Bridge Builder 8th Grade Math	Code	ACTIVITY 1: STRUCTURAL CONCEPTS	BRIDGE BUILDER ACTIVITIES 2A, 2B, AND 2C: BEAM ME UP	ACTIVITY 3: COMPUTER-BASED BRIDGE MODELING	ACTIVITY 4: BASIC BOX BRIDGE STRUCTURE
NUMBERS AND					
Understand real number					
Understand the meaning of a square root of a number and its connection to the square whose area is the number; understand the meaning of a cube root and its connection to the volume of a cube.	**N.ME.08.01**				
Understand meanings for zero and negative integer	**N.ME.08.02**				
Understand that in decimal form, rational numbers either terminate or eventually repeat, and that calculators truncate or round repeating decimals; locate rational numbers on the number line; know fraction	**N.ME.08.03**				
Understand that irrational numbers are those that cannot be expressed as the quotient of two integers, and cannot be represented by terminating or repeating decimals; approximate the position of familiar irrational numbers	**N.ME.08.04**				
Estimate and solve problems with square roots and cube roots using calculators.	**N.FL.08.05**				

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Find square roots of perfect squares and approximate the square roots of non-perfect squares by locating between consecutive integers, e.g., √130 is between 11 and 12.	N.FL.08.06				
Solve problems					
Understand percent increase and percent decrease in both sum and product form, e.g., 3% increase of a quantity x is x + .03x = 1.03x.	N.MR.08.07				
Solve problems involving percent increases and decreases.	N.MR.08.08				
Solve problems involving compounded interest or multiple discounts.	N.FL.08.09				
Calculate weighted averages such as course grades, consumer price indices, and sports ratings.	N.MR.08.10				
Solve problems involving ratio units, such as miles per hour, dollars per pound, or persons per square mile.*	N.FL.08.11				
ALGEBRA					
Understand the concept of non-linear functions using basic examples					

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Identify and represent linear functions, quadratic functions, and other simple functions including inversely proportional relationships (y = k/x); cubic's (y = ax3); roots (y = √x); and exponentials (y = ax , a > 0); using tables, graphs, and equations.*	A.RP.08.01				
For basic functions, e.g., simple quadratics, direct and indirect variation, and population growth, describe how changes in one variable affect the others.	A.PA.08.02				
Recognize basic functions in problem context, e.g., area of a circle is πr2, volume of a sphere is πr3, and represent them using tables, graphs, and formulas.	A.PA.08.03				
Use the vertical line test to determine if a graph represents a function in one variable.	A.RP.08.04				
Understand and represent quadratic functions					
Identify and represent linear functions, quadratic functions, and other simple functions including inversely proportional relationships (y = k/x); cubic's (y = ax3); roots (y = √x); and exponentials (y = ax , a > 0); using tables, graphs, and equations.*	A.RP.08.01				

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For basic functions, e.g., simple quadratics, direct and indirect variation, and population growth, describe how changes in one variable affect the others.	A.PA.08.02				
Recognize basic functions in problem context, e.g., area of a circle is πr^2, volume of a sphere is πr^3, and represent them using tables, graphs, and formulas.	A.PA.08.03				
Use the vertical line test to determine if a graph represents a function in one variable.	A.RP.08.04				
Understand and represent quadratic functions					
Relate quadratic functions in factored form and vertex form to their graphs, and vice versa; in particular, note that solutions of a quadratic equation are the x-intercepts of the corresponding quadratic function.	A.RP.08.05				

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Graph factorable quadratic functions, finding where the graph intersects the x-axis and the coordinates of the vertex; use words "parabola" and "roots"; include functions in vertex form and those with leading coefficient –1, e.g., $y = x2 – 36$, $y = (x – 2)2 – 9$; $y = – x2$; $y = – (x – 3)2$.	A.RP.08.06				
Recognize, represent, and apply common formulas					
Recognize and apply the common formulas: $(a + b)2 = a2 + 2 ab + b2$ $(a – b)2 = a2 – 2 ab + b2$ $(a + b) (a – b) = a2 – b2$; represent geometrically.	A.FO.08.07				
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Factor simple quadratic expressions with integer coefficients, e.g., $x2 + 6x + 9$, $x2 + 2x – 3$, and $x2 – 4$; solve simple quadratic equations, e.g., $x2 = 16$ or $x2 = 5$ (by taking square roots); $x2 – x – 6 = 0$, $x2 – 2x = 15$ (by factoring); verify solutions by evaluation.	A.FO.08.08				
Solve applied problems involving simple quadratic equations.	A.FO.08.09				
Understand solutions and solve equations, simultaneous equations, and linear inequalities					

