



WASHINGTON
Essential Academic Learning Requirements—Mathematics
Benchmark 2—Grade 7
MathScape: Seeing and Thinking Mathematically
Course 1 © 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: 52-53, 54-55, 58-59, 62-63, 64-65, 66-67, 68-69, 76-77, 78-79, 80, 81, 83, 90, 91, 220-221, 224-225, 244-245, 269 #13, 270 TG: 49A, 49B, 50, 51, 52A, 54A, 60, 61, 62A, 68A, 70, 71, 221A, 224A, 242, 244A
Compare and order integers, fractions, and decimals.	SE: 108-109, 110-111, 112-113, 114-115, 210-211, 212-213, 214-215, 234-235, 238-239, 244-245, 246-247, 258-259, 266 #21, 270, 280 TG: 110A, 112A, 115A, 209A
Understand the concepts of prime and composite numbers, factors and multiples, and divisibility rules.	SE: 56-57, 66-67, 96-97, 98-99, 100-101, 104-105, 108-109, 142, 143, 144 TG: 94, 95, 97, 99A, 100A, 101A See <i>MathScape Course 2</i> © 2005 for divisibility. SE: 116-117, 132 TG: 114-115
Understand and apply the concepts of ratio and direct proportion.	SE: 236-237, 290-291, 300-301, 302-303, 306-307, 311, 316-319 TG: 106, 129, 237A, 277G, 278, 288, 300A
Computation	
Understand operations on nonnegative rational numbers.	SE: 118-119, 120-121, 122-123, 124-125, 126-127, 130-131, 132-133, 134-135, 136-137, 140-141, 151-156, 157-158, 159-161 TG: 117, 120A, 123A, 126A, 128, 132A, 136A
Add, subtract, multiply, and divide nonnegative fractions and decimals using rules for order of operation.	SE: 102-103, 104-105, 145, 146 TG: 95, 96
Use mental arithmetic, pencil and paper, calculator, or computer as appropriate to the task involving nonnegative rational numbers.	SE: 74-75, 98-99, 104-105, 112-113, 118-119, 120-121, 138-139, 142, 212-213, 216-217, 224-225, 226-227, 257, 260 #14, 264, 319 #1-#9 TG: 98A, 115A, 121A, 213A, 224A, 225A, 231A

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Estimation	
Identify situations involving nonnegative rational numbers in which estimation is sufficient and computation is not required.	SE: 134-135, 138-139, 158, 161, 216-217, 259, 260, 263 #26, 284-285, 286-287, 290-291 TG: 129, 134A, 139A, 219, 230
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: 134-135, 158, 216-217, 220-221, 236-237, 261, 262, 263 #22-#26, 265 #10-#12, 284-285 TG: 129, 219, 285A
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: 182-183, 201, 284-285, 294-295, 304-305, 306-307, 313, 314 TG: 182A, 288, 289, 295A
Measure objects and events directly or using indirect methods <i>such as calculating and applying procedures for determining perimeter, area, and volume.</i>	SE: 178-179, 182-183, 199, 201, 282-283, 284-285, 290-291, 294-295, 304-305, 306-307, 315, 318 #17, 319 #12 TG: 178A, 200, 201
Understand the concept of rate and how to calculate rates and determine units.	SE: 262 #18, 344-345, 362 TG: 344A, 345A
Approximation and Precision	
Understand that precision is related to the unit of measurement used and the calibration of the measurement tool.	SE: 89 #12, 178-179, 199, 280-281, 282-283, 286-287, 290-291, 292-293, 296-297, 304-305, 306-307, 313-315 TG: 292A, 293A, 296A
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: 182-183, 201, 282-283, 284-285, 287-288, 290-291, 292-293, 294-295, 296-297, 300-301, 302-303, 312, 319 TG: 282A, 284A, 285A, 291A, 295A
Systems and Tools	
Understand the appropriate uses of standard units of measurement for both direct and indirect measurement.	SE: 284-285, 286-287, 290-291, 292-293, 294-295, 296-297, 304-305, 310, 311, 313, 314, 315, 319 TG: 288, 289, 296A
Understand the relationship among units within both the U.S. and metric systems.	SE: 149 #21-#25, 256 #19-#20, 280-281, 282-283, 292-293, 296-297, 310, 311, 313, 315 TG: 277E, 292A, 296A
Select and use tools that will provide an appropriate degree of precision, <i>for example, using meters vs. kilometer.</i>	SE: 89 #12, 178-179, 199, 292-293, 296-297, 310, 314, 357 #9, 365 #8 TG: 292A, 293A

