

Chart of Activities

Use this chart to locate appropriate activities for various lessons in your curriculum.

Activity	Pre-algebra	Algebra 1	Algebra 2	Precalculus	Statistics	Sketchpad Level	Average Time	Paired/Individual	Small Groups	Whole-Class	Short Demo	Presenter Notes	Description
1: Functions													
Introducing Dynagraphs		○	○			E	35	○	○	○	○	○	Students explore dynagraphs to develop a feel for functional relationships.
From Dynagraphs to Cartesian Graphs		○	○			E	45	○	○				Students make connections between symbolic, Cartesian, and dynagraph representations of functions.
Domain and Range		○	○			E	35	○	○	○	○		Students explore the domain and range of functions, including those with restricted domain or range, using dynagraphs and Cartesian graphs.
Function Composition with Dynagraphs			○	○		E	40	○	○	○	○	○	Students use dynagraphs to model composite functions.
Odd and Even Functions			○	○		E	35	○	○	○	○		Students explore odd and even functions using dynagraphs and transformations.
Inverse Functions		○	○			E	30	○	○	○	○	○	Students use linked dynagraphs to investigate inverse functions.
Functions Again and Again		○	○			I	35	○	○			○	Students define an iterated coordinate transformation on a point, and observe and draw conclusions from the orbit.
2: Functions and Relations													
Relations and Functions		○	○			E	35	○	○	○	○	○	Students explore the definitions of relation and function, and develop a vertical line test for functions.
The Circumference Function	○	○	○			I	35	○	○				Students measure, graph, and analyze the function that connects a circle's diameter and circumference.
Radius and Arc Length		○	○			E/ I	35	○	○	○	○	○	Students explore the relationship between the radius of a circle and the arc length of a semicircle.
Functions in a Triangle	○	○	○			I	30	○	○				Students measure constructions in a triangle and investigate the relations and their graphs.
Functional Geometry		○	○			I	30	○	○				Students explore relations defined by geometric measurements and create graphs, explaining how they decided on the independent variable.
3: Systems													
Solving Systems of Equations		○	○			I	35	○	○	○	○		Students use rate information from two companies to find out which is cheaper for various moves.
Graphing Inequalities in Two Variables		○	○			E	45	○	○				Students use a prepared sketch to graph various inequalities in x and y .
Legend: E = Easy; I = Intermediate; C = Challenging													

Activity	Pre-algebra	Algebra 1	Algebra 2	Precalculus	Statistics	Sketchpad Level	Average Time	Paired/Individual	Small Groups	Whole-Class	Short Demo	Presenter Notes	Description
3: Systems continued													
Graphing Systems of Inequalities			○			I	40	○	○	○	○		Students use a prepared sketch to solve systems of two and three inequalities.
Linear Programming: Swans and Giraffes			○			E	45	○	○				Students explore a linear programming problem, by writing constraint equations, defining the feasible region, and maximizing a quantity.
4: Quadratic Functions													
Parabolas in Vertex Form		○	○			E	45	○	○	○	○	○	Students graph parabolas using the vertex form.
Exploring Parabolas in Vertex Form		○	○			E	30	○	○				Students graph parabolas using the vertex form (open-ended).
Parabolas in Factored Form		○	○			I	45	○	○	○	○		Students investigate the relationship between the factored form of a quadratic function and its graph.
Parabolas in Standard Form		○	○			I	40	○	○	○	○		Students use the standard form to identify the behavior of the graph when a , b , and c are changed.
Changing Quadratic Function Forms			○	○		C	50	○	○				Students change quadratic functions between standard, vertex, and factored forms.
The Discriminant			○	○		I	35	○	○	○	○	○	Students calculate and explore the discriminant of a quadratic function.
Parabolas: A Geometric Approach		○	○			I	40	○	○				Students construct a parabola geometrically.
Parabolas in Headlights and Satellite Dishes		○	○			C	45	○	○				Students construct and explore a two-dimensional model of a parabolic reflector.
Conic Reflections			○	○		C	45	○	○	○	○	○	Students explore reflective properties of ellipses and hyperbolas.
Modeling Projectile Motion		○	○			I	40	○	○	○	○		Students make a Sketchpad model of a basketball's flight, and make the ball go through a basket.
5: Algebraic Transformations													
Translating Coordinates		○	○			I	40	○	○	○	○	○	Students translate points in and make connections between the coordinates of a point and its translated image.
Rotating Coordinates		○	○			I	35	○	○			○	Students explore coordinate rotation of figures about the origin by multiples of 90° .
Reflecting in Geometry and Algebra		○	○			E/ I	35	○	○	○	○	○	Students explore algebraic associations between the coordinates of a point and its reflected image.
Stretching and Shrinking Coordinates			○			I	30	○	○	○	○	○	Students investigate the behavior of polygons when the x - or y -values of the vertices are multiplied by various constants.
Legend: E = Easy; I = Intermediate; C = Challenging													

Activity	Pre-algebra	Algebra 1	Algebra 2	Precalculus	Statistics	Sketchpad Level	Average Time	Paired/Individual	Small Groups	Whole-Class	Short Demo	Presenter Notes	Description
5: Algebraic Transformations continued													
Transforming Coordinates		○	○			I	35	○	○			○	Students perform elementary transformations in the coordinate plane.
Translating Functions			○			I	25	○	○	○	○	○	Students translate function graphs vertically and horizontally by adding constants to x - and y -values.
Reflecting Functions		○	○			I	23	○	○	○	○	○	Students reflect function plots across the axes and explore connections between algebraic and geometric transformations.
Stretching and Shrinking Functions			○			I	25	○	○	○	○	○	Students stretch and shrink function graphs vertically and horizontally.
Transforming Odd and Even Functions			○			C	30	○	○	○	○		Students explore the symmetry in odd and even functions.
6: Other Functions													
Absolute Value Functions		○	○			E	25	○	○	○	○	○	Students graph and explore the absolute value function, reviewing the point-slope form of linear functions.
Exponential Functions			○	○		I	35	○	○	○	○	○	Students graph exponential functions, examine their properties, and use them to model real-world applications.
Logarithmic Functions			○			I/ C	45	○	○	○	○	○	Students explore the relationships between exponential and logarithmic functions.
Square Root Functions			○			I	35	○	○	○	○	○	Students explore the square root function and think about the conditions under which inverse relations are also inverse functions.
Rational Functions			○			I	35	○	○	○	○	○	Students explore rational functions as transformations of $y = 1/x$.
Modeling Linear Motion: An Ant's Progress			○			E	25	○	○	○	○	○	Students model linear motion using parametric equations.
7: Trigonometric Functions													
Right Triangle Functions			○			I	25			○	○	○	Students calculate ratios for right triangles, plotting the values to reveal the graphs of the trigonometric functions.
Radian Measure			○	○		I	25	○	○	○	○	○	Students explore the relationship between the length, radius, and central angle of an arc.
Unit Circle Functions			○	○		I	40	○	○	○	○	○	Students use a unit circle to define the trigonometric functions.
Unit Circle and Right Triangle Functions			○	○		I	25	○	○	○	○	○	Students compare the unit circle definitions and right triangle definitions of trigonometric functions.
Trigonometric Identities			○	○		E	35	○	○	○	○	○	Students use geometric relationships to justify trigonometric identities.
Legend: E = Easy; I = Intermediate; C = Challenging													

Activity	Pre-algebra	Algebra 1	Algebra 2	Precalculus	Statistics	Sketchpad Level	Average Time	Paired/Individual	Small Groups	Whole-Class	Short Demo	Presenter Notes	Description
7: Trigonometric Functions <small>continued</small>													
Law of Sines			○	○		I	20	○	○	○	○		Students explore the Law of Sines and develop a proof.
Law of Cosines			○	○		I	35	○	○	○	○	○	Students develop the Law of Cosines by exploring how the Pythagorean theorem fails for triangles without a right angle.
8: Probability and Data													
Normal Distribution			○	○	○	E	35	○	○				Students use a random distribution to explore the normal density curve.
Permutation and Combination			○		○	E	45	○	○				Students explore permutations and combinations of a given set of objects.
Box and Whiskers		○	○	○	○	E	45	○	○			○	Students change data and explore the effects on a box-and-whiskers plot.
Fitting Functions to Data			○	○	○	I	40	○	○	○	○	○	Students transform functions to fit data and use a least-squares calculation to judge how good the fit is.
9: Vectors and Matrices													
Introduction to Vectors: Walking Rex		○	○			E	25	○	○	○	○	○	Students explore vectors, learning the connection between two ways to describe vectors.
Vector Addition and Subtraction		○	○			E	25	○	○	○	○	○	Students add and subtract vectors, and explore the commutativity of these operations.
Solving Systems Using Matrices			○	○		I	25	○	○	○	○	○	Students solve a system of equations expressed as a single matrix equation.
Supplemental Activities (on CD-ROM)													
Quadratic Intercepts		○	○			I	30	○	○	○	○	○	Students derive a quadratic function from the y -intercept and the two x -intercepts.
Function Transformation Game			○	○		E		○	○				Students match the graph of a mystery function by choosing a parent function and applying transformations to it.
Point Field		○	○			E	35	○	○	○	○	○	Students use a point field to investigate linear combinations in the form $ax + by$.
Build Your Own Dynagraph		○	○	○		C	35	○	○				Students or teachers build their own dynagraphs from scratch.
Legend: E = Easy; I = Intermediate; C = Challenging													