

Precalculus
Khan Academy Video Correlations
By SpringBoard Activity

SB Activity	Video(s)
Unit 1: Sequences, Series, Exponential and Logarithmic Functions	
Activity 1 <i>Arithmetic Sequences</i> 1-1 Learning Targets: <ul style="list-style-type: none"> • Write an expression for a sequence. • Use subscript notation. 1-2 Learning Targets: <ul style="list-style-type: none"> • Use sigma notation to represent a series. • Write the algebraic form of an arithmetic sequence. • Calculate the nth term or nth partial sum of an arithmetic series. 1-3 Learning Targets: <ul style="list-style-type: none"> • Understand the method of mathematical induction. • Use mathematical induction to prove statements. 	<i>Sequences and Subscript Notation</i>
	Arithmetic sequences Finding the 100th term in a sequence Equations of sequence patterns
	<i>Sigma Notation</i>
	Sigma notation for sums
	<i>Mathematical Induction</i>
	Proof by induction Alternate proof to induction for integer sum
Activity 2 <i>Geometric Sequences</i> 2-1 Learning Targets: <ul style="list-style-type: none"> • Identify a geometric sequence. • Determine the common ratio of a geometric sequence. 2-2 Learning Targets: <ul style="list-style-type: none"> • Write the algebraic form of a geometric sequence. • Calculate the sum of a finite geometric series. 2-3 Learning Targets: <ul style="list-style-type: none"> • Determine if a sequence converges or diverges. • Find the sum of an infinite geometric series. 	<i>Identifying Geometric Sequences</i>
	Geometric sequences introduction Geometric sequences
	<i>Finite Geometric Sequences and Series</i>
	Geometric series Formula for a finite geometric series Series as sum of sequence Constructing a geometric series for new users Geometric series sum to figure out mortgage payments
	<i>Infinite Geometric Sequences and Series</i>
	Sum of an infinite geometric series Another derivation of the sum of an infinite geometric series Geometric series convergence and divergence examples Repeating decimal as infinite geometric series Vertical distance of bouncing ball

<p>Activity 3 <i>Modeling Recursive Relationships</i></p> <p>3-1 Learning Targets:</p> <ul style="list-style-type: none"> • Represent arithmetic and geometric sequences recursively. • Determine the explicit form of a recursive sequence. <p>3-2 Learning Targets:</p> <ul style="list-style-type: none"> • Represent arithmetic and geometric sequences recursively. • Determine the explicit form of a recursive sequence. 	<p>Explicit and Recursive Formulas</p> <p>Explicit and recursive definitions of sequences</p> <p>Converting an explicit function to a recursive function</p>
<p>Activity 4 <i>Exponential Functions</i></p> <p>4-1 Learning Targets:</p> <ul style="list-style-type: none"> • Write, graph, analyze, and model with exponential functions. • Solve exponential equations. <p>4-2 Learning Targets:</p> <ul style="list-style-type: none"> • Write, graph, analyze, and model with exponential functions. • Calculate compound interest. • Solve exponential equations. <p>4-3 Learning Targets:</p> <ul style="list-style-type: none"> • Write, graph, analyze, and model with exponential functions. • Calculate compound interest. • Solve exponential equations. 	<p>Exponential Functions and Equations</p> <p>Exponential growth functions</p> <p>Graphing exponential functions</p> <p>Solving exponential equation</p> <p>Modeling with Exponential Functions</p> <p>Exponential growth and decay word problems</p> <p>Decay of cesium 137 example</p> <p>Modeling ticket fines with exponential function</p> <p>Compound Interest</p> <p>Introduction to compound interest and e</p> <p>Compound interest and e (part 2)</p> <p>Compound interest and e (part 3)</p> <p>Compound interest and e (part 4)</p>
<p>Activity 5 <i>Logarithms</i></p> <p>5-1 Learning Targets:</p> <ul style="list-style-type: none"> • Explore the inverse relationship between exponents and logarithms. • Graph logarithmic functions and analyze key features of the graphs. <p>5-2 Learning Targets:</p> <ul style="list-style-type: none"> • Apply the Change of Base Formula. • Use properties of logarithms to evaluate and transform expressions. <p>5-3 Learning Targets:</p> <ul style="list-style-type: none"> • Solve exponential equations by taking the logarithm of both sides. • Use properties of exponents and logarithms to solve logarithmic equations. 	<p>Common and Natural Logarithms</p> <p>Comparing exponential and logarithmic functions</p> <p>Graphing logarithmic functions</p> <p>Matching functions to their graphs</p> <p>Graphs of logarithmic functions</p> <p>Using Properties and the Change of Base Formula</p> <p>Introduction to logarithm properties</p> <p>Introduction to logarithm properties (part 2)</p> <p>Logarithm of a power</p> <p>Sum of logarithms with same base</p> <p>Using multiple logarithm properties to simplify</p> <p>Change of base formula</p> <p>Solving Logarithmic Equations</p>

