based on analysis of new problem situations.	SE: 8-9, 10-11, 28-29, 35, 36, 43, 106-107, 128, 162-163, 164-165, 166-167, 177-179, 290-291, 296-297, 300-301, 307, 311, 313 TG: 93G, 290A, 300A
3.3 Draw conclusions and verify results.	
Test conjectures and explain why they are true or false.	SE: 62-63, 70-71, 74-75, 85, 88, 89, 125, 278-279, 280-281, 288-289, 290-291, 304, 305, 308, 309
Support arguments and justify results using evidence.	SE: 37 #12, 41 #9, 50-51, 62-63, 66-67, 80, 85, 86, 135 #11, 228-229, 230-231, 234-235, 236-237, 254-255, 256-257, 258, 259, 260, 261, 268, 269 TG: 226-227

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Check for reasonableness of results.	SE: 41 #9, 74-75, 89, 171 #13, 252-253, 254-255, 267, 268 TG: 226, 227
Reflect on and evaluate procedures and results in new problem situations.	SE: 122-123, 135, 198-199, 218, 236-237, 244-245, 254-255, 261, 264, 268 TG: 235, 244A
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: 28-29, 43, 76-77, 78-79, 90, 91, 169 #17, 240-241, 244-245, 263, 264 TG: 29A, 77A, 225E, 244A
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: 36 #13, 37 #12, 38 #16, 40 #16, 131 #26, #27, 130 #18, 212 #20, 263 #1-#5, 266 #10, 269 #7-#8, 300-301, 313
Choose appropriate available technology to browse, select, and retrieve relevant mathematical information from a variety of sources.	SE: 236-237, 240-241, 244-245, 261, 263, 264 TG: 225H
4.2 Organize and interpret information.	
Organize and clarify mathematical information by reflecting, verbalizing, discussing, or writing.	SE: 102-103, 110-111, 112-113, 116-117, 122-123, 127, 130-135, 190-191, 194-195, 196-197, 200-201, 206-207, 210-211, 215, 216, 217, 219, 221, 223, 238-239, 252-253, 254-255, 262, 267, 268, 305 #11 TG: 103A, 111A, 113A, 117A, 123A, 210A, 251A
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: 41 #9, 89 #9, 126 #11-#13, 135 #11, 184-185, 190-191, 198-199, 200-201, 212, 215, 218, 219 TG: 185A, 186A, 187A, 192, 193
Explain or represent mathematical ideas and information in ways appropriate for audience and purpose.	SE: 39 #6, 41 #9, 126 #11-#13, 135 #11, 215 #12, 258 #3, 263 #8-#10, 266 #10
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: 34-38, 44, 89 #4-#5, 140-141, 142-143, 150-151, 164-166, 168, 169, 172, 178, 259 #10, 266 #10, 309 #14, 310 #16
Relate and use different mathematical models and representations of the same situation.	SE: 188-189, 198-199, 200-201 TG: 192-193

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5.2 Relate mathematical concepts and procedures to other disciplines.	
Identify mathematical patterns and ideas in other disciplines.	SE: 39 #1, 89 #4-#8, 130 #18, 169 #17, 173 #17, 177 #13, 212 #20, 214 #13, 217 #16, 300-301, 310
Use mathematical thinking and modeling in other disciplines.	SE: 89 #4-#8, 130 #18, 169 #17, 173 #17, 175 #7, 212 #20, 213 #24, 217 #16, 310 #16
Describe examples of contributions to the development of mathematics <i>such as the contributions of women, men, and different cultures.</i>	SE: 130 #18, 134 #14, #15, 171 #13, 172 #7-#8, 173 #17, 304 #18, 306 #14, 312 #13
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: 34-38, 40, 43, 44, 88 #10, 91, 130 #18, 169 #17, 170 #10-#11, 176 #11, 178 #8, 212 #20, 213 #24, 258, 261, 263, 266, 269, 313
Investigate the use of mathematics within several occupations/careers of interest.	SE: 175 #8, 212 #20, 215, 313 #10 TG: 142A, 162A