Chart of Activities

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

Activity	Pre-algebra	Algebra 1	Algebra 2	Sketchpad Level	Average Time	Paired/Individual	Small Groups	Whole-Class	Short Demo	Presenter Notes	Description
1: Fundamental Operations											
Adding Integers	○	○		E	25	○	○	○	○		Add positive and negative integers using a visual model.
Subtracting Integers	○	○		E	25	○	○	○	○		Subtract positive and negative integers using a visual model.
Raz's Magic Multiplying Machine	○	○		E	35	○	○	○	○		Explore features of multiplication with a continuous dynamic model.
Multiple Models of Multiplication	○	○		E	45	○	○	○	○	○	Look at multiplication in four very different ways.
Mystery Machines	○	○		E	40	○	○	○			Figure out where 0 and 1 are located on these machines, or what operations they perform.
Dividing Real Numbers	○	○		I	30	○	○	○	○		See how division works by switching a model from multiplication to division.
The Commutative Property	○	○	○	E	35	○	○	○	○		Use a dynamic model to determine which algebraic operations are commutative.
The Associative Property	○	○	○	I	30	○	○	○	○		Use a dynamic model to determine which algebraic operations are associative.
Identity Elements and Inverses	○	○	○	I	25	○	○	○	○		Determine which operations have identity elements and inverses and which do not.
Exploring Properties of Operations	○	○		I	Varies	○	○				Verify or disprove various properties, some common and some obscure.
2: Ratios and Exponents											
Ratio and Proportion	○	○		E	25	○	○	○	○		Explore ratios and proportions involving side lengths of rectangles.
Proportions in Similar Triangles	○	○		I	25	○	○	○	○	○	Use ratio and proportion in triangles to determine inaccessible distances.
Rates and Ratios	○	○		E	30	○	○	○			Work with a Sketchpad pasta machine to better understand rates and ratios.
The Golden Rectangle and Ratio		○	○	C	35	○		○	○		Construct the ratio while building rectangles and spirals.
Fractals and Ratios		○	○	I	30	○	○	○	○		Explore the fractions that occur in fractals.
Length of the Koch Curve		○	○	I	25	○	○	○	○		Investigate the ratio of similarity in this self-similar curve.
The Chaos Game		○	○	I	40	○	○	○	○	○	Produce striking results by randomly applying ratios.

Legend: E = Easy; I = Intermediate; C = Challenging

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2: Ratios and Exponents continued											
Exponents	○	○		I	40	○	○	○	○	○	Learn principles of exponents by experimenting with repeated multiplication
Zero and Negative Exponents		○		E	35	○	○	○	○	○	Use a visual model to understand the behavior of negative exponents.
3: Algebraic Expressions											
Order of Operations	○	○		I	25	○	○	○		○	Explore how mathematical communication requires agreement on certain rules.
Equivalent Expressions		○		I	35	○	○			○	Compare expressions to determine which are equivalent.
Equivalent Expressions: The Border Problem		○		I	25	○	○	○			Invent a variety of equivalent expressions for a real-world problem.
The Distributive Property: A Painting Dilemma	○	○		I	20	○	○	○		○	A Student Activities Committee project leads to a mathematical principle.
The Distributive Property	○	○		E	25	○	○	○	○		A visual model brings the distributive property to life.
Algebra Tiles	○	○		I	45	○		○	○	○	Model algebraic quantities with the dimensions and area of dynamic tiles.
The Product of Two Binomials		○		I	35	○	○		○		Use tiles to model multiplication of binomials.
Squaring Binomials		○		I	25	○	○	○	○	○	Use dynamic algebra tiles to connect algebraic and geometric squares.
Squares and Square Roots		○		E	25	○	○				Explore squares and square roots using virtual dot paper.
4: Solving Equations and Inequalities											
Approximating Solutions to Equations		○		I	25	○	○	○	○	○	Substitute many values quickly and easily to find approximate solutions.
Undoing Operations		○		C	35	○	○	○	○		Use inverse operations in a visual model to undo an algebraic expression.
Solving Linear Equations by Balancing	○	○		E	35	○	○	○	○	○	Manipulate a balance model and use it to solve equations.
Solving Linear Equations by Undoing		○		I	35	○	○	○	○	○	Use a visual model and inverse operations to solve equations.
Solving Linear Equations by Jumping	○	○		E	25	○	○	○		○	Use distances and rates to write and solve equations of the form $a + bx = c + dx$.
Properties of Inequality	○	○		E	20	○	○	○			Investigate arithmetic properties of inequality using a visual model.
Solving Inequalities by Substitution		○	○	E	20	○	○	○	○		Substitute many values quickly to find the solution set of an inequality.
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4: Solving Equations and Inequalities continued											
Solving Inequalities by Balancing	○	○		E	25	○	○	○	○		Use a balance model to solve equations.
Solving Compound Inequalities		○	○	E	35	○	○	○	○	○	Substitute many values quickly to solve compound inequalities.
5: Coordinates, Slope, and Distance											
Coordinates: The Fly on the Ceiling	○	○		I	35	○	○	○	○	○	Measure coordinates and plot points with the help of a fly on Descartes' ceiling
The Origin: Center of the World	○	○		E	35	○	○	○	○	○	Work with the origin and negative coordinates, identify the quadrants, and draw figures.
Points Lining Up in the Plane	○	○		E	30	○	○	○	○	○	Find points that satisfy algebraic rules and write rules to describe sets of points.
The Slope of a Line	○	○		E	25	○	○	○	○		Explore the relationship between the slope of a line and the points that determine the line.
The Slope Game	○	○		E	10	○	○				Construct and play a game involving lines and slope measurements.
More Slope Games	○	○		E	10	○	○				Acquire an intuitive feel for slope by playing four different games involving slopes.
How Slope Is Measured	○	○		E	30	○	○	○	○		Connect an intuitive sense of slope to specific calculations based on coordinates.
Slopes of Parallel and Perpendicular Lines	○	○		I	20	○	○	○	○		Experiment and draw conclusions about the slopes of parallel and perpendicular lines.
The Pythagorean Theorem		○		I	35	○	○	○			Verify the Pythagorean theorem using coordinates and develop the distance formula.
6: Variation and Linear Equations											
Direct Variation		○		I	40	○	○	○	○		Build a geometric model to study direct variation.
Inverse Variation	○	○		I	25	○	○	○		○	Plot (x, y) points representing an inverse relationship, and then plot a family of curves.
The Slope-Intercept Form of a Line		○		I	30	○	○	○	○		Plot points determined by $y = mx + b$ and construct the resulting line and families of lines. This activity is also available in the **Supplemental Activities** folder using the form $y = a + bx$.
The Point-Slope Form of a Line		○		I	30	○	○	○	○		Examine the effect of each constant on the graph of an equation in the form $y = m(x - h) + k$. This activity is also available in the **Supplemental Activities** folder using the form $y = y_1 + b(x - x_1)$.
The Standard Form of a Line		○	○	E	30	○	○	○	○	○	Explore the effects of a, b, and c on the graph of a line expressed in the form $ax + by = c$.
Lines of Fit	○	○		I	25	○	○	○	○	○	Approximate a line of best fit to a number of data points, and use the line to make an estimate.
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7: Quadratic Equations											
Modeling with Quadratic Equations: Where Are the Giant Ants?	○	○		C	35	○	○	○			Explore issues of scale to better understand quadratic and linear relationships.
Graphing Quadratic Functions		○	○	I	25	○	○	○	○	○	Plot the graph of $y = ax^2 + bx + c$ and study the effects of changing the parameters.
Factoring Trinomials		○		I	35	○	○	○		○	Factor trinomials using algebra tiles and investigate the role of the coefficients.
Graphing Factored Quadratics		○	○	I	35	○	○	○	○	○	Graph a function in the form $f(x) = a(x - r_1)(x - r_2)$, and investigate the role of the parameters.
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