	Solving exponential equation with logarithm Solving exponential equation Solving logarithmic equations Solving logarithmic equations
Activity 6 <i>Transformations of Functions</i> 6-1 Learning Targets: <ul style="list-style-type: none"> Graph transformations of functions and write the equations of the transformed functions. Describe the symmetry of the graphs of even and odd functions. 6-2 Learning Targets: <ul style="list-style-type: none"> Add, subtract, multiply, and divide functions. Transform and perform operations with piecewise-defined functions. 	<i>Transforming Functions</i> Recognizing odd and even functions Connection between even and odd numbers and functions Recognizing features of functions (example 1) Recognizing features of functions (example 2) Recognizing features of functions (example 3)
	<i>Function Operations</i> Sum of functions Difference of functions Product of functions Quotient of functions
	Activity 7 <i>Modeling with Power Functions</i> 7-1 Learning Targets: <ul style="list-style-type: none"> Write an equation that models a data set. Transform data to determine whether a power function is a good model for a data set. 7-2 Learning Targets: <ul style="list-style-type: none"> Graph power functions. Identify and analyze key features of the graphs of power functions.
Activity 8 <i>Compositions of Functions and Inverses</i> 8-1 Learning Targets: <ul style="list-style-type: none"> Determine the composition of two functions. Determine the inverse of a function. 8-2 Learning Targets: <ul style="list-style-type: none"> Find the inverse of a function. Restrict the domain of a function so that its inverse is also a function. 	<i>Composition of Functions</i> Introduction to function composition Creating new function from composition Evaluating composite functions example Modeling with function composition
	<i>Inverse Functions</i> Introduction to function inverses Function inverse example 1 Function inverses example 2 Function inverses example 3
Unit 2: Functions and Their Graphs	

<p>Activity 9 <i>Polynomials</i></p> <p>9-1 Learning Targets:</p> <ul style="list-style-type: none"> • Compare models to best fit a data set. • Use a polynomial regression to make predictions. <p>9-2 Learning Targets:</p> <ul style="list-style-type: none"> • Describe and analyze graphs of polynomial functions. • Graph polynomial functions using technology. 	<p><i>Polynomial Functions: End Behavior</i></p> <p>Polynomial end behavior</p> <p>Polynomial end behavior example</p> <p>Another polynomial end behavior example</p> <p>Polynomial end behavior exercise example</p>
<p>Activity 10 <i>Analyzing Polynomial Functions</i></p> <p>10-1 Learning Targets:</p> <ul style="list-style-type: none"> • Analyze end behavior and zeros to sketch polynomial functions. • Understand the Fundamental Theorem of Algebra. • Understand the Linear Factorization Theorem. <p>10-2 Learning Targets:</p> <ul style="list-style-type: none"> • Apply the Rational Root Theorem to find zeros. • Use the Factor Theorem. • Apply the Remainder Theorem. <p>10-3 Learning Targets:</p> <ul style="list-style-type: none"> • Use Descartes' Rule of Signs. • Accurately graph polynomial functions. 	<p><i>Fundamental Theorem of Algebra</i></p> <p>Fundamental theorem of algebra</p> <p>Fundamental theorem of algebra for quadratic</p> <p><i>Factoring Polynomials</i></p> <p>Factoring sum of cubes</p> <p>Difference of cubes factoring</p> <p>Factoring special products</p> <p>Example: Factoring a fourth degree expression</p> <p><i>Roots of Polynomial Functions</i></p> <p>Possible number of real roots</p> <p>Identifying graph based on roots</p>
<p>Activity 11 <i>Complex Polynomial Roots and Inequalities</i></p> <p>11-1 Learning Targets:</p> <ul style="list-style-type: none"> • Maximize volume in applications. • Apply the Complex Conjugate Theorem. <p>11-2 Learning Targets:</p> <ul style="list-style-type: none"> • Rewrite polynomial functions in factored form. • Find all of the zeros of a polynomial function. <p>11-3 Learning Targets:</p> <ul style="list-style-type: none"> • Solve polynomial inequalities. • Represent solutions using interval notation and graphs. 	<p><i>Complex Conjugates</i></p> <p>Complex conjugates example</p> <p><i>Roots of Polynomials</i></p> <p>Factoring 5th degree polynomial to find real zeros</p>
<p>Activity 12 <i>Rational Expressions and the Reciprocal Function</i></p> <p>12-1 Learning Targets:</p>	<p><i>Asymptotes</i></p> <p>Asymptotes of rational functions</p> <p>Horizontal and vertical asymptotes of function</p>