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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: 176-177, 178-179, 180-181, 190-191, 198, 199, 200 TG: 174, 175, 175A, 176A, 177A, 184, 185
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: 280-281, 282-283, 286-287, 290-291, 300-301, 302-303, 306-307, 309, 310 #17, 312, 316, 317
Understand symmetry, congruence, and similarity.	See <i>MathScape Course 1</i> © 2005 for similarity. SE: 282-283, 309, 290-291, 312 #17 See <i>MathScape Course 2</i> © 2005 for symmetry and congruence. SE: 274, 279, 288-289, 290-291, 304, 308, 309
Perform geometric constructions using a variety of tools and technologies <i>such as paper folding, computer software, straightedge, compass.</i>	SE: 166-167, 168-169, 176-177, 195, 198, 318 #18 TG: 163G, 164, 165, 166A
Locations and Transformations.	
Identify and describe location of objects on coordinate grids in any of the four quadrants.	SE: 340-341, 342-343, 360, 361 TG: 340A
Understand and apply simple geometric transformations using combinations of translations (slides), or reflections (flips), or rotations (turns).	SE: 168-169, 176-177, 318 #18 TG: 169A
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: 30-31, 32-33, 34-35, 45, 46, 47 TG: 28, 29, 30A
Understand procedures for counting outcomes to determine probabilities.	SE: 30-31, 32-33, 34-35, 45, 46, 47
Know how to conduct experiments and simulations and to compare results with mathematical expectations.	SE: 30-31, 32-33, 34-35, 45, 46, 47 TG: 3H, 28, 29
Statistics	
Collect a random sample of data that represents a described population.	SE: 8-9, 10-11, 18-19, 36, 38
Organize and display data in appropriate forms <i>such as frequency tables, circle graphs, and stem-and-leaf plots.</i>	SE: 6-7, 8-9, 10-11, 14-15, 16-17, 18-19, 22-23, 24-25, 26-27, 36, 38, 265 TG: 6A, 7A, 9A, 11A, 21
Calculate and appropriately use range and measures of central tendency to describe data.	SE: 6-7, 8-9, 10-11, 18-19, 22-23, 36-38, 42, 44 TG: 3A, 4, 5, 7A
Identify how statistics can be used to support different points of view.	SE: 8-9, 10-11, 14-15, 16-17, 18-19, 22-23, 24-25, 26-27, 36, 38, 40, 41 TG: 5, 11A, 12, 13, 14A, 21, 22A, 25A

