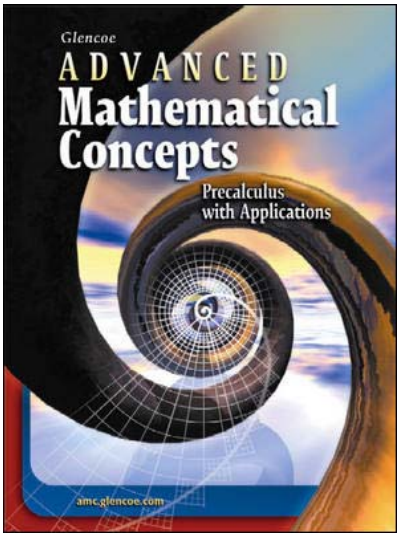
Mathematics Academic Standards
Grades 11-12

Minnesota



ADVANCED Mathematical Concepts

Precalculus
with Applications
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STANDARDS	PAGE REFERENCES
I. STATISTICS	
Standard: Use tables of the normal distribution and properties of that distribution to make judgments about populations based on random samples from these populations.	
1. Use the concept of normal distribution and its properties to answer questions about sets of data.	**Student Edition:** 918-925, 932 #34, 935 #23-#28, 937 #42 *Graphing Calculator Exploration* 926 **Teacher Wraparound Edition:** A 925, 926; EC 925; F 927; MTL 919, 926 **Teacher Resources:** *Enrichment* 925 *Study Guide and Practice* 618-619
2. Describe and use sampling distributions and the central limit theorem. Calculate confidence intervals when appropriate.	This standard is outside the scope of this text. However, it can be met during teacher/class discussion.
3. Understand the importance of appropriate sampling methods. For instance, the time of day of a survey could lead to inaccuracies in the outcome.	**Student Edition:** 927-932, 936 #29-#40 **Teacher Wraparound Edition:** A 932; AIN 929; EC 932; ICE 928, 929 **Teacher Resources:** *Study Guide and Practice* 621-622

Codes used for Teacher Wraparound Edition pages are the initial caps of headings on that page.

STANDARDS	PAGE REFERENCES
II. ALGEBRA	
Standard: Demonstrate facility with a wide range of algebraic operations and use the relationship between coordinate geometry and algebraic equations to solve real-world and mathematical problems.	
1. Solve systems of two, three or more simultaneous linear equations or inequalities, in particular, deciding whether a given system of equations has one solution, no solution or infinitely many solutions and, in this latter case, describing them parametrically.	**Student Edition:** 67-72, 73-77, 86 #55, 96 #36, 104 #55, 120 #17-#19 **Teacher Wraparound Edition:** A 72, 77; AIN 69, 75; EC 72, 76; ICE 74, 75 **Teacher Resources:** *Study Guide and Practice* 45-46, 48-49
2. Solve problems with quadratic functions and equations, where some of the coefficients may be expressed in terms of parameters.	**Student Edition:** 213-221, 228 #46, 235 #3, 236-242, 653-661, 662-669 **Teacher Wraparound Edition:** A 221, 661; AIN 657; FTC 214, 655; ICE 214, 656 **Teacher Resources:** *Study Guide and Practice* 134-135, 429-430
3. Perform the four arithmetic operations with polynomials, except that division is restricted to division by monomials and linear binomials.	**Student Edition:** 183 ex 3, 184 ex 4, 223 ex 1, 224 ex 2, 226 #5-#6, 227 #28, 235 #5, 250 #48, 268 #22-#25 **Teacher Wraparound Edition:** A 228; AIN 184; ICE 183, 184, 224 **Teacher Resources:** *Study Guide and Practice* 105-106, 137-138
4. Simplify a wide variety of algebraic expressions, including those in which numerator or denominator needs to be rationalized.	**Student Edition:** 229-235, 242 #39, 248 #37, 269 #26-#33, 271 #58, 582 ex 5, 583 #25-#27, 609 #41, 718-725, 735 #5-#8 **Teacher Wraparound Edition:** A 235; ICE 230, 719
5. Apply the laws of exponents to perform operations on expressions with fractional exponents.	**Student Edition:** 695-703, 716 #18, 717 #3-#5, 750 #19-#20, 753 #1 **Teacher Wraparound Edition:** A 703; EC 702; FTC 699; ICE 697, 698, 699; TT 697 *Chapter 11 Test* #1-#2 A66 **Teacher Resources:** *Enrichment* 463 *Study Guide and Practice* 461-462

STANDARDS	PAGE REFERENCES
6. Know the numeric, graphic and symbolic properties of power, logarithmic and exponential functions.	**Student Edition:** 137-145, 151 #46, 159-168, 171-179, 180-188, 704-711, 718-725 **Teacher Wraparound Edition:** A 145; EC 168; FTC 139; GCE 704; ICE 138, 140 **Teacher Resources:** *Study Guide and Practice* 464-465, 470-471
7. Solve a wide variety of mathematical and real-world problems involving power, exponential and logarithmic functions and equations, discard extraneous solutions and present results graphically.	**Student Edition:** 86 #64, 213-221, 228 #46, 235 #3, 243-250, 740-748 **Teacher Wraparound Edition:** A 748; EC 748; FTC 214; ICE 215, 216, 218, 741, 743 **Teacher Resources:** *Study Guide and Practice* 479-480
8. Know the numeric, graphic and symbolic properties of rational functions.	**Student Edition:** 180-188, 196 #42, 200 #48-#51, 212 #57 **Teacher Wraparound Edition:** A 188; EC 188; ICE 181, 182, 183, 185 **Teacher Resources:** *Enrichment* 107 *Study Guide and Practice* 105-106
9. Solve a wide variety of mathematical and real-world problems involving rational functions, discard extraneous solutions and present results graphically.	**Student Edition:** 243-250, 257 #43, 270 #44-#48, 283 #69 **Teacher Wraparound Edition:** A 252; AIN 246; EC 250; ICE 244; TT 245, 246 **Teacher Resources:** *Study Guide and Practice* 146-147
10. Factor polynomials representing the difference of squares, perfect square trinomials and quadratics with rational factors.	**Student Edition:** 202, 203 #1, 210 #9, 214 ex 1, 217, 218 ex 5, 219 #9, 220 #31
11. Make sketches including axes, centers, asymptotes, vertices of parabola, ellipses (including circles) and hyperbolas with axes parallel to the coordinate axes, given their equations, and completing the square if necessary.	**Student Edition:** 631-641, 642-652, 653-661 **Teacher Wraparound Edition:** A 641; AIN 632, 644; EC 651; F 642; ICE 634, 635, 646, 649, 656 **Teacher Resources:** *Study Guide and Practice* 423-424, 426-427

STANDARDS	PAGE REFERENCES
12. Find equations of parabolas, ellipses and hyperbolas when presented with their graphs having axes parallel to the coordinate axes.	**Student Edition:** 631-641, 642-652, 653-661 **Teacher Wraparound Edition:** A 641; AIN 632, 644; EC 651; F 642; ICE 634, 635, 646, 649, 656 **Teacher Resources:** *Study Guide and Practice* 423-424, 426-427
13. Add, subtract, multiply and divide complex numbers, interpret sums geometrically, and find complex solutions of quadratic equations.	**Student Edition:** 580-585, 591 #51, 593-598, 606 #41, 609 #36-#42, 611 #1, 621 #38 **Teacher Wraparound Edition:** A 585, 598; EC 583, 597; F 586; ICE 581, 594, 595; TT 581 **Teacher Resources:** *Study Guide and Practice* 379-380, 385-386
14. Know and use the Factor and Remainder Theorems.	**Student Edition:** 222-228, 235 #6, 250 #48, 268 #22-#25 **Teacher Wraparound Edition:** F 229; ICE 224, 225 **Teacher Resources:** *Study Guide and Practice* 137-138
15. Find the inverse of a function and the composition of functions by numeric and symbolic methods. Know the relationship between the graphs of a function and its inverse.	**Student Edition:** 13-19, 152-158, 168 #40, 188 #49, 196 #43, 198 #29-#34 **Teacher Wraparound Edition:** A 158; AIN 154; EC 158; FTC 155; ICE 154, 155; MTL 152; TT 153 **Teacher Resources:** *Study Guide and Practice* 4-5, 96-97
16. Know and use formal notation for sequences and series to solve related problems.	**Student Edition:** 759-765, 766-773, 774-783, 794-800 **Teacher Wraparound Edition:** A 783, 785, 800; EC 764, 773, 799; ICE 760 **Teacher Resources:** *Study Guide and Practice* 509-510, 512-513, 521-522

STANDARDS	PAGE REFERENCES
III. TRIGONOMETRY & GEOMETRY	
Standard: Understand the properties of the standard trigonometric functions and apply them to real-world and mathematical problems, especially geometrical problems. Develop increased mastery of geometric proof methodology.	
1. Know the six trigonometric functions defined for an angle in a right triangle.	**Student Edition:** 284-290, 298 #50, 304 #32, 305-312, 336 #23-#26, 337 #37-#39 **Teacher Wraparound Edition:** A 290; AIN 308; EC 290; F 291; ICE 285, 286 **Teacher Resources:** *Study Guide and Practice* 184-185, 193-194
2. Given the coordinates of a point on the terminal side of an angle in standard position in the xy-plane, find the values of the trigonometric functions.	**Student Edition:** 291-298, 304 #31, 337 #27-#36 **Teacher Wraparound Edition:** A 298; EC 298; F 299; ICE 292, 293, 204, 295; TT 293 **Teacher Resources:** *Study Guide and Practice* 187-188
3. Convert between degrees and radian measures.	**Student Edition:** 343-351, 366 #58, 377 #1, 414 #11-#16 **Teacher Wraparound Edition:** EC 351; FTC 345; ICE 344, 346; TT 344 **Teacher Resources:** *Study Guide and Practice* 379-380, 385-386
4. Solve applied problems about triangles using the law of sines including the ambiguous case.	**Student Edition:** 313-318, 320-326 **Teacher Wraparound Edition:** A 318, 326; AIN 315; EC 317, 326; F 320; ICE 314, 315, 321, 323; TT 322 **Teacher Resources:** *Study Guide and Practice* 196-197, 199-200
5. Solve applied problems about triangles using the law of cosines.	**Student Edition:** 327-332, 338 #55-#58, 339 #60 **Teacher Wraparound Edition:** A 332; AIN 321; FTC 328; ICE 328, 329, 330 **Teacher Resources:** *Enrichment* 204 *Study Guide and Practice* 202-203

STANDARDS	PAGE REFERENCES
6. Graph the functions of the form Asin (Bt + C), Acos (Bt + C), and Atan (Bt + C) and know the meaning of the terms frequency, amplitude, phase shift and period.	**Student Edition:** 359-366, 368-377, 378-386, 395-403 **Teacher Wraparound Edition:** A 366, 377; EC 365, 376; F 405; ICE 360, 362, 369, 370 **Teacher Resources:** *Study Guide and Practice* 231-232, 234-235
7. Simplify trigonometric expressions using identities and verify simple trigonometric identities including $\sin^2 x + \cos^2 x = 1$, sum, difference, double angle and half-angle formulas for sine and cosine.	**Student Edition:** 421-430, 431-436, 437-445 **Teacher Wraparound Edition:** A 430, 437; AIN 426; EC 429, 436, 445; ICE 422, 426, 432, 433, 441 **Teacher Resources:** *Study Guide and Practice* 275-277, 278-279
8. Find all the solutions of a trigonometric equation on various intervals.	**Student Edition:** 456-461, 469 #38, 479 #34-#39 **Teacher Wraparound Edition:** EC 461; ICE 457, 458 **Teacher Resources:** *Study Guide and Practice* 287-288
9. Know and be able to use the definitions of the inverse trigonometric functions and related methods to solve problems such as find cos(x) and tan(x) given the value of sin x and the quadrant containing the terminal side.	**Student Edition:** 405-412, 416 #43-#49, 429 #60, 444 #51 **Teacher Wraparound Edition:** A 412; AIN 409; ICE 407; TT 407 **Teacher Resources:** *Study Guide and Practice* 246-247