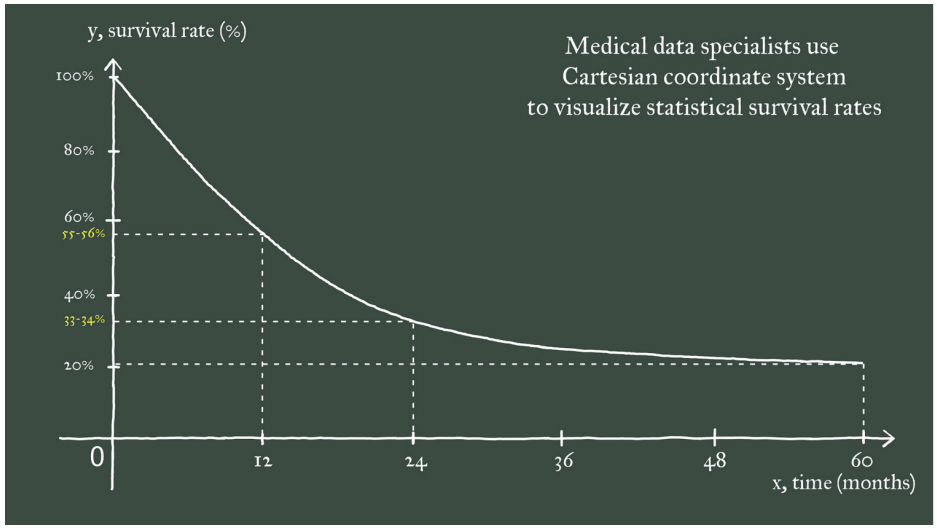
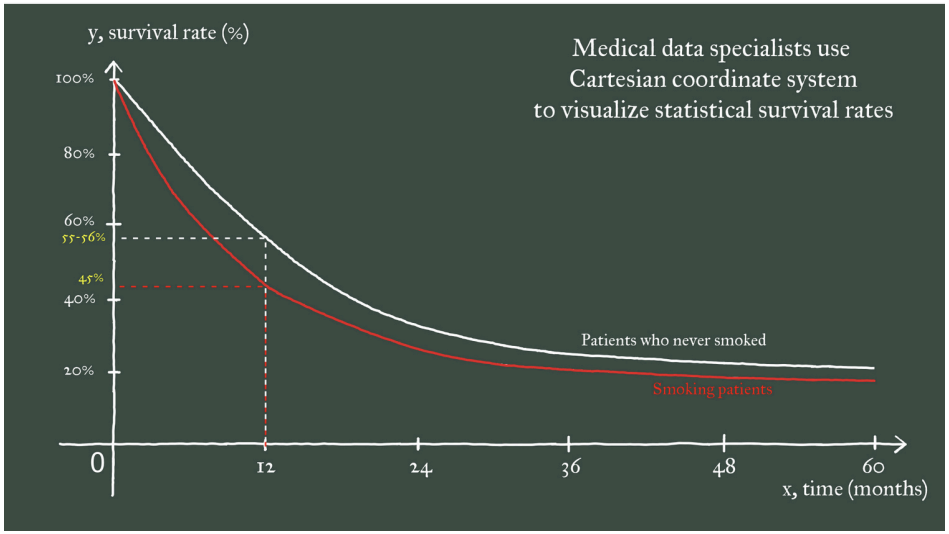
MATH Operations Work Coordinate Planes Applicable Math: Opportunity Calculations Continuing Geometry	7.NS.1: Apply and extend previous understandings of addition and subtraction to add and subtract rational numbers; represent addition and subtraction on a horizontal or vertical number line diagram. 7.NS.1.a Describe situations in which opposite quantities combine to make 0. For example, a hydrogen atom has 0 charge because its two constituents are oppositely charged. 7.NS.1.b Understand p + q as the number located a distance |q| from p, in the positive or negative direction depending on whether q is positive or negative. Show that a number and its opposite have a sum of 0 (are additive inverses). Interpret sums of rational numbers by describing real-world contexts. 7.NS.1.c: Understand subtraction of rational numbers as adding the additive inverse, p - q = p + (-q). Show that the distance between two rational numbers on the number line is the absolute value of their difference, and apply this principle in real-world contexts. 7.NS.1.d: Apply properties of operations as strategies to add and subtract rational numbers. 7.NS.2: Apply and extend previous understandings of multiplication and division and of fractions to multiply and divide rational numbers.	A. Assessments. While you have already completed initial assessments, in January/February of each year we take at minimum 1 hour per day of silent observation of the Learners in our environment. Working with journals, you as the Educator (along with your co-Educator), will watch and record children most especially in the area of mathematics and reading/writing. This will allow you to further work purposefully and intentionally with them for the second half of the year. B. PRESENT: Pre-Algebra SESSION II via Kahn Academy and TSH. 1. Exponents and Order of Operations (9 films and exercises/quiz) 2. Variables and Expressions (25 films and exercises/quiz) 3. Equations and Inequalities (23 films and exercises/quiz) 4. Percent and Rational Numbers Word Problems (11 films and exercises/quiz) Can Learners solve at the end of this Session: • If a woman making $25 an hour gets a 10% raise, she will make an additional 1/10 of her salary an hour, or $2.50, for a new salary of $27.50. • If you want to place a towel bar 9 3/4 inches long in the center of a door that is 27 1/2 inches wide, you will need to place the bar about 9 inches from each edge; this estimate can be used as a check on the exact computation. • Write your own word problems involving each of the 4 areas above from Khan Academy. C. PRESENT: COORDINATE PLANES

