Math Learning Objectives

Pre-Calculus

Learning objective 1a Find the x- and y- intercepts of graphs of equations.
Learning objective 1b Sketch graphs of equations including circles.
Learning objective 1c Use graphs of equations to solve real-life problems.
Learning objective 1d Use symmetry to sketch graphs of equations.

Learning objective 2a Find slopes of lines.
Learning objective 2b Use linear equations in two variables to model and solve real-life problems.
Learning objective 2c Use slope to graph line equations in two variables.
Learning objective 2d Use slope to identify parallel and perpendicular lines.
Learning objective 2e Write linear equations in two variables.

Learning objective 3a Determine if a relation is a function.
Learning objective 3b Determine whether relations between two variables are functions.
Learning objective 3c Find the domains and ranges of functions.
Learning objective 3d Use functions to model and solve real-life problems.
Learning objective 3e Use the Vertical Line Test for functions.

Learning objective 4a Find the zeros of functions.
Learning objective 4b Use function notation and evaluate functions.

Learning objective 5a Determine the intervals on which functions are increasing or decreasing.
Learning objective 5b Identify even and odd functions.

Learning objective 6 Identify linear, quadratic, and cubic functions.

Pre-Calculus

Learning objective 7*a* Determine the domain and range of square root functions.
Learning objective 7*b* Identify and graph piecewise-defined functions.
Learning objective 7*c* Identify reciprocal and rational functions.
Learning objective 7*d* Identify square root functions.
Learning objective 7*e* Identify step functions.

Learning objective 8*a* Use reflections to sketch graphs of functions.
Learning objective 8*b* Use vertical and horizontal shifts to sketch graphs of functions.

Learning objective 9*a* Apply multiple transformations to sketch graphs of functions.
Learning objective 9*b* Use nonrigid transformations to sketch graphs of functions.

Learning objective 10*a* Find the composition of one function with another function.
Learning objective 10*b* Perform the operations of addition, subtraction, multiplication, and division of functions.
Learning objective 10*c* Use combinations of functions to model and solve real-life problems.

Learning objective 11*a* Find the inverse of functions informally.
Learning objective 11*b* Verify that two functions are inverse functions of each other.

Learning objective 12*a* Determine if functions are one-to-one.
Learning objective 12*b* Use the Horizontal Line Test to determine if functions are one-to-one.

Learning objective 13*a* Find inverse functions algebraically.
Learning objective 13*b* Use graphs of functions to determine whether functions have inverse functions.

Learning objective 14*a* Write mathematical models for direct variation as an nth power.
Learning objective 14*b* Write mathematical models for direct variation.

Learning objective 15*a* Write mathematical models for inverse variation.
Learning objective 15*b* Write mathematical models for joint variation.

Learning objective 16 Sketch graphs of quadratic functions.

Learning objective 17 Write quadratic functions in vertex form.

Learning objective 18 Analyze graphs of quadratic functions.

Learning objective 19 Use quadratic functions to model and solve real life-problems.

Learning objective 20 Use transformations to sketch graphs of polynomial functions.

Learning objective 21 Use the Leading Coefficient test to determine the end behavior of graphs of polynomial functions.

Pre-Calculus

Learning objective 22a Find the domains of rational expressions.
Learning objective 22b Simplify rational expressions.

Learning objective 23 Use long division to divided polynomials by other polynomials.

Learning objective 24 Use synthetic division to divide polynomials by binomials in the form of $(x - k)$.

Learning objective 25 Use the Remainder Theorem.

Learning objective 26 Use the Factor Theorem.

Learning objective 27 Use the imaginary unit i to write imaginary numbers.

Learning objective 28 Distinguish types of complex numbers.

Learning objective 29 Add and subtract complex numbers.

Learning objective 30 Multiply complex numbers.

Learning objective 31 Use complex conjugates to write the quotient of two complex numbers in standard form.

Learning objective 32 Find complex solutions of quadratic equations.

Learning objective 33 Use the Fundamental Theorem of Algebra to determine the number of zeros of the polynomial function.

Learning objective 34 Use Descartes' Rule of Signs to determine the more exact number of zeros of a polynomial function.

Learning objective 35 Determine possible rational zeros of polynomial functions.