<ul style="list-style-type: none"> • Write ratios of variable expressions. • Write a rational function based on a real-world scenario. <p>12-2 Learning Targets:</p> <ul style="list-style-type: none"> • Write equations for vertical and horizontal asymptotes. • Sketch the graph of a rational function. 	<p>Finding horizontal and vertical asymptotes</p> <p><i>Rational Functions and Their Graphs</i></p> <p>Matching rational functions to their graphs</p>
<p>Activity 13 <i>Rational Functions</i></p> <p>13-1 Learning Targets:</p> <ul style="list-style-type: none"> • Compare and contrast graphs of rational functions. • Write and sketch graphs of transformations of rational functions. <p>13-2 Learning Targets:</p> <ul style="list-style-type: none"> • Determine horizontal, vertical, or oblique asymptotes. • Accurately graph rational functions. • Solve rational inequalities. <p>13-3 Learning Targets:</p> <ul style="list-style-type: none"> • Write the equation of a rational function given certain attributes. • Solve rational inequalities. 	<p><i>Graphing Rational Functions</i></p> <p>Another rational function graph example</p> <p>A third example of graphing a rational function</p> <p><i>Rational Inequalities</i></p> <p>Rational inequalities</p> <p>Rational inequalities 2</p>
<p>Unit 3: Trigonometric Functions</p>	
<p>Activity 14 <i>Angles and Angle Measure</i></p> <p>14-1 Learning Targets:</p> <ul style="list-style-type: none"> • Draw angles in standard position. • Find the initial side and terminal side of an angle in standard position. • Identify coterminal angles. <p>14-2 Learning Targets:</p> <ul style="list-style-type: none"> • Measure angles in radians. • Convert angle measures from degrees to radians. • Recognize trigonometric ratios to complete reference triangles. 	<p><i>Radian Measure</i></p> <p>Introduction to radians</p> <p>Rotation by radians and quadrants</p> <p>Finding arc length from radian angle measure</p> <p>Example: Radian measure and arc length</p> <p>Example: Converting degrees to radians</p> <p>Example: Converting radians to degrees</p> <p>Radian and degree conversion practice</p> <p>Radians and degrees</p>
<p>Activity 15 <i>Sinusoidal Functions</i></p> <p>15-1 Learning Targets:</p> <ul style="list-style-type: none"> • Recognize situations that involve periodic data. • Sketch a graph of periodic data. <p>15-2 Learning Targets:</p>	<p><i>Exploring Periodic Data</i></p> <p>Modeling annual temperature variation with trigonometry</p> <p>Modeling temperature through the day</p> <p>Day length in Alaska</p> <p><i>Periodic Functions</i></p> <p>Midline, amplitude and period of a function</p>

