



WASHINGTON
Essential Academic Learning Requirements—Mathematics
Benchmark 3—Grade 10
Impact Mathematics: Algebra and More Course 3 © 2005

STANDARDS	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	
Understand and use properties and symbolic representations of rational numbers, powers, and roots.	SE: 150 #6, 220 #8, 403-406, 411-413, 414-416, 421-423 TG: SA T405, T412 SS T406, T417
Compare and order rational numbers, powers, and roots.	SE: 224 #19 <i>Remember</i> 118, 227 TG: D T151
Understand concepts of and use processes involving prime and composite numbers, factors and multiples, and divisibility.	SE: 312 #12
Understand and apply the concepts of ratio and both direct and inverse proportion.	SE: 6-9, 206 #58, 207 #60, 330-333 TG: AL T333
Computation	
Understand operations on rational numbers, powers, and roots.	SE: 146-148, 149-152, 154-155 TG: SS T149
Compute with rational numbers, powers, and roots.	SE: 150 #6, 220 #8, 403-406, 411-413, 414-416, 421-423 TG: SA T405, T412 SS T406, T417
Use mental arithmetic, pencil and paper, calculator, or computer as appropriate to the task involving real numbers.	SE: 201 #1-#3, 203 #28-#33, 207 #61-#64, 211 #13-#24, 240, 242 #2, 248 #3, 501 #4
Estimation	
Identify situations involving rational numbers, powers, and roots in which estimation is sufficient and computation is not required.	SE: 201 #3
Use estimation to predict computation results and to determine the reasonableness of answers involving real numbers, <i>for example, estimating.</i>	SE: 201, 247 #2, 248 #3, 250 #7, 501 #4

STANDARDS	PAGE REFERENCES
1.2 Understand and apply concepts and procedures from measurement.	
Attributes and Dimensions	
Understand how changes in dimension affect perimeter, area, and volume.	SE: 500 #2
Measure objects and events directly or use indirect methods such as finding the volume of a cone given its height and diameter.	SE: 62-63, 72, 255 #23-#24, 502-503, 512 #35
Calculate rate and other derived and indirect measurements.	SE: 6-9, 206 #58, 207 #60, 330-333 TG: AL T333
Approximation and Precision	
Understand precision and accuracy of measurement are affected by measurement tools and calculating procedures.	This objective can be met in Glencoe's <i>Impact Mathematics: Algebra and More Course 2</i> © 2004 on pages 98-99.
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: 201, 247 #2, 248 #3, 250 #7, 501 #4
Systems and Tools	
Understand the benefits of standard units of measurement and the advantages of the metric system.	SE: 441 #35
Compare, contrast, and use both the U.S. system and metric system.	SE: 441 #35
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>	This objective can be met in Glencoe's <i>Impact Mathematics: Algebra and More Course 2</i> © 2004 on pages 98-99.
1.3. Understand and apply concepts and procedures from geometric sense—properties and relationships and locations and transformations.	
Properties and Relationships	
Use geometric properties and relationships to compare, contrast, describe, and classify 2- and 3-dimensional geometric figures.	SE: 76 #1-#4, 77 #5-#6, 290 #1, 291 #2, 297 #1-#4, 299 #13, 465 #36 <i>Just the Facts</i> 77 <i>Remember</i> 311
Construct geometric models and scale drawings using tools as appropriate, <i>for example, building a model of a bridge.</i>	SE: 331-333, 335 #6, 337 #11 TG: AL T333
Understand and use properties of symmetry, congruence, and similarity.	SE: 302-304, 305-306, 309-311 TG: AL T304
Perform complex geometric constructions using a variety of tools and technologies <i>such as paper folding, computer software, straightedge, compass.</i>	This objective can be met in Glencoe's <i>Impact Mathematics: Algebra and More Course 2</i> © 2004 on pages 467 and 516.

