

	Code	Introduction	Momentum Activity 1: Bump-N-Run	Momentum Activity 2: Calculated Collisions	Momentum Activity 3: Design Your Own TMS	Impulse Activity 1: Stop That Truck!	
<b>NUMBERS AND OPERATIONS</b>							
<b>Understand real number concepts</b>							
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.	<b>N.ME.08.01</b>						
Understand meanings for zero and negative integer exponents.	<b>N.ME.08.02</b>						
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 forms of common repeating decimals	<b>N.ME.08.03</b>						
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	<b>N.ME.08.04</b>						
Estimate and solve problems with square roots and cube roots using calculators.	<b>N.FL.08.05</b>						

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

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<p>Identify and represent linear functions, quadratic functions, and other simple functions including inversely proportional relationships (<math>y = k/x</math>); cubics (<math>y = ax^3</math>); roots (<math>y = \sqrt{x}</math>); and exponentials (<math>y = ax</math>, <math>a &gt; 0</math>); using tables, graphs, and equations.*</p>	<p style="text-align: center;"><b>A.RP.08.01</b></p>						
<p>For basic functions, e.g., simple quadratics, direct and indirect variation, and population growth, describe how changes in one variable affect the others.</p>	<p style="text-align: center;"><b>A.PA.08.02</b></p>						
<p>Recognize basic functions in problem context, e.g., area of a circle is <math>\pi r^2</math>, volume of a sphere is <math>\frac{4}{3}\pi r^3</math>, and represent them using tables, graphs, and formulas.</p>	<p style="text-align: center;"><b>A.PA.08.03</b></p>						
<p>Use the vertical line test to determine if a graph represents a function in one variable.</p>	<p style="text-align: center;"><b>A.RP.08.04</b></p>						
<p><b>Understand and represent quadratic functions</b></p>							
<p>Identify and represent linear functions, quadratic functions, and other simple functions including inversely proportional relationships (<math>y = k/x</math>); cubics (<math>y = ax^3</math>); roots (<math>y = \sqrt{x}</math>); and exponentials (<math>y = ax</math>, <math>a &gt; 0</math>); using tables, graphs, and equations.*</p>	<p style="text-align: center;"><b>A.RP.08.01</b></p>						

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						
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Recognize basic functions in problem context, e.g., area of a circle is $\pi r^2$ , volume of a sphere is $\frac{4}{3}\pi r^3$ , 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						
<b>Understand and represent quadratic functions</b>							
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						
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., $y = x^2 - 36$ , $y = (x - 2)^2 - 9$ ; $y = -x^2$ ; $y = -(x - 3)^2$ .	A.RP.08.06						
<b>Recognize, represent, and apply common formulas</b>							

Recognize and apply the common formulas: $(a + b)^2 = a^2 + 2 ab + b^2$ $(a - b)^2 = a^2 - 2 ab + b^2$ $(a + b)(a - b) = a^2 - b^2$ ; represent geometrically.	<b>A.FO.08.07</b>						
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Factor simple quadratic expressions with integer coefficients, e.g., $x^2 + 6x + 9$ , $x^2 + 2x - 3$ , and $x^2 - 4$ ; solve simple quadratic equations, e.g., $x^2 = 16$ or $x^2 = 5$ (by taking square roots); $x^2 - x - 6 = 0$ , $x^2 - 2x = 15$ (by factoring); verify solutions by evaluation.	<b>A.FO.08.08</b>						
Solve applied problems involving simple quadratic equations.	<b>A.FO.08.09</b>						
<b>Understand solutions and solve equations, simultaneous equations, and linear inequalities</b>							
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 $3x^2 + 2 = 4x + 2$ , but 1 is not a solution).	<b>A.FO.08.10</b>						
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.	<b>A.FO.08.11</b>						

Solve linear inequalities in one and two variables, and graph the solution sets.	<b>A.FO.08.12</b>						
Set up and solve applied problems involving simultaneous linear equations and linear inequalities.	<b>A.FO.08.13</b>						
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<b>GEOMETRY</b>							
<b>Understand and use the Pythagorean Theorem</b>							
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.	<b>G.GS.08.01</b>						
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.	<b>G.LO.08.02</b>						
<b>Solve problems about geometric figures</b>							
Understand the definition of a circle; know and use the formulas for circumference and area of a circle to solve problems.	<b>G.SR.08.03</b>						
Find area and perimeter of complex figures by sub-dividing them into basic shapes (quadrilaterals, triangles, circles).	<b>G.SR.08.04</b>						

Solve applied problems involving areas of triangles, quadrilaterals, and circles.	<b>G.SR.08.05</b>						
<b>Understand concepts of volume and surface area, and apply formulas</b>							
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Know the volume formulas for generalized cylinders ((area of base) x height), generalized cones and pyramids ( $\square \square$ (area of base) x height), and spheres ( $\square \square \pi$ (radius) <sup>3</sup> ) and apply them to solve problems.	<b>G.SR.08.06</b>						
Understand the concept of surface area, and find the surface area of prisms, cones, spheres, pyramids, and cylinders.	<b>G.SR.08.07</b>						
<b>Visualize solids</b>							
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.	<b>G.SR.08.08</b>						
<b>Understand and apply concepts of transformation and symmetry</b>							
Understand the definition of a dilation from a point in the plane, and relate it to the definition of similar polygons.	<b>G.TR.08.09</b>						

Understand and use reflective and rotational symmetries of two-dimensional shapes and relate them to transformations to solve problems	<b>G.TR.08.10</b>						
<b>DATA AND PROBABILITY</b>							
<b>Draw, explain, and justify conclusions based on data</b>							
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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	<b>D.AN.08.01</b>						
Recognize practices of collecting and displaying data that may bias the presentation or analysis.	<b>D.AN.08.02</b>						
<b>Understand probability concepts for simple and compound events</b>							
Compute relative frequencies from a table of experimental results for a repeated event. Interpret the results using relationship of probability to relative frequency.*	<b>D.PR.08.03</b>						
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.	<b>D.PR.08.04</b>						



<p>Find and/or compare the theoretical probability, the experimental probability, and/or the relative frequency of a given event.*</p>	<p><b>D.PR.08.05</b></p>						
<p>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.</p>	<p><b>D.PR.08.06</b></p>						