Learning objective 36 Use the Intermediate Value Theorem to help locate zeros of polynomial functions.

Learning objective 37 Use the Upper and Lower Bound Rules to find zeros of polynomials.

Learning objective 38a Factor polynomials using zeros.
Learning objective 38b Find all zeros of polynomial functions.

Learning objective 39 Use zeros of polynomial functions as sketching aids.

Learning objective 40 Find the domains of rational functions.

Learning objective 41 Find the vertical asymptotes of graphs of rational functions.

Learning objective 42 Find the horizontal asymptote of graphs of rational functions.

Learning objective 43 Find the intercepts of graphs of rational functions.

Learning objective 44 Sketch graphs of rational functions.

Pre-Calculus

Learning objective 45 Use rational functions to model real-life problems.

Learning objective 46a Graph exponential functions.
Learning objective 46b Recognize and evaluate exponential functions with base a .

Learning objective 47 Recognize and evaluate exponential functions with base e .

Learning objective 48 Use exponential functions to model and solve real-life applications.

Learning objective 49 Recognize and evaluate logarithmic functions with base a .

Learning objective 50 Graph logarithmic functions.

Learning objective 51 Recognize and evaluate natural logarithmic functions.

Learning objective 52 Use the change-of-base formula to rewrite and evaluate logarithmic expressions.

Learning objective 53a Use properties of logarithms to evaluate or rewrite logarithmic expressions.
Learning objective 53b Use properties of logarithms to expand or condense logarithmic expressions.

Learning objective 54 Solve simple exponential equations.

Learning objective 55a Solve more complicated exponential equations.
Learning objective 55b Use exponential functions to model and solve real-life applications.

Learning objective 56a Solve more complicated logarithmic equations.
Learning objective 56b Solve simple logarithmic equations.

Learning objective 57 Use logarithmic functions to model and solve real-life applications.

Learning objective 58 Use logistic growth functions to model and solve real-life problems.

Learning objective 59 Use logistic growth functions to model and solve real-life problems.

Learning objective 60a Use Gaussian functions to model and solve real-life problems.
Learning objective 60b Use logarithmic functions to model and solve real-life problems.

Learning objective 61 Interpret graphically the numbers of solutions of systems of linear equations in two variables.

Learning objective 62 Solve systems of equations graphically.

Learning objective 63 Solve systems of equations algebraically using the substitution method.

Learning objective 64 Solve systems of linear equations using the elimination method.

Learning objective 65 Use systems of equations in two variables to model and solve real-life problems.

Pre-Calculus

Learning objective 66 Use systems of equations in two variables to model and solve real-life problems.

Learning objective 67 Use back-substitution to solve linear systems in row-echelon form.

Learning objective 68 Use Gaussian elimination to solve systems of linear equations.

Learning objective 69 Solve Non-Square systems of linear equations.

Learning objective 70 Use systems of linear equations in three or more variables to model and solve application problems.

Learning objective 71 Sketch the graphs of inequalities in two variables.

Learning objective 72 Solve systems of inequalities.

Learning objective 73 Use systems of inequalities in two variables to model and solve real-life problems.

Learning objective 74 Solve linear programming problems.

Learning objective 75 Use linear programming to model and solve real-life problems.

Learning objective 76 Use matrices to display mathematical and real world data.

Learning objective 77 Add and subtract matrices.

Learning objective 78 Find scalar products of matrices.

Learning objective 79 Multiply two matrices.

Learning objective 80 Multiply two matrices.

Learning objective 81 Define and evaluate a 2 x 2 determinant.

Learning objective 82 Use Cramer's rule to solve a system of two linear equations in two variables.

Learning objective 83 Define and evaluate a 3 x 3 determinant.

Learning objective 84 Use Cramer's rule to solve a linear system of three equations in three variables.

Learning objective 85 Perform elementary row operations on augmented matrices.

Learning objective 86 Use matrices to solve a system of two equations.

Learning objective 87 Use matrices to solve a system of three equations.

Learning objective 88a Determine whether a square matrix has an inverse.
Learning objective 88b Find the inverse of a square matrix.

Learning objective 89 Solve systems of equations using inverse matrices.