STANDARDS	PAGE REFERENCES
Locations and Transformations	
Understand and use coordinate grids.	SE: 660-662, 663-666, 677 #21 <i>Share & Summarize</i> 670
Understand and apply multiple geometric transformations using combinations of translations, reflections, and/or rotations.	SE: 288-291, 292-294, 295-296, 297-301, 302-304, 305-306, 307-308, 309-312, 313-315, 316-318
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 met in Glencoe's <i>Impact Mathematics: Algebra and More Course 3</i> © 2004 on pages 396-397.
Understand and use appropriate counting procedures to determine probabilities.	SE: 545-546, 547-549, 550-553, 554-557, 558-563 TG: AL T546 AM T549 SA T545, T553 TD T551
Use both experimental and theoretical methods to determine probabilities.	SE: 372 #46, 482 #25, 582-584, 585-586
Statistics	
Collect data using appropriate methods and technology.	SE: <i>Think & Discuss</i> 51
Organize and display data in appropriate forms <i>such as tables, graphs, scatter plots, and box and whisker plots.</i>	SE: 51-55, 66 #13, 352 #18, 410 #36, 537 #60, 570 #6, 603 #1, 605-607, 618 #6, 629 #19, 632 #1
Calculate and use the different measures of central tendency, variability, and range as appropriate to describe data.	SE: 45 #46b, 53 #2a, 388 #20, 537 #60 <i>Remember</i> 45, 53
Use statistics to support different points of view, <i>for example, in a debate or a position paper.</i>	SE: 575 #6b, 587-589
Prediction and Inference	
Predict outcomes and design and conduct experiments to verify or disprove predictions.	SE: 550-554, 565-568, 571-572, 582-586, 606 #1-#4, 608-612
Understand and make inferences based on the analysis of experimental results, statistical data, and graphical representations.	SE: 51-55, 66 #13, 352 #18, 410 #36, 537 #60, 570 #6, 603 #1, 605-607, 618 #6, 629 #19, 632 #1
1.5 Understand and apply concepts and procedures from algebraic sense.	
Patterns	
Recognize, extend, and create complex patterns and sequences.	SE: 51-55, 61 #27, 62 #28, 74-75, 76-77, 78-79 TG: SA T77
Generalize and express rules describing patterns and sequences.	SE: 51-55, 61 #27, 62 #28, 74-75, 76-77, 78-79 TG: SA T77

STANDARDS	PAGE REFERENCES
Representations	
Translate among tabular, symbolic, and graphical representations of relations using =, ≠, >, <, ≥, ≤.	SE: 51-55, 61 #27, 62 #28, 74-75, 76-77, 78-79 TG: SA T77
Use variables to write expressions, equations, and inequalities.	SE: 358-361, 362-365, 368-369, 629 #23-#25 TG: SA T360, 361, 363 T T365
Operations	
Simplify and evaluate expressions and formulas.	SE: 51-55, 61 #27, 62 #28, 74-75, 76-77, 78-79 TG: SA T77
Solve equations and inequalities.	SE: 217-218, 223 #1-#9, 225 #22 <i>Think & Discuss</i> 216 TG: TD T216
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 complex situations.	SE: 51-55, 61 #27, 62 #28, 74-75, 76-77, 78-79 <i>Explore</i> 146 TG: SA T77
Use multiple strategies.	SE: 501 #4
Identify what information is missing or extraneous and compensate for it.	TG: xxvii
Analyze an unproductive approach and attempt to modify it or try a new approach.	SE: 501 #4
2.2 Formulate questions and define the problem.	
Identify questions to be answered in complex situations.	SE: 6 #2
Define problems in complex situations.	SE: 6 #2
Identify the information that is known and unknown in complex situations.	SE: 501 #4
2.3 Construct solutions.	
Organize and synthesize information from multiple sources.	This objective can be met in Glencoe's <i>Impact Mathematics: Algebra and More Course 2</i> © 2004 on pages 312-313.
Select and use appropriate mathematical tools.	SE: 201 #1-#3, 203 #28-#33, 207 #61-#64, 211 #13-#24, 240, 242 #2, 248 #3, 501 #4
Apply viable strategies and appropriate concepts and procedures to construct a solution.	SE: 501 #4
3. The student uses mathematical reasoning. To meet this standard, the student will:	
3.1 Analyze information.	
Compare, contrast, interpret and integrate information from multiple sources.	SE: <i>Think & Discuss</i> 51
Validate thinking and mathematical ideas using models, known facts, patterns, relationships, counter-examples, and proportional reasoning.	SE: 44 #40, 127-130, 131-133, 135-137, 143 #25