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Understand that to solve the equation f(x) = g(x) means to find all values of x for which the equation is true, e.g., determine whether a given value, or values from a given set, is a solution of an equation (0 is a solution of $3x2 + 2 = 4x + 2$, but 1 is not a solution).	A.FO.08.10				
Solve simultaneous linear equations in two variables by graphing, by substitution, and by linear combination; estimate solutions using graphs; include examples with no solutions and infinitely many solutions.	A.FO.08.11				
Solve linear inequalities in one and two variables, and graph the solution sets.	A.FO.08.12				
Set up and solve applied problems involving simultaneous linear equations and linear inequalities.	A.FO.08.13				
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GEOMETRY					
Understand and use the Pythagorean Theorem					
G.GS.08.01 Understand at least one proof of the Pythagorean Theorem; use the Pythagorean Theorem and its converse to solve applied problems including perimeter, area, and volume problems.	G.GS.08.01				

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Find the distance between two points on the coordinate plane using the distance formula; recognize that the distance formula is an application of the Pythagorean Theorem.	G.LO.08.02	▓	▓	▓	▓
Solve problems about geometric figures					
Understand the definition of a circle; know and use the formulas for circumference and area of a circle to solve problems.	G.SR.08.03				
Find area and perimeter of complex figures by sub-dividing them into basic shapes (quadrilaterals, triangles, circles).	G.SR.08.04				
Solve applied problems involving areas of triangles, quadrilaterals, and circles.	G.SR.08.05				
Understand concepts of volume and surface area, and apply formulas					
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Know the volume formulas for generalized cylinders ((area of base) x height), generalized cones and pyramids ((area of base) x height), and spheres (π (radius) 3) and apply them to solve problems.	G.SR.08.06	▓	▓	▓	▓
Understand the concept of surface area, and find the surface area of prisms, cones, spheres, pyramids, and cylinders.	G.SR.08.07	▓	▓	▓	▓
Visualize solids					

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Sketch a variety of two-dimensional representations of three-dimensional solids including orthogonal views (top, front, and side), picture views (projective or isometric), and nets; use such two-dimensional representations to help solve problems.	G.SR.08.08	▓	▓	▓	▓
Understand and apply concepts of transformation and symmetry					
Understand the definition of a dilation from a point in the plane, and relate it to the definition of similar polygons.	G.TR.08.09	▓	▓	▓	▓
Understand and use reflective and rotational symmetries of two-dimensional shapes and relate them to transformations to solve problems	G.TR.08.10	▓	▓	▓	▓
DATA AND PROBABILITY					
Draw, explain, and justify conclusions based on data		▓	▓	▓	▓
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Determine which measure of central tendency (mean, median, mode) best represents a data set, e.g., salaries, home prices, for answering certain questions; justify the choice made	D.AN.08.01				

Recognize practices of collecting and displaying data that may bias the presentation or analysis.	D.AN.08.02				
Understand probability concepts for simple and compound events					
Compute relative frequencies from a table of experimental results for a repeated event. Interpret the results using relationship of probability to relative frequency.*	D.PR.08.03				
Apply the Basic Counting Principle to find total number of outcomes possible for independent and dependent events, and calculate the probabilities using organized lists or tree diagrams.	D.PR.08.04				
Find and/or compare the theoretical probability, the experimental probability, and/or the relative frequency of a given event.*	D.PR.08.05				
Understand the difference between independent and dependent events, and recognize common misconceptions involving probability, e.g., Alice rolls a 6 on a die three times in a row; she is just as likely to roll a 6 on the fourth roll as she was on any previous roll.	D.PR.08.06				

ACTIVITY 5: IMPROVED BOX BRIDGE STRUCTURE

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