Pre-Calculus

Learning objective 90 Solve real world problems using matrices.

Learning objective 91 Use degree measure to describe angles.

Learning objective 92 Use radian measure to describe angles.

Learning objective 93 Convert between degree and radian measures of angles.

Learning objective 94 Use angles to model and solve real-life problems.

Learning objective 95 Determine the coordinates of 45 degree angles on the unit circle.

Learning objective 96 Determine the coordinates of 30 degree and 60 degree angles on the unit circle.

Learning objective 97 Evaluate trigonometric functions using the unit circle.

Learning objective 98 Use the domain and period to evaluate sine and cosine functions.

Learning objective 99 Use a calculator to evaluate trigonometric functions.

Learning objective 100 Evaluate trigonometric functions of acute angles.

Learning objective 101 Use the fundamental trigonometric identities to assist in finding values of the trigonometric functions.

Learning objective 102 Solve a right triangle using trigonometric functions.

Learning objective 103 Use trigonometric functions to model and solve real-life problems.

Learning objective 104 Evaluate trigonometric functions at any angle.

Learning objective 105 Use reference angles to evaluate trigonometric functions.

Learning objective 106 Sketch the graphs of basic sine and cosine functions.

Learning objective 107 Use amplitude to help sketch the graphs of cosine and sine.

Learning objective 108 Use period to help sketch the graphs of cosine and sine.

Learning objective 109 Sketch translations of the graphs of cosine and sine functions.

Learning objective 110 Use cosine and sine functions to model real-life applications.

Learning objective 111 Sketch the graph of the tangent function.

Learning objective 112 Sketch the graph of the cotangent function.

Learning objective 113 Sketch the graphs of secant and cosecant functions.

Pre-Calculus

Learning objective 114 Evaluate damped trigonometric functions.

Learning objective 115 Evaluate the inverse sine function.

Learning objective 116 Evaluate the other inverse trigonometric functions.

Learning objective 117 Evaluate the compositions of trigonometric functions.

Learning objective 118 Solve real-life problems involving right triangles.

Learning objective 119 Solve real-life problems involving directional bearings.

Learning objective 120 Solve real-life problems involving harmonic motion.

Learning objective 121 Recognize and write the fundamental trigonometric identities.

Learning objective 122*a* Use the fundamental trigonometric identities to evaluate trigonometric identities.
Learning objective 122*b* Use the fundamental trigonometric identities to rewrite and simplify trigonometric expressions.

Learning objective 123*a* Plan a strategy for verifying trigonometric identities.
Learning objective 123*b* Verify trigonometric identities.

Learning objective 124 Use standard algebraic techniques to solve trigonometric equations.

Learning objective 125 Solve trigonometric equations of the quadratic type.

Learning objective 126 Solve trigonometric equations involving multiple angles.

Learning objective 127*a* Use the sum and difference formulas to evaluate trigonometric functions.
Learning objective 127*b* Use the sum and difference formulas to solve trigonometric equations.
Learning objective 127*c* Use the sum and difference formulas to verify identities.

Learning objective 128 Use multiple-angle formulas to rewrite and evaluate trigonometric functions.

Learning objective 129 Use product-to-sum and sum-to-product formulas to rewrite and evaluate trigonometric functions.

Learning objective 130*a* Use half-angle formulas to rewrite and evaluate trigonometric functions.
Learning objective 130*b* Use power-reducing formulas to rewrite and evaluate trigonometric functions.

Learning objective 131 Use the Law of Sines to solve oblique triangles (AAS or ASA).

Learning objective 132 Use the Law of Sines to solve oblique triangles (SSA).

Learning objective 133 Use the Law of Cosines to solve oblique triangles (SAS or SSS).

Learning objective 134 Use the Law of Sines and the Law of Cosines to model and solve real-life problems.

Pre-Calculus

Learning objective 135 Find the areas of oblique triangles.

Learning objective 136*a* Use factorial notation.
Learning objective 136*b* Use sequence notation to write the terms of a sequence.

Learning objective 137*a* Find the sum of an infinite series.
Learning objective 137*b* Use sequences and series to model and solve real-life problems.
Learning objective 137*c* Use summation notation to write sums.

Learning objective 138*a* Find an nth partial sum of an arithmetic sequence.
Learning objective 138*b* Recognize and write arithmetic sequences.
Learning objective 138*c* Use arithmetic sequences to model and solve real-life problems.

Learning objective 139 Recognize and write geometric sequences.

Learning objective 140*a* Evaluate the sum of an infinite geometric series.
Learning objective 140*b* Find the sum of a geometric sequence.

Learning objective 141 Use geometric sequences to model and solve real-life problems.

Learning objective 142*a* Find a finite difference of a sequence.
Learning objective 142*b* Write the nth term of a sequence.

Learning objective 143 Use mathematical induction to prove a statement.

Learning objective 144 Find the sums of powers of integers.

Learning objective 145*a* Use Pascal's Triangle to calculate binomial coefficients.
Learning objective 145*b* Use counting principles to calculate binomial coefficients.

Learning objective 146 Use the Binomial Theorem to write Binomial Expansions.

Learning objective 147*a* Solve simple counting problems.
Learning objective 147*b* Use the Fundamental Counting Principle to solve counting problems.

Learning objective 148*a* Use combinations to solve counting problems.
Learning objective 148*b* Use permutations to solve counting problems.

Pre-Calculus

Learning objective 149*a* Find the probabilities combinations.
Learning objective 149*b* Find the probabilities of events.
Learning objective 149*c* Find the probabilities of independent events.
Learning objective 149*d* Find the probabilities of mutually exclusive events.
Learning objective 149*e* Find the probability of the complement of an event.

Learning objective 150 Solve real-world probability problems.

Learning objective 151 Draw a vector that is equal to or opposite another vector.

Learning objective 152 Write the component form of vectors.

Learning objective 153 Perform basic vector operations and represent them graphically.

Learning objective 154 Write vectors as linear combinations of unit vectors.

Learning objective 155 Find the magnitude of a vector.

Learning objective 156 Find the direction angle of a vector.

Learning objective 157 Use the magnitude and direction angle of a vector to write the vector in component form.

Learning objective 158 Find a unit vector based on another vector.

Learning objective 159 Use vectors to model and solve real-life application problems.

Learning objective 160*a* Find the dot product of two vectors.
Learning objective 160*b* Use the properties of the dot product.

Learning objective 161 Find the angle between two vectors.

Learning objective 162 Determine whether two vectors are orthogonal.

Learning objective 163 Find the projection of a vector onto another vector.

Learning objective 164 Write a vector as the sum of two vector components.

Learning objective 165 Use vectors to find the work done by a force.

Learning objective 166*a* Find the distance between a point and a line.
Learning objective 166*b* Find the inclination of a line.

Learning objective 167 Find the angle between two lines.

Pre-Calculus

Learning objective 168*a* Recognize a conic as the intersection of a plane and a double-napped cone.
Learning objective 168*b* Write the vertex form of the equation of a parabola.

Learning objective 169*a* Solve real-life problems involving parabolas.
Learning objective 169*b* Use the reflective property to solve problems.

Learning objective 170 Write the equation of an ellipse.

Learning objective 171*a* Evaluate the eccentricity of an ellipse.
Learning objective 171*b* Identify the axes and find the length of the major axis and minor axis.

Learning objective 172 Write the equation of a hyperbola.

Learning objective 173*a* Find the equations of the asymptotes of a hyperbola.
Learning objective 173*b* Use ellipses and hyperbolas to solve real-life problems.

Learning objective 174 Classify a conic from its standard equation.

Learning objective 175 Change equations of conics from standard to vertex form.

Learning objective 176 Use rotation of axes for conic sections.

Learning objective 177 Classify conics by using the discriminant.

Learning objective 178*a* Convert between rectangular and polar coordinates.
Learning objective 178*b* Plot points given rectangular coordinates and determine polar coordinates.

Learning objective 179*a* Convert rectangular equations to polar equations, and convert polar equations to rectangular equations.
Learning objective 179*b* Graph polar equations and find points of intersection.

Learning objective 180*a* Evaluate a set of parametric equations for a given value of the parameter.
Learning objective 180*b* Re-write a set of parametric equations as a single rectangular equation.
Learning objective 180*c* Sketch a curve that is represented by a set of parametric equations.

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