



Precalculus

© 2011

STANDARDS

PAGE REFERENCES

The main goal of Precalculus is for students to gain a deep understanding of the fundamental concepts and relationships of functions. Students will expand their knowledge of quadratic, exponential, and logarithmic functions to include power, polynomial, rational, piece-wise, and trigonometric functions. Students will investigate and explore mathematical ideas, develop multiple strategies for analyzing complex situations, and use graphing calculators and mathematical software to build understanding, make connections between representations, and provide support in solving problems. Students will analyze various representations of functions, sequences, and series. Students will analyze bivariate data and data distributions. Students will apply mathematical skills and make meaningful connections to life's experiences. Precalculus is highly recommended preparation for students who plan to continue their formal education beyond high school.

Standard I: Students will use the language and operations of algebra to evaluate, analyze and solve problems.

Objective 1: Compute with matrices and use matrices to solve problems.

a. Represent real-world situations with matrices.

Student Edition:

P26 ex 6, P27 #45, 368 ex 4, 372 #15, 373 #49,
377 ex 2, 383 #9-#10, 384 #54, 389 ex 2,
392 #9-#10, 393 #35-#36, 397 #15

Graphing Technology Lab 395-396

Teacher Wraparound Edition:

A 396; AE P26, 368, 377, 389; T 395

STANDARDS	PAGE REFERENCES
<p>b. Add, subtract, and multiply (including scalar multiplication) matrices using paper and pencil, and computer programs or calculators.</p>	<p>Student Edition: P2 #39-#44, P23-P27, P38 #39-#41, 375, 376 ex 1, 377 ex 2, 383 #1-#8, 385 #57-#60, 394 #54-#55, 397 #9-#10, 412 #54, 414 #23-#26, 417 #6-#7</p> <p><i>Technology Tip</i> 374</p> <p>Teacher Wraparound Edition: A P27; AE P23, P24, P25, 376; F 377; TWT P24</p>
<p>c. Demonstrate that matrix multiplication is associative and distributive, but not commutative.</p>	<p>Student Edition: 376, 385 #71-#75, 394 #54-#55, 397 #9-#10, 417 #6-#7</p> <p><i>Key Concept</i> 377</p> <p>Teacher Wraparound Edition: F 377</p>
<p>d. Determine additive and multiplicative identities and inverses of a matrix when they exist.</p>	<p>Student Edition: 378-379, 380 ex 5, 381 ex 6, 383 #19-#34, 385 #66, 397 #11-#14, 414 #27-#30</p> <p><i>Reading Math</i> 378, 379</p> <p><i>Study Tip</i> 379</p> <p><i>Technology Tip</i> 380</p> <p>Teacher Wraparound Edition: AE 379, 380, 382; TWT 381</p>
<p>e. Solve systems of linear equations with up to three variables using matrices.</p>	<p>Student Edition: 378 ex 3, 383 #11-#18, 386 #79-#81, 388-394, 397 #19-#20, 404 #56-#58, 412 #54, 415 #31-#36, 417 #13-#14</p> <p>Teacher Wraparound Edition: A 386; AE 378, 389, 390, 391; DI 382, 391, 394; F 389; TNT 378</p>
<p>Objective 2: Analyze the behavior of sequences and series.</p>	
<p>a. Describe a sequence as a function where the domain is the set of natural numbers.</p>	<p>Student Edition: 590 ex 1, 591 ex 2, 636-643, 648 #42-#43</p> <p><i>Study Tip</i> 591</p> <p>Teacher Wraparound Edition: AE 591, 637; DI 641; T 591; TWT 638</p>