	7.NS.2.a: Understand that multiplication is extended from fractions to rational numbers by requiring that operations continue to satisfy the properties of operations, particularly the distributive property, leading to products such as (-1)(-1) = 1 and the rules for multiplying signed numbers. Interpret products of rational numbers by describing real-world contexts. 7.NS.2.b: Understand that integers can be divided, provided that the divisor is not zero, and every quotient of integers (with non-zero divisor) is a rational number. If p and q are integers, then -(p/q) = (-p)/q = p/(-q). Interpret quotients of rational numbers by describing real-world contexts. 7.NS.2.c: Apply properties of operations as strategies to multiply and divide rational numbers. 7.NS.2.d: Convert a rational number to a decimal using long division; know that the decimal form of a rational number terminates in 0s or eventually repeats. 7.NS.3: Solve real-world and mathematical problems involving the four operations with rational numbers. 7.EE.1: Apply properties of operations as strategies to add, subtract, factor, and expand linear expressions with rational coefficients.	See AEC Film Here: https://members.tshanywhere.org/curriculum/geometry/ 1. COORDINATE PLANES allow human beings to solve geometric questions and to make useful products like GPS. It's always important to UNDERSTAND THE WHY behind math and everything else we learn. Sometimes we learn math just to be able to learn more math and because it's fun. Math is always fun because math doesn't change or adapt like our cells. Math is constant. 2. A Coordinate Plane is just a fancy term for a COORDINATE (graph paper with notches and an X and Y axis) and a PLANE (a surface). Pretty simple. 3. Now, let's say you're a doctor and you want to SEE instead of just READ your numbers. You might want to do this to explain things better. Here is your information on lung cancer: 

	7.EE.2: Understand that rewriting an expression in different forms in a problem context can shed light on the problem and how the quantities in it are related. For example, a + 0.05a = 1.05a means that "increase by 5%" is the same as "multiply by 1.05." 7.EE.3: Solve multi-step real-life and mathematical problems posed with positive and negative rational numbers in any form (whole numbers, fractions, and decimals), using tools strategically. Apply properties of operations to calculate with numbers in any form; convert between forms as appropriate; and assess the reasonableness of answers using mental computation and estimation strategies. For example: If a woman making $25 an hour gets a 10% raise, she will make an additional 1/10 of her salary an hour, or $2.50, for a new salary of $27.50. If you want to place a towel bar 9 3/4 inches long in the center of a door that is 27 1/2 inches wide, you will need to place the bar about 9 inches from each edge; this estimate can be used as a check on the exact computation. 7.EE.4: Use variables to represent quantities in a real-world or mathematical problem, and construct simple equations and inequalities to solve problems by reasoning about the quantities 8.NS.1 Understand informally that every number has a decimal expansion; for rational	What is this showing? Well, after taking data (which we'll learn more about in the coming months) a patient had lung cancer for two years and was still living - they marked this on a Coordinate Plane. After taking more data from more patients, they came up with this curve. What can you predict using this information at a glance? Here's another plane:  What can you see from this Coordinate Plane? Now, let's make sure we know what we're saying and how to place data before we do anything else. 4. LEARNER WORK OF NECESSITY: Coordinate Plane Project

	numbers show that the decimal expansion eventually repeats. Know that other numbers that are not rational are called irrational. 8.NS.2 Use rational approximations of irrational numbers to compare the size of irrational numbers, locate them approximately on a number line, and estimate the value of expressions. 8.EE Expressions, Equations, and Inequalities Work with radicals and integer exponents. 8.EE.1 Know and apply the properties of integer exponents to generate equivalent numerical expressions. 8.EE.2 Use square root and cube root symbols to represent solutions to equations of the form $x^2 = p$ and $x^3 = p$, where p is a positive rational number. Know square roots of perfect squares up to 225 and cube roots of perfect cubes up to 125. Know that the square root of a non-perfect square is irrational. 8.EE.3 Use numbers expressed in the form of a single digit times an integer power of 10 to estimate very large or very small quantities, and to express how many times as much one is than the other. 8.EE.4 Perform multiplication and division with numbers expressed in scientific notation, including problems where both standard decimal form and scientific notation are used. Use scientific notation and choose units of	1. Create a coordinate plane picture using only straight lines between points. Try this: https://www.nasa.gov/stem-content/mystery-picture-graphing-activities/ 2. Create directions for another person to recreate your picture - it can be a simpler version! You need to identify each ordered pair that you plotted, as well as the quadrant each point is located in. 3. Have your friends recreate your picture by following the directions you've written. Do the two pictures match? D. PRESENT: Opportunity Costs 1. Learners WATCH: https://www.youtube.com/watch?v=q0oZ1H8MlD4 2. LEARNER WORK OF NECESSITY: Take time to write or draw out your day. What do you do every day with the moments that you are awake? Now, write or draw out what you'd like to do better? Be a scientist? Pro football player? We know that takes a lot of practice. **Most people who do things well have put in at least 10,000 hours of practice.** Maybe you have savings and you'd like to have more money to make the world a better place? Would you like to spend more time with a grandparent who is sick? In your OPPORTUNITY COST plan, DESIGN the next MONTH of your life. Will you do X instead of Y? At the end of the month, what has been the result?

	appropriate size for measurements of very large or very small quantities. Interpret scientific notation that has been generated by technology. Understand the connections between proportional relationships, lines, and linear equations. 8.EE.5 Graph proportional relationships, interpreting the unit rate as the slope of the graph. Compare two different proportional relationships represented in different ways. 8.EE.6 Use similar triangles to explain why the slope m is the same between any two distinct points on a non-vertical line in the coordinate plane; derive the equation y = mx for a line through the origin and the equation y = mx + b for a line intercepting the vertical axis at b. Analyze and solve linear equations and pairs of simultaneous linear equations. 8.EE.7 Solve linear equations in one variable. 8.EE.7a Recognize when linear equations in one variable have one solution, infinitely many solutions, or no solutions. Give examples and show which of these possibilities is the case by successively transforming the given equation into simpler forms. 8.EE.7b Solve linear equations with rational number coefficients, including equations	DOCUMENT and DISPLAY in the classroom once complete. E. PRESENT: Continuing Geometry - The Circle Geometry is meant to be an engaging experience with Learners and you have already set up the start to it in the previous Session. We will progress from Circle, to in-depth work with Triangles to in-depth work with Polygons throughout the year. Here, present each section, each week. Make sure your Written and Oral Mastery Practice is allowing for Learners to exercise their knowledge. See AEC Circle Films & Printables Here: https://members.tshanywhere.org/curriculum/circles/ 1. PRESENT: The Circle Story Lesson & the Story of How we Derive Pi (China) a. PRESENT: The Circle Nomenclature Materials: plane; sheets of newsprint; box of geometry sticks; fraction insets (halves and couple other representations); plate with triangle inscribed circle; pencil. b. PRESENT: Relationships Between Two Circumferences c. PRESENT: Two Circles Material (also known as Concentric Circles or Circumference Strips) Use this material to show: ● If diameter doubles, circumference doubles. ● The ratio between diameters and circumferences remains constant (π). ● Exploration of similarity between circles.

	whose solutions require expanding expressions using the distributive property and combining like terms. 8.EE.8 Analyze and solve pairs of simultaneous linear equations. 8.EE.8a Understand that solutions to a system of two linear equations in two variables correspond to points of intersection of their graphs, because points of intersection satisfy both equations simultaneously. Recognize when the system has one solution, no solution, or infinitely many solutions. 8.EE.8b Solve systems of two linear equations in two variables with integer coefficients: graphically, numerically using a table, and algebraically. Solve simple cases by inspection. 8.EE.8c Solve real-world and mathematical problems involving systems of two linear equations in two variables with integer coefficients. 8.F Functions: Define, evaluate, and compare functions. 8.F.1 Understand that a function is a rule that assigns to each input exactly one output. The graph of a function is the set of ordered pairs consisting of an input and the corresponding output.	d. PRESENT: Compass and Ruler/Geometry Tools Use this material to show: • Used for constructing two circles of different radii. • Reinforces accuracy, scale, and relationships. e. PRESENT: Relationships Between Lines and Circumferences • Materials to present this concept: Geometric Stick Material and Circle Models with Pegs. Use this material to show: • A physical model with a central peg and movable lines may be used to physically demonstrate the location and behavior of tangents, chords, and secants. F. SOCRATIC QUIZZING: Coordinate Planes & Circles 1. In their groups, Learners will create a quiz for this section. CHOOSE A DAY where they can investigate all they have learned, reviewing their work and lessons to create quizzes for their peers. 2. Learners should refer to their Journals to BOTH create the quiz and to look over their notes before the Socratic Quiz. 3. Explain to Learners that Socratic Quizzes are created for them and if you don't remember something, you'll be able to find the answer afterwards.

	8.F.2 Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions). 8.F.3 Interpret the equation y = mx + b as defining a linear function, whose graph is a straight line. Recognize examples of functions that are linear and non-linear. Use functions to model relationships between quantities. 8.F.4 Construct a function to model a linear relationship between two quantities. Determine the rate of change and initial value of the function from a description of a relationship or from two (x, y) values, including reading these from a table or from a graph. Interpret the rate of change and initial value of a linear function in terms of the situation it models, and in terms of its graph or a table of values. 8.F.5 Describe qualitatively the functional relationship between two quantities by analyzing a graph. Sketch a graph that exhibits the qualitative features of a function that has been described in a real-world context.	