



ADVANCED Mathematical Concepts

Precalculus
with Applications
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STANDARDS	PAGE REFERENCES
<p>12.1 NUMERATION/NUMBER SENSE</p>	
<p>12.1.1 By the end of twelfth grade, students will describe and compare the relationships between subsets of real numbers. <i>Example indicators:</i></p> <ul style="list-style-type: none"> • Draw Venn diagrams including, but not limited to, natural, whole, integers, rational, irrational, and real numbers. • Find intersection and union of two sets of numbers. • Given a number, identify which subsets it belongs. • Justify why a number does not belong to a specific set. 	<p>Student Edition: 206, 209 #3, 861-862</p>
<p>12.1.2 By the end of twelfth grade, students will express the equivalent forms of numbers using exponents, radicals, scientific notation, absolute values, fractions, decimals, and percents.</p>	<p>Student Edition: 695-703, 716 #18, 717 #3-#5, 750 #19-#20, 753 #1 <i>Chapter 11 Test #1-#2 A66</i> Teacher Wraparound Edition: A 703; EC 702; FTC 699; ICE 697, 698, 699; TT 697 Teacher Resources: <i>Enrichment 463</i> <i>Study Guide and Practice 461-462</i></p>

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12.2 COMPUTATION/ESTIMATION	
<p>12.2.1 By the end of twelfth grade, students will solve theoretical and applied problems using numbers in equivalent forms, radicals, exponents, scientific notation, absolute values, fractions, decimals, and percents, ratios and proportions, order of operations, and properties of real numbers.</p>	<p>Student Edition: 695-703, 716 #18, 717 #3-#5, 750 #19-#20, 753 #1 <i>Chapter 11 Test #1-#2 A66</i></p> <p>Teacher Wraparound Edition: A 703; EC 702; FTC 699; ICE 697, 698, 699; TT 697</p> <p>Teacher Resources: <i>Enrichment 463</i> <i>Study Guide and Practice 461-462</i></p>
<p>12.2.2 By the end of twelfth grade, students will justify solutions to mathematical problems.</p> <p><i>Example indicator:</i></p> <ul style="list-style-type: none"> • Write an explanation based on the context of the problem stating why the solution is reasonable. 	<p>Student Edition: 94 #25, 498 #43, 510 #40, 621 #28-#32, 724 #61, 822-828, 832 #51-#53</p> <p>Teacher Resources: <i>Enrichment 141</i> <i>Study Guide and Practice 231-232</i></p>
<p>12.2.3 By the end of twelfth grade, students will perform estimations and computations of real numbers mentally, with paper and pencil, and with technology.</p>	<p>Student Edition: 272 ex 2, 744 #6c, 745 #14c, 747 #21d, 974 #45</p>
12.3 MEASUREMENT	
<p>12.3.1 By the end of twelfth grade, students will select and use measuring units, tools, and/or technology and explain the degree of accuracy and precision of measurements.</p> <p><i>Example indicators:</i></p> <ul style="list-style-type: none"> • Explain the accuracy of the measurement. • Explain the precision of the measurement tool. 	<p>Standard error of the mean can be found on pages</p> <p>Student Edition: 927-928</p>

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<p>12.3.2 By the end of twelfth grade, students will convert between metric and standard units of measurement, given conversion factors.</p> <p><i>Example indicators:</i></p> <ul style="list-style-type: none"> • Change yards to meters. • Change miles/hour to meters/second. 	<p>Student Edition: 353 ex 3, 354 ex 6, 355 #8-#9</p> <p>Teacher Wraparound Edition: AIN 354; ICE 353; MTL 352</p>
<p>12.4 <u>GEOMETRY/SPATIAL CONCEPT</u></p>	
<p>12.4.1 By the end of twelfth grade, students will calculate perimeter and area of two-dimensional shapes and surface area and volume of three-dimensional shapes.</p>	<p>Student Edition: 168 #46, 178 #35, 187 #44, 192-193 ex 5, 226 #13, 229, 303 #22, 318 #42, 358 #51, 510 #38, 612, 701 #68</p>
<p>12.4.2 By the end of twelfth grade, students will create geometric models to describe the physical world.</p> <p><i>Example indicators:</i></p> <ul style="list-style-type: none"> • Create perspective drawing. • Create scale models. 	<p>Student Edition: 92 ex 4, 93 #11-#12, 95 #33, 121 #31, 234 #24</p>
<p>12.4.3 By the end of twelfth grade, students will evaluate characteristics and properties of two- and three-dimensional geometric shapes.</p> <p><i>Example indicators:</i></p> <ul style="list-style-type: none"> • Classify and compare attributes of two- and three-dimensional shapes. • Classify shapes in terms of congruence and similarity and apply these relationships. • Determine the effects of changing dimensions on perimeter, area, and volume. • Investigate and deduce geometric properties using transformations such as translations, rotations, and reflections. 	<p>Student Edition: 36 #11, 273 #3, 483 #3, 613 #3, 617 ex 3, 620 #23-#27, 640 #55, 652 #51, 688 #13, 887 #2, 948 #57</p> <p>Teacher Wraparound Edition: EC 621; TT 617</p> <p>Teacher Resources: <i>Study Guide and Practice 177-178</i></p>
<p>12.4.4 By the end of twelfth grade, students will apply coordinate geometry to locate and describe objects algebraically.</p> <p><i>Example indicators:</i></p> <ul style="list-style-type: none"> • Graph a geometric shape and determine the slope of the sides. • Identify the missing vertices of a polygon. 	<p>Student Edition: 20 ex 1, 32 ex 1, 121 #28-#33, 272 ex 2, 470-476, 480 #48-#51, 615-622, 640 #55, 652 #51, 688 #11-#13, 887 #2</p> <p>Teacher Resources: <i>Study Guide and Practice 131-132, 177-178</i></p>