STANDARDS	PAGE REFERENCES
b. Represent sequences and series using various notations.	<p>Student Edition: 590-597, 599-607, 608-617, 620 #15-#18, 627 #61-#63, 646 #11-#16, 673 #42-#44, 694 #31-#33</p> <p><i>Reading Math</i> 594 <i>Study Tip</i> 591</p> <p>Teacher Wraparound Edition: AE 591, 600; DI 592, 601, 604, 607; T 591, 599</p>
c. Identify arithmetic and geometric sequences and series.	<p>Student Edition: 599-607, 608-617, 620 #15-#18, 646 #17-#28</p> <p><i>Study Tip</i> 603 <i>Watch Out</i> 609</p> <p>Teacher Wraparound Edition: A 618; F 600</p>
d. Discover and justify the formula for a finite arithmetic series.	<p>Student Edition: 603 ex 6, 605 #40-#45, 618 #115-#117, 620 #10-#13, 646 #21-#22, 649 #4, 683 #38-#40</p> <p><i>Key Concept</i> 603</p> <p>Teacher Wraparound Edition: AE 603; TWT 601</p>
e. Discover and justify the formulas for finite and infinite geometric series.	<p>Student Edition: 612 ex 6, 613 ex 7, 615 #40-#47, 616 #48-#55, 618 #13, 620 #10-#13, 644 #77, 646 #27-#28, 649 #3</p> <p><i>Key Concept</i> 612, 613 <i>Study Tip</i> 612, 613</p> <p>Teacher Wraparound Edition: AE 610, 612, 613, 614</p>
<p style="text-align: center;">Mathematical Language and Symbols Students Should Use</p> <p style="text-align: center;">matrix, scalar, sequence, series, arithmetic sequence, arithmetic series, geometric sequence, geometric series, Σ</p>	

STANDARDS	PAGE REFERENCES
<p>Standard II: Students will understand and represent functions and analyze function behavior.</p>	
<p>Objective 1: Analyze and solve problems using polynomial functions.</p>	
<p>a. Raise a binomial to a power using the Binomial Theorem and Pascal's Triangle.</p>	<p>Student Edition: 628-635, 644 #61-#63, 647 #36-#41, 649 #19-#20, 663 #31-#33 <i>Study Tip</i> 629 Teacher Wraparound Edition: A 635; AE 629, 630, 631, 632; DI 632, 635; F 629, 630; T 628; TWT 630</p>
<p>b. Determine the number and nature of solutions to polynomial equations with real coefficients over the complex numbers.</p>	<p>Student Edition: 100 ex 3, 101 ex 4, 102 ex 6, 104 #23-#32, 106 #81-#84, 108 #3-#6, 119-129 <i>Key Concept</i> 100 Teacher Wraparound Edition: AE 100, 101, 102, 120, 121, 122, 123, 125, 126; DI 100; F 100, 122; T 108; TNT 101; TWT 121</p>
<p>c. Factor polynomials to solve equations and real-world applications.</p>	<p>Student Edition: P11 ex 4, P13 #23-#28, 118 #10-#12, 100 ex 3, 104 #23-#42, 106 #85-#88, 149 #25-#28, 153 #11-#12 <i>Key Concept</i> P11 Teacher Wraparound Edition: AE P11, 100</p>
<p>d. Understand the relationships among the solutions of a polynomial equation, the zeros of a function, the x-intercepts of a graph, and the factors of a polynomial.</p>	<p>Student Edition: 116 #62, 128 #77 <i>Concept Summary</i> 114 <i>Key Concept</i> 100, 112, 113, 123 <i>Study Tip</i> 125 <i>Technology Tip</i> 114 Teacher Wraparound Edition: DI 100, 113; F 122; TNT 101, 113; TWT 121</p>

STANDARDS	PAGE REFERENCES
e. Write an equation with given solutions.	<p>Student Edition: 105 #54-#63, 124 ex 6, 127 #32-#41, 128 #57-#60</p> <p>Teacher Wraparound Edition: AE 124</p>
Objective 2: Model and graph functions and transformations of functions.	
a. Model real-world relationships with functions.	<p>Student Edition: 89 ex 4, 92 #30-#33, 93 #69, 103 ex 7, 104 #43, 105 #75, 106 #80, 118 #5, 713-722, 729 #46</p> <p><i>Graphing Technology Lab</i> 723-724</p> <p>Teacher Wraparound Edition: AE 89, 103, 714, 716, 718; DI 107; TNT 103, 720; TWT 715</p>
b. Graph rational, piece-wise, power, exponential, and logarithmic functions.	<p>Student Edition: 50 ex 5, 52 #7-#10, 90 ex 5, 92 #1-#29, 133 ex 2, 134 ex 3, 135 ex 4, 136 ex 5, 138 #9-#18, 149 #11-#16, 151 #54-#59, 153 #25-#26, 175 ex 5, 178 #28-#33</p> <p><i>Key Concept</i> 132</p> <p>Teacher Wraparound Edition: AE 50, 90, 133, 134, 135, 136, 175</p>
c. Identify the effects of changing the parameter a in $y = af(x)$, $y = f(ax)$, $y = f(x - a)$, and $y = f(x) + a$, given the graph of $y = f(x)$.	<p>Student Edition: 45-55, 93 #70-#73, 94 #85, 99 ex 2, 104 #33-#42</p> <p><i>Graphing Technology Lab</i> 96</p> <p><i>Key Concept</i> 47, 51, 86, 90</p> <p>Teacher Wraparound Edition: A 55; AE 46, 47, 48, 49, 51, 92; DI 48, 50, 55; F 48; T 45; TWT 47, 99</p>
Objective 3: Analyze the behavior of functions.	
a. Identify the domain, range, and other attributes of families of functions and their inverses.	<p>Student Edition: 46 ex 1, 52 #1-#6, 87 ex 1, 88 ex 3, 92 #1-#29, 131 ex 1, 134 ex 3, 135 ex 4, 138 #1-#8, 147 #70-#72, 149 #11-#16, 151 #50-#52, 153 #25-#2</p> <p>Teacher Wraparound Edition: AE 46, 87, 88, 89, 90, 132, 133, 134, 135</p>

STANDARDS	PAGE REFERENCES
<p>b. Approximate instantaneous rates of change and find average rates of change using graphs and numerical data.</p>	<p>Student Edition: 39 ex 5, 41 #34-#35, 42 #73, 44 #20, 64 #110g, 78 #36-#37, 81 #12-#13, 759 ex 1, 762 #1-#6, 765 #22, 774 #82</p> <p><i>Connect to AP Calculus</i> 82-83</p> <p><i>Key Concept</i> 38, 758</p> <p>Teacher Wraparound Edition: A 83; AE 39, 759; F 38, 759; TWT 760</p>
<p>c. Identify and analyze continuity, end behavior, asymptotes, symmetry (odd and even functions), and limits, and connect these concepts to graphs of functions.</p>	<p>Student Edition: 52 #1-#6, 131 ex 1, 134 ex 3, 135 ex 4, 136 ex 5, 138 #9-#18, 147 #70-#72, 149 #11-#16, 153 #9-#10</p> <p><i>Graphing Technology Lab</i> 96, 108</p> <p><i>Key Concept</i> 98, 131, 132</p> <p><i>Study Tip</i> 135</p> <p>Teacher Wraparound Edition: AE 46, 132, 133, 134, 135, 136; F 131; TNT 136; TWT 132; WO 90</p>
<p>d. Determine intervals over which a function is increasing or decreasing, and describe the intervals using interval notation.</p>	<p>Student Edition: 35 ex 1, 40 #1-#10, 41 #49, 44 #15-#16</p> <p><i>Key Concept</i> 34</p> <p>Teacher Wraparound Edition: AE 35, 36; T 34</p>
<p>e. Relate the graphical representation of discontinuities and end behavior to the concept of limit.</p>	<p>Student Edition: 24-33, 44 #15-#16, 55 #85-#87, 78 #27-#33, 81 #10-#11, 131 ex 1, 138 #20-#29, 139 #54</p> <p><i>Key Concept</i> 130, 134</p> <p>Teacher Wraparound Edition: A 33; AE 25, 26, 28, 29, 132, 133, 134, 135, 136; DI 29, 132; F 131; TWT 26, 132</p>
<p style="text-align: center;">Mathematical Language and Symbols Students Should Use</p> <p style="text-align: center;">Binomial Theorem, rate of change, interval, asymptote, hole, extrema, discontinuous, continuous, odd and even function, limit, Σ</p>	

STANDARDS	PAGE REFERENCES
<p>Standard III: Students will use algebraic, spatial, and logical reasoning to solve geometry and measurement problems.</p>	
<p>Objective 1: Solve problems using trigonometry.</p>	
<p>a. Define the six trigonometric functions using the unit circle.</p>	<p>Student Edition: 242-253, 279 #78, 281, 304 #29-#32, 307 #11-#12</p> <p>Teacher Wraparound Edition: AE 243, 244, 245, 246, 247, 248; DI 253; F 244</p>
<p>b. Prove trigonometric identities using definitions, the Pythagorean Theorem, or other relationships.</p>	<p>Student Edition: 220-230, 241 #98-#99, 253 #106, 266 #64, 268 #15-#20, 279 #76, 282 ex 2, 283 ex 3, 288 #29-#40, 307 #1-#4</p> <p>Teacher Wraparound Edition: A 230; AE 221, 222, 223, 224, 225, 226, 282, 283; DI 221; F 223; TWT 222</p>
<p>c. Simplify trigonometric expressions and solve trigonometric equations using identities.</p>	<p>Student Edition: 312-319, 320-326, 327-333</p> <p>Teacher Wraparound Edition: A 319, 333; AE 313, 314, 315, 316, 321, 322, 323, 328, 329, 330; DI 314, 315, 319, 329, 333; F 313; TNT 324</p>
<p>d. Solve problems using the Law of Sines and the Law of Cosines.</p>	<p>Student Edition: 291-301, 305 #61-#66, 319 #72-#77, 326 #72</p> <p>Teacher Wraparound Edition: A 301; AE 292, 293, 294, 295, 296, 297; DI 292, 295, 301; F 293, 296; TNT 297; TWT 293</p>
<p>e. Construct the graphs of the trigonometric functions and their inverses, and describe their behavior, including periodicity and amplitude.</p>	<p>Student Edition: 256-266, 268 #21-#22, 269-279</p> <p><i>Graphing Technology Lab</i> 254-255, 267</p> <p>Teacher Wraparound Edition: AE 257, 258, 259, 261, 262, 270, 271, 272, 274, 275; DI 261, 271; F 259; TNT 258, 264, 271</p>

STANDARDS	PAGE REFERENCES
Objective 2: Graph curves using polar and parametric equations.	
<p>a. Define and use polar coordinates and relate them to Cartesian coordinates.</p>	<p>Student Edition: 534-540, 550 #69-#71, 551 ex 1, 553 ex 2, 554 ex 3, 557 #1-#12 <i>Key Concept</i> 551, 553</p> <p>Teacher Wraparound Edition: A 540; AE 535, 536, 537, 552, 553, 554; DI 537, 553, 559; F 537; TWT 537, 553</p>
<p>b. Represent complex numbers in rectangular and polar form, and convert between rectangular and polar form. .</p>	<p>Student Edition: P6-P8, 569-579, 583 #55-58 <i>Reading Math</i> 571 <i>Watch Out</i> 570</p> <p>Teacher Wraparound Edition: AE P6, P7, 571, 572, 573; TNT 570; TWT 570</p>
<p>c. Translate equations in Cartesian coordinates into polar coordinates and graph them in the polar coordinate plane.</p>	<p>Student Edition: 542-550, 555 ex 4, 556 ex 5, 557 #26-#35, 558 #57-#60, 560 #28-#29, 582 #39-#42, 585 #14-#15 <i>Graphing Technology Lab</i> 541</p> <p>Teacher Wraparound Edition: AE 543, 544, 545, 547, 554, 556; DI 546, 550; F 546; T 541, 542; TNT 547</p>
<p>d. Multiply complex numbers in polar form and use DeMoivre's Theorem to find roots of complex numbers.</p>	<p>Student Edition: 569-579, 583 #51-#70, 585 #22-#25, 607 #92-#93</p> <p>Teacher Wraparound Edition: A 579; AE 571, 572, 573, 574, 575, 576; DI 572, 579; F 572</p>
<p>e. Define a curve parametrically and draw parametric graphs</p>	<p>Student Edition: 464-471, 476 #50-#55, 477 #4-#5, 499 #75-#77 <i>Graphing Technology Lab</i> 472</p> <p>Teacher Wraparound Edition: A 471; AE 465, 466, 467; DI 471; F 466; TNT 467; TWT 468</p>

STANDARDS	PAGE REFERENCES
Objective 3: Solve problems involving the geometric properties of conic sections.	
<p>a. Write equations of conic sections in standard form.</p>	<p>Student Edition: 425 ex 3, 426 ex 4, 428 #15-#24, 429 #60-#63, 430 #77, 435 ex 2, 437 ex 5, 438 #7-#13, 439 #39-#42, 446 ex 3, 449 #23-#30, 451 #67-#68, 453 #7-#10</p> <p><i>Key Concept</i> 423, 433, 443</p> <p>Teacher Wraparound Edition: A 441; AE 425, 426, 435, 437, 446; DI 426; F 443</p>
<p>b. Identify the geometric properties of conic sections (i.e., vertex, foci, lines of symmetry, directrix, major and minor axes, and asymptotes).</p>	<p>Student Edition: 424 ex 1, 428 #1-#10, 430 #77, 436 ex 3, 438 #14-#21, 439 #44-#47, 440 #70, 446 ex 4, 449 #34-#43, 453 #12, 461 #70-#72, 474 #11-#14</p> <p>Teacher Wraparound Edition: A 431; AE 424, 436, 446; DI 423; F 433; TNT 423; TWT 424</p>
<p>c. Solve real-world applications of conic sections.</p>	<p>Student Edition: 424 ex 2, 428 #11-#14, 429 #59, 430 #72, 436 ex 4, 438 #22-#23, 439 #52-#53, 440 #59-#60, 448 ex 6, 449 #11, 450 #54-#55, 451 #69, 452 #87, 453 #11, 471 #62, 476 #56, 477 #6</p> <p>Teacher Wraparound Edition: AE 424, 436, 446; DI 426</p>
<p>Mathematical Language and Symbols Students Should Use</p> <p>Law of Sines, Law of Cosines, conic section, ellipse, hyperbola, secant (sec), cosecant (csc), cotangent (cot), polar coordinates, parametric</p>	
<p>Standard IV: Students will understand concepts from probability and statistics and apply statistical methods to solve problems.</p>	
<p>Objective 1: Compute probabilities for discrete distributions and use sampling distributions to calculate approximate probabilities.</p>	
<p>a. Obtain sample spaces and probability distributions for simple discrete random variables.</p>	<p>Student Edition: 664-673, 683 #36, 694 #27, 695 #1, 727 #15, 731 #2</p> <p>Teacher Wraparound Edition: AE 666, 668, 669; F 665</p>

STANDARDS	PAGE REFERENCES
b. Compute binomial probabilities using Pascal's Triangle and the Binomial Theorem.	<p>Student Edition: 668 ex 6, 669 ex 7, 671 #13-#19, 727 #14 <i>Key Concept</i> 668, 669</p> <p>Teacher Wraparound Edition: AE 668, 669</p>
c. Compute means and variances of discrete random variables.	<p>Student Edition: 666 ex 3, 667 ex 4, 670 ex 8, 671 #7-#10, 672 #20-#24, 683 #36, 694 #27, 695 #1, 727 #15, 731 #2</p> <p>Teacher Wraparound Edition: AE 666, 667, 670; TWT 667, 671</p>
d. Compute probabilities using areas under the Normal Curve.	<p>Student Edition: 674-683, 694 #26, 695 #6, 704 #33, 727 #16-#23</p> <p>Teacher Wraparound Edition: A 683; AE 675, 676, 677, 678, 679, 680; DI 679, 683; TNT 675, 681</p>
e. Calculate parameters of sampling distributions for the sample average, sum, and proportion.	<p>Student Edition: 696-704</p> <p>Teacher Wraparound Edition: A 704; AE 697; DI 701</p>
f. Calculate probabilities in real problems using sampling distributions.	<p>Student Edition: 685, 686 ex 1, 687 ex 2, 692 #1-#10, 693 #11, 695 #14, 704 #32, 712 #38, 728 #24-#25, 731 #5-#6</p> <p>Teacher Wraparound Edition: AE 686, 688, 690, 691; F 687</p>
Objective 2: Analyze bivariate data using linear regression methods.	
a. Fit regression lines to pairs of numeric variables and calculate the means and standard deviations of the two variables and the correlation coefficient, using technology.	<p>Student Edition: 713-722, 730 #55, 731 #10</p> <p>Teacher Wraparound Edition: A 722; AE 714, 715, 716, 717, 718, 719; F 715; TNT 716, 720; TWT 715</p>
b. Compute predictions of y -values for given x -values using a regression equation, and recognize the limitations of such predictions.	<p>Student Edition: 719 ex 6, 720 #1-#6, 721 #6, 729 #46, 730 #55 <i>Graphing Technology Lab</i> 723-724</p> <p>Teacher Wraparound Edition: AE 719; DI 719</p>

STANDARDS	PAGE REFERENCES
c. Compute and use the standard error for regression.	Student Edition: 713-722
Mathematical Language and Symbols Students Should Use regression line, correlation coefficient, standard error	