STANDARDS	PAGE REFERENCES
3.2 Predict results.	
Make and explain conjectures based on analysis of problem situations.	SE: 44 #40, 127-130, 131-133, 135-137, 143 #25
3.3 Draw conclusions and verify results.	
Test conjectures by formulating a proof or by constructing a counterexample.	SE: 44 #40, 127-130, 131-133, 135-137, 143 #25 <i>Remember</i> 147, 380
Support arguments and justify results using inductive and deductive reasoning.	SE: 44 #40, 127-130, 131-133, 135-137, 143 #25
Check for reasonableness of results.	SE: 201, 247 #2, 248 #3, 250 #7, 501 #4
Reflect on and evaluate procedures and results and make necessary revisions.	SE: 501 #4
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 or select and follow an efficient system for collecting information.	SE: <i>Think & Discuss</i> 51
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>	This objective can be met in Glencoe's <i>Impact Mathematics: Algebra and More Course 2</i> © 2004 on pages 312-313.
Integrate the use of a variety of available technologies to browse, select, and retrieve mathematical information from multiple sources.	This objective can be met in Glencoe's <i>Impact Mathematics: Algebra and More Course 2</i> © 2004 on pages 386-391.
4.2 Organize and interpret information.	
Organize, clarify, and refine mathematical information in multiple ways—reflecting, verbalizing, discussing, or writing.	SE: 8 #5 <i>Share & Summarize</i> 375, 378, 383, 392, 395 <i>Think & Discuss</i> 373, 381, 403, 417
4.3 Represent and share information.	
Express complex ideas and situations using mathematical language and notation in appropriate and efficient forms.	SE: 8 #5 <i>Share & Summarize</i> 375, 378, 383, 392, 395 <i>Think & Discuss</i> 373, 381, 403, 417
Explain or represent complex mathematical ideas and information in ways appropriate for audience and purpose.	SE: 8 #5 <i>Share & Summarize</i> 375, 378, 383, 392, 395 <i>Think & Discuss</i> 373, 381, 403, 417

STANDARDS	PAGE REFERENCES
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 multiple mathematical content strands.	SE: 488-491, 492-496, 504-505, 510 #23-#25
Relate and use multiple equivalent mathematical models and representations.	SE: 488-491, 492-496, 504-505, 510 #23-#25
5.2 Relate mathematical concepts and procedures to other disciplines.	
Extend mathematical patterns and ideas to other disciplines.	SE: 41 #29, 58-59 #15, 81 #9, 167 #56, 186-187, 389 #63, 423 #26, 508 #18, 512 #35, 626-627
Apply mathematical thinking and modeling in other disciplines.	SE: 41 #29, 58-59 #15, 81 #9, 167 #56, 186-187, 389 #63, 423 #26, 508 #18, 512 #35, 626-627
Describe examples of contributions to the development of mathematics <i>such as the contributions of women, men, and different cultures.</i>	SE: 469 #26 <i>Just the Facts</i> 137, 478, 623
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: 41 #29, 101 #13, 166 #50, 189 #32, 337 #12, 651 #28
Investigate the mathematical knowledge and training requirements for occupational/career areas of interest.	SE: 41 #29, 58-59 #15, 167 #56, 455

Codes Used for TG Pages

AL	Access for All Learners
AM	About the Mathematics
D	Develop
SA	On the Spot Assessment
SS	Share & Summarize
T	Troubleshooting
TD	Think and Discuss