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Prediction and Inference	
Predict outcomes of experiments and simulations and compare the predictions to experimental results.	SE: 30-31, 32-33, 24-25, 43 #6, 45, 46, 47 TG: 28, 29, 31A
Understand and make inferences based on analysis of experimental results, statistical data, and simple graphical representations.	SE: 30-31, 32-33, 24-25, 43 #6, 45, 46, 47 TG: 28, 29, 31A
1.5 Understand and apply concepts and procedures from algebraic sense.	
Patterns	
Recognize, extend, and create patterns and sequences.	SE: 56-57, 66-67, 81, 85, 86, 88, 200 #14, 324-325, 326-327, 328-329, 332-333, 334-335, 336-337, 342-343, 344-345, 348-349, 350-351, 354-355, 357, 358, 362, 363, 364 TG: 321E, 321H, 322, 323, 326A, 330, 331, 345A, 346, 347, 349A
Represent and describe patterns with tables, graphs, and rule.	SE: 324-325, 326-327, 328-329, 332-333, 334-335, 336-337, 344-345, 348-349, 350-351, 352-353, 354, 359, 362, 363, 365 TG: 321H, 322, 323, 324A, 327A, 330, 331, 333A, 338, 339, 344A, 346-347, 349A, 350A
Representations	
Represent equalities and inequalities symbolically using =, >, <, ≤, ≥.	SE: 110-111, 112-113, 148, 149, 216-217, 258, 270 TG: 111A, 112A, 217A
Use variables to write simple expressions, equations, and inequalities, for example, $3x > 18$.	SE: 273 #21, 332-333, 334-335, 357, 358 TG: 332A, 334A
Operations	
Evaluate expressions and formulas.	SE: 228-229, 264, 334-335, 357 #9, 359 #9
Solve single-variable equations.	SE: 332-333, 357 #9, 358, 359 #9
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: 324-325, 326-327, 328-329, 350-351, 352-353, 354, 355, 356, 364, 365 TG: 321E, 321H, 322, 323, 350A
Develop and use a variety of strategies and approaches.	SE: 200 #14, 324-325, 326-327, 328-329, 332-333, 334-335, 342-343, 344-345, 348-349, 350, 354, 356, 361, 363, 365 TG: 322, 323, 330, 331, 333A, 338, 339, 342A, 343A, 346, 347, 348A
Identify missing or extraneous information.	SE: 6-7, 10-11, 18-19, 26-27, 36, 38, 39, 41 #8, 43 #6, 240, 269, 364 #12, 365 #8 TG: 3G, 5, 18A, 19A
Recognize the need to modify or abandon an unproductive approach.	SE: 6-7, 10-11, 18-19, 26-27, 36, 38, 39 #10, 240, 269, 365 #8 TG: 7A, 11A, 18A

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2.2 Formulate questions and define the problem.	
Identify questions to be answered in new situations.	SE: 6-7, 8-9, 10-11, 18-19, 36-38, 41, 143 #25, 324-325, 328-329, 342-343, 348-349, 352-353, 357 #9, 358 #20, 359 #10 TG: 7A, 11A, 19A, 348A, 352A
Define problems in new situations.	SE: 6-7, 10-11, 18-19, 22-23, 26-27, 36, 38, 39 #10, 41, 44, 324-325, 328-329, 342-343, 348-349, 352-353, 358 #20, 359 #10 TG: 7A, 11A, 19A, 27A, 348A
Identify the known and unknown in new situations.	SE: 6-7, 10-11, 18-19, 22-23, 24-25, 26-27, 36, 38, 41-44, 324-325, 328-329, 332-333, 342-343, 348-349, 352-353, 357 #9, 358 #20, 359 #10 TG: 7A, 11A, 19A, 22A, 26A, 348A
2.3 Construct solutions.	
Organize relevant information from multiple sources.	SE: 8-9, 10-11, 16-17, 18-19, 37, 38, 40, 41 TG: 3G, 16A, 20, 21
Select and use appropriate mathematical tools.	SE: 6-7, 10-11, 14-15, 36, 38, 39, 42, 43, 62-63, 84, 166-167, 168-169, 170-171, 172-173, 195 #12, 290-291, 312 #17, 318 #1-#10, 350-351 TG: 3G, 3H, 12, 13, 14A, 93G, 163G, 163H, 277G, 277H
Apply viable strategies and appropriate concepts and procedures to construct a solution.	SE: 6-7, 10-11, 14-15, 22-23, 26-27, 34-35, 36, 38, 39, 42, 43 #6, 45, 102-103, 104-105, 145, 146, 216-217, 236-237, 259, 267, 324-325, 326-327, 328-329, 348-349, 354-356, 363 TG: 20, 21, 321H, 325A, 326A
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: 8-9, 10-11, 26-27, 37, 38, 42 #9, 44, 52-53, 56-57, 62-63, 80, 82, 84, 87 #17, 91 #17, 312 #17, 313 #20 TG: 8A, 52A
Validate thinking and mathematical ideas using models, known facts, patterns, relationships, and counter-examples.	SE: 81 #14, 85 #11, 91 #17, 142 #11-#16, 143 #25, 256 #20, 257 #26, 313 #17, 354 #17, 359 #11, 365 #8
3.2 Predict results.	
Make conjectures based on analysis of new problem situations.	SE: 30-31, 32-33, 43 #6, 46 #12, 143 #25, 144 #26-#33, 155 #17, 159 #21, 180-181, 182-183, 186-187, 194 #14, 196 #7, 200 #14

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3.3 Draw conclusions and verify results.	
Test conjectures and explain why they are true or false.	SE: 30-31, 32-33, 39 #10, 46 #12, 47 #8, 132-133, 143 #25, 144 #26-#33, 146 #17, 159 #21, 180-181, 200 #14
Support arguments and justify results using evidence.	SE: 214-215, 216-217, 222-223, 224-225, 260 #13, 262 #23, 296-297, 302-303, 364 #12 TG: 225A, 303A
Check for reasonableness of results.	SE: 39 #10, 43 #6, 46 #12, 47 #8, 196 #7, 263 #26, 266 #20, 268 #31, 269 #12, 365 #18
Reflect on and evaluate procedures and results in new problem situations.	SE: 43 #6, 46 #12, 47 #8, 81 #13, 83 #14, #15, 146 #17, 159 #21, 199 #8, 204 #10, 363 #15
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: 6-7, 8-9, 10-11, 18-19, 104-105, 120-121, 126-127, 143 #25, 146 #17, 263 #25, 363 #15 TG: 6A, 9A, 104A
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: 110-111, 118-119, 148 #19, 257 #26, 263 #25, 269 #13, 274 #19, 280-281, 290-291, 292-293 TG: 164, 165, 280A, 290A, 292A
Choose appropriate available technology to browse, select, and retrieve relevant mathematical information from a variety of sources.	SE: 264 #30 TG: 3G, 3H, 93G, 93H, 163G, 163H, 207G, 207H, 277H, 321H
4.2 Organize and interpret information.	
Organize and clarify mathematical information by reflecting, verbalizing, discussing, or writing.	SE: 14-15, 16-17, 24-25, 26-27, 41 #8, 166-167, 168-169, 170-171, 172-173, 204 #10, 269 #13, 274 #19 TG: 25A, 26A, 171A, 174-175
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: 22-23, 24-25, 38 #7, 43 #12, 146 #17, 166-167, 168-169, 170-171, 201 #5, 204 #10, 267 #27-#30, 268 #31, 296-297, 302-303, 312 #17 TG: 12, 13, 22A, 24A, 164-165, 171A, 174-175, 297A
Explain or represent mathematical ideas and information in ways appropriate for audience and purpose.	SE: 22-23, 24-25, 38 #7, 43 #12, 166-167, 168-169, 170-171, 172-173, 201 #5, 204 #10, 244-245, 262 #23, 312 #17 TG: 12-13, 164-165, 171A, 174, 175, 244A

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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: 39 #10, 89 #12, 147 #17, 148 #19, 154 #26, 157 #16, 199 #8, 310 #17, 312 #17, 315 #15, 365 #18 TG: 97A, 98A
Relate and use different mathematical models and representations of the same situation.	SE: 41 #7, 42 #1, 43 #1-#3, 96-97, 98-99, 108-109, 110-111, 130-131, 140-141, 205 #11, 257 #25, 269 #13, 359 #11 TG: 93E, 97A, 98A, 109A, 130A
5.2 Relate mathematical concepts and procedures to other disciplines.	
Identify mathematical patterns and ideas in other disciplines.	SE: 144 #26-#33, 147 #17, 267 #27-#30, 318 #18, 354 #7
Use mathematical thinking and modeling in other disciplines.	SE: 42 #7-#8, 144 #26-#33, 147 #17, 158 #23, 309 #18
Describe examples of contributions to the development of mathematics <i>such as the contributions of women, men, and different cultures.</i>	SE: 62-63, 84, 89 #11, 144 #26-#33, 151 #21, 354 #7
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: 39 #9-#10, 89 #12, 157 #16, 158 #23, 312 #18, 354 #7
Investigate the use of mathematics within several occupations/careers of interest.	SE: 157 #16