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<p>12.4.5 By the end of twelfth grade, students will apply right triangle trigonometry to find length and angle measures.</p>	<p>Student Edition: 284-290, 298 #50, 304 #32, 305-312, 331 #23-#26, 337 #37-#39</p> <p>Teacher Wraparound Edition: A 290; AIN 308; EC 290; F 291; ICE 285, 286</p> <p>Teacher Resources: <i>Study Guide and Practice</i> 184-185, 193-194</p>
<p>12.4.6 By the end of twelfth grade, students will apply geometric properties to solve problems.</p> <p><i>Example indicator:</i></p> <ul style="list-style-type: none"> • Find missing angles and lengths of geometric shapes using geometric properties. (Properties may include but are not limited to similarity, parallel and line-transversal). 	<p>Student Edition: 92, 127-136, 151 #47, 158 #49, 198 #11-#18, 331 #69, 483 #8, 560 #62, 630 #56</p> <p><i>Graphing Calculator Exploration</i> 284</p> <p>Teacher Wraparound Edition: MTL 127; TT 129, 130</p> <p>Teacher Resources: <i>Enrichment</i> 25 <i>Study Guide and Practice</i> 39-40</p>
<p>12.4.7 By the end of twelfth grade, students will apply deductive reasoning to arrive at a conclusion.</p> <p><i>Example indicators:</i></p> <ul style="list-style-type: none"> • Justify steps when solving an algebraic equation using properties of real numbers. • Use logic statements, paragraph proof, two-column proof, or algebraic proof to arrive at a conclusion. 	<p>Student Edition: 185 #4, 239 #1, 308 #3, 363 #1, 410 #11-#12, 411 #32-#37, 421-422, 427 #1, 438 ex 1, 467 #3, 589 #3, 627 #4, 848 #3, 923 #4</p>
<p>12.5 DATA ANALYSIS, PROBABILITY, AND STATISTICAL CONCEPTS</p>	
<p>12.5.1 By the end of twelfth grade, students will select a sampling technique to gather data, analyze the resulting data and make inferences.</p> <p><i>Example indicators:</i></p> <ul style="list-style-type: none"> • Justify the chosen sampling techniques. • Use technology to analyze data. 	<p>Student Edition: 927-932, 936 #29-#40</p> <p><i>Graphing Calculator Exploration</i> 877</p> <p>Teacher Wraparound Edition: A 932; AIN 929; EC 932; ICE 928, 929</p> <p>Teacher Resources: <i>Study Guide and Practice</i> 621-622</p>

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<p>12.5.2 By the end of twelfth grade, students will write equations and make predictions from sets of data. <i>Example indicators:</i></p> <ul style="list-style-type: none"> • Display data in a scatter plot, describe its shape, and estimate how close the data comes to fitting an equation. • Relate the slope of a regression line to the rate of change for the data set. • Determine what the y-intercept or beginning value indicates about the data. • Determine the validity of predictions made from regression equations. 	<p>Student Edition: 38-44, 51 #31, 60 #53, 61 #69, 145 #49, 151 #51, 258-264, 739 #7, 743 ex 4, 744 #6, 745 #15, 747 #21</p> <p>Teacher Wraparound Edition: AIN 40, 260; EC 44; ICE 743</p>
<p>12.5.3 By the end of twelfth grade, students will apply theoretical probability to represent problems and make decisions. <i>Example indicator:</i></p> <ul style="list-style-type: none"> • Explain the likelihood of the next event based on theoretical probabilities. 	<p>Student Edition: 837, 838 ex 1, 839 ex 2, 843 #6, 859-867, 868-874, 884 #41-#43, 885 #51</p> <p>Teacher Wraparound Edition: A 874; AIN 862, 869; EC 873; ICE 838, 839, 862; TT 838</p> <p>Teacher Resources: <i>Study Guide and Practice 580-581</i></p>
<p>12.5.4 By the end of twelfth grade, students will evaluate how transformations on data affect the measures of central tendency and variability. <i>Example indicators:</i></p> <ul style="list-style-type: none"> • Describe how adding the same amount to each score changes the mean, median, mode, range, outliers, interquartile points, maximum, and minimum. • Describe how dropping an outlier changes the other measures. 	<p>Student Edition: 111 #33, 150 #43, 897-907, 908-917, 925 #23, 934 #14-#18, 935 #19-#22, 937 #41, 939 #9</p> <p>Teacher Resources: <i>Enrichment 158, 159</i> <i>Study Guide and Practice 257-258, 259-260</i></p>

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<p>12.5.5 By the end of twelfth grade, students will interpret data represented by the normal distribution and formulate conclusions.</p> <p><i>Example indicators:</i></p> <ul style="list-style-type: none"> • Sketch a normal or bell curve, label one and two standard deviations from the mean and fill in approximate percents associated with the deviations. • Determine factors that will produce a curve that is not normal. • Describe how sample size is related to a normal curve. • Determine position or rank relative to others in a normally distributed group given the standard deviation and mean. 	<p>Student Edition: 918-925, 932 #34, 935 #23-#28, 937 #42 <i>Graphing Calculator Exploration</i> 926</p> <p>Teacher Wraparound Edition: A 925, 926; EC 925; F 927; MTL 919, 926</p> <p>Teacher Resources: <i>Enrichment</i> 925 <i>Study Guide and Practice</i> 618-619</p>
<p>12.5.6 By the end of twelfth grade, students will calculate probabilities of independent events.</p> <p><i>Example indicator:</i></p> <ul style="list-style-type: none"> • Calculate probabilities using the fundamental counting principle and permutations. 	<p>Student Edition: 837, 838 ex 1, 839 ex 2, 843 #6, 859-867, 868-874, 884 #41-#43, 885 #51</p> <p>Teacher Wraparound Edition: A 874; AIN 862, 869; EC 873; ICE 838, 839, 862; TT 838</p> <p>Teacher Resources: <i>Study Guide and Practice</i> 580-581</p>
12.6 ALGEBRAIC CONCEPTS	
<p>12.6.1 By the end of twelfth grade, students will graph and interpret algebraic relations and inequalities.</p> <p><i>Example indicators:</i></p> <ul style="list-style-type: none"> • Describe a graph by identifying intercepts, slopes, maximum, minimum, increasing, decreasing, parallel, and perpendicular. • Use families of curves to describe the effect of changing coefficients of an equation. 	<p>Student Edition: 137-145, 146-151, 159-168, 171-179 <i>Graphing Calculator Exploration</i> 26</p> <p>Teacher Wraparound Edition: A 26, 145, 168; EC 145, 151; ICE 138, 140, 148; TT 139</p> <p>Teacher Resources: <i>Study Guide and Practice</i> 90-91, 93-94</p>
<p>12.6.2 By the end of twelfth grade, students will solve problems involving equations and inequalities.</p> <p><i>Example indicator:</i></p> <ul style="list-style-type: none"> • Use appropriate methods to solve linear and quadratic equations. 	<p>Student Edition: 213-221, 228 #46, 235 #3, 236-242, 653-661, 662-669</p> <p>Teacher Wraparound Edition: A 221, 661; AIN 657; FTC 214, 655; ICE 214, 656</p> <p>Teacher Resources: <i>Study Guide and Practice</i> 134-135, 429-430</p>

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<p>12.6.3 By the end of twelfth grade, students will solve problems involving systems of two equations, and systems of two or more inequalities.</p> <p><i>Example indicator:</i></p> <ul style="list-style-type: none"> • Solve systems by graphing, substitution, elimination or matrices. 	<p>Student Edition: 67-72, 73-77, 86 #55, 96 #36, 104 #55, 120 #17-#19</p> <p>Teacher Wraparound Edition: A 72, 77; AIN 69, 77; EC 72, 76; ICE 74, 75</p> <p>Teacher Resources: <i>Study Guide and Practice 45-46, 48-49</i></p>
<p>12.6.4 By the end of twelfth grade, students will solve problems using patterns and functions.</p> <p><i>Example indicators:</i></p> <ul style="list-style-type: none"> • Apply direct and indirect variations. • Recognize the properties of families of functions. • Recognize patterns of exponential growth and decay and their significance to real-life situations. • Represent a problem in multiple formats (words, tables, graphs, and symbols). 	<p>Student Edition: 759-765, 766-773, 774-783, 794-800</p> <p>Teacher Wraparound Edition: A 783, 785, 800; EC 764, 773, 799; ICE 760</p> <p>Teacher Resources: <i>Study Guide and Practice 509-510, 512-513, 515-516, 521-522</i></p>