<ul style="list-style-type: none"> Explore how a change in parameters affects a graph. Determine the period, amplitude, or phase shift of a periodic function. <p>15-3 Learning Targets:</p> <ul style="list-style-type: none"> Graph a periodic function with various domains. Compare the graph of $y = \sin x$ to periodic graphs. 	<p>Example: Amplitude and period</p> <p>Example: Amplitude and period transformations</p> <p>Example: Amplitude and period cosine transformations</p> <p>Graph of the Sine and Cosine Function</p> <p>Example: Graph, domain, and range of sine function</p> <p>Example: Graph of cosine</p> <p>Example: Intersection of sine and cosine</p>
<p>Activity 16 <i>Trigonometric Functions and the Unit Circle</i></p> <p>16-1 Learning Targets:</p> <ul style="list-style-type: none"> Label points on the unit circle. Use the unit circle to find trigonometric values. <p>16-2 Learning Targets:</p> <ul style="list-style-type: none"> Define the reciprocal trigonometric functions using the unit circle. Evaluate all six trigonometric functions for an angle in standard position 	<p>The Unit Circle</p> <p>Introduction to the unit circle</p> <p>Unit circle manipulative</p> <p>Matching ratios to trig functions</p> <p>Solving triangle in unit circle</p> <p>Finding trig functions of special angles example</p> <p>Reciprocal Trigonometric Functions</p> <p>Secant (sec), cosecant (csc) and cotangent (cot) example</p> <p>Example: Using trig to solve for missing information</p>
<p>Activity 17 <i>Graphs of the form $y = A \sin[B(x - C)] + D$</i></p> <p>17-1 Learning Targets:</p> <ul style="list-style-type: none"> Graph a trigonometric function over a specified interval. Describe how changing parameters affect a trigonometric graph.. <p>17-2 Learning Targets:</p> <ul style="list-style-type: none"> Find the amplitude and period of a trigonometric function. Write a trigonometric function given its graph. Model situations with trigonometric functions. 	<p>Trigonometric Graphs</p> <p>Example: Figure out the trig function</p> <p>Determining the equation of a trig function</p>
<p>Activity 18 <i>Graphs of Trigonometric Functions</i></p> <p>18-1 Learning Targets:</p> <ul style="list-style-type: none"> Sketch the graphs of $\csc x$, $\sec x$, $\tan x$, and $\cot x$. Find the period and locate asymptotes of reciprocal trig functions. 	<p>Tangent Graph</p>

<ul style="list-style-type: none"> Determine the domain and range of reciprocal trig functions. 18-2 Learning Targets: <ul style="list-style-type: none"> Graph transformations of reciprocal trig functions. Describe how changing parameters affect a trigonometric graph. 	
Activity 19 <i>Inverse Trigonometric Functions</i> 19-1 Learning Targets: <ul style="list-style-type: none"> Apply a trigonometric function to a real-world situation. Define and apply the inverse cosine function. 19-2 Learning Targets: <ul style="list-style-type: none"> Relate one-to-one functions to inverse trigonometric functions. Define and apply the inverse sine function. 19-3 Learning Targets: <ul style="list-style-type: none"> Define and apply the inverse tangent function. Find values of inverse trigonometric functions. 	<p style="text-align: center;"><i>Inverse Cosine Functions</i></p> <p>Inverse trig functions: arccos</p> <p>Example: Calculator to evaluate inverse trig function</p> <hr/> <p style="text-align: center;"><i>Inverse Sine Functions</i></p> <p>Inverse trig functions: arcsin</p> <p>Example: Calculator to evaluate inverse trig function</p> <hr/> <p style="text-align: center;"><i>Inverse Tangent Functions</i></p> <p>Inverse trig functions: arctan</p> <p>Example: Calculator to evaluate inverse trig function</p> <hr/> <p style="text-align: center;"><i>Modeling with Trigonometric Functions</i></p> <p>Inverse tan domain and range</p> <p>Inverse tangent scenario</p> <p>Angle of sun with the ground based on shadow</p> <p>Modeling annual temperature variation with trigonometry</p> <p>Applying inverse trig function with model</p>
Activity 20 <i>Solving Simple Trigonometric Equations</i> 20-1 Learning Targets: <ul style="list-style-type: none"> Apply a trigonometric equation to represent a real-world situation. Find the general solution to a trigonometric equation 20-2 Learning Targets: <ul style="list-style-type: none"> Use reference angles to solve trigonometric equations. Find the solution to a trigonometric equation over an interval. Generate a trigonometric equation for a real-world situation 	N/A
Unit 4: Analytic Trigonometry and Trigonometric Applications	
Activity 21 <i>Trigonometric Identities</i> 21-1 Learning Targets:	<p style="text-align: center;"><i>Trigonometric Identities</i></p> <p>Pythagorean trig identity from soh cah toa</p> <p>Pythagorean trig identity from unit circle</p>

<ul style="list-style-type: none"> Define the reciprocal and quotient identities. Use and transform the Pythagorean identity. <p>21-2 Learning Targets:</p> <ul style="list-style-type: none"> Simplify trigonometric expressions. Verify trigonometric identities. 	<p>Using the Pythagorean trig identity</p> <p><i>Simplifying Trigonometric Expressions</i></p> <p>Examples using pythagorean identities to simplify trigonometric expressions</p>
<p>Activity 22 <i>Identities and Equations</i></p> <p>22-1 Learning Targets:</p> <ul style="list-style-type: none"> Use the unit circle to write equivalent trigonometric expressions. Write cofunction identities for sine and cosine. <p>22-2 Learning Targets:</p> <ul style="list-style-type: none"> Use trigonometric identities to solve equations. Solve trigonometric equations by graphing. 	<p>N/A</p>
<p>Activity 23 <i>Multiple Angle Identities</i></p> <p>23-1 Learning Targets:</p> <ul style="list-style-type: none"> Model a sound wave with a trigonometric function. Derive an expression for the cosine of a difference. <p>23-2 Learning Targets:</p> <ul style="list-style-type: none"> Write the sum and difference identities for sine, cosine, and tangent. Use sum and difference identities to find exact values of a trig function. Derive the double angle and half angle identities. <p>23-3 Learning Targets:</p> <ul style="list-style-type: none"> Use trigonometric identities to solve equations. Verify trigonometric identities 	<p><i>Exploring Sums of Trig Functions</i></p> <p>Applying angle addition formula for sin</p> <p>Angle addition formula with cosine</p> <p>Another example using angle addition formula with cosine</p> <p>Sine of non special angle</p> <p>Cosine addition identity example</p> <p>Proof of angle addition formula for sine</p> <p>Proof of angle addition formula for cosine</p> <p><i>Double Angle Formulas</i></p> <p>Double angle formula for cosine example</p>
<p>Activity 24 <i>Law of Cosines</i></p> <p>24-1 Learning Targets:</p> <ul style="list-style-type: none"> Use trigonometry to draw and interpret diagrams for a model. 	<p><i>Law of Cosines</i></p> <p>Law of cosines</p> <p>Law of cosines to determine grade</p> <p>Law of cosines for star distance</p> <p>Proof of the law of cosines</p>

<ul style="list-style-type: none"> Write a trigonometric function for a real-world situation <p>24-2 Learning Targets:</p> <ul style="list-style-type: none"> Write equations for the Law of Cosines using a standard angle. Apply the Law of Cosines in real-world and mathematical situations. 	
<p>Activity 25 <i>Law of Sines</i></p> <p>25-1 Learning Targets:</p> <ul style="list-style-type: none"> Calculate the bearing of a flight. Derive and use the Law of Sines. Find unknown sides or angles in oblique triangles. <p>25-2 Learning Targets:</p> <ul style="list-style-type: none"> Determine the number of distinct triangles given certain criteria. Use the Law of Sines to solve triangles with unknown sides or angles. 	<p style="text-align: center;"><i>Law of Sines</i></p> <p>Law of sines</p> <p>Law of sines for missing angle</p> <p>Proof: Law of sines</p>
Unit 5: Conics, Parametric Equations, and Vectors	
<p>Activity 26 <i>Parabola Equations and Graphs</i></p> <p>26-1 Learning Targets:</p> <ul style="list-style-type: none"> Define conic sections as intersections of a double-napped cone. Relate the locus definition of a parabola to its equation. Find the inverse relation for a parabola. <p>26-2 Learning Targets:</p> <ul style="list-style-type: none"> Find the standard form of a parabola. Graph parabolas in the coordinate plane. Find the focus, directrix, and axis of symmetry of a parabola. Find the equation of a parabola with certain characteristics. 	<p style="text-align: center;"><i>Parabolas and Conic Sections</i></p> <p>Introduction to conic sections</p> <p style="text-align: center;"><i>Graphs of Parabolas</i></p> <p>Examples: Graphing and interpreting quadratics</p> <p>Graphing a parabola with a table of values</p> <p>Graphing a parabola by finding the roots and vertex</p> <p>Graphing a parabola using roots and vertex</p> <p>Multiple examples graphing parabolas using roots and vertices</p> <p style="text-align: center;"><i>Graphs and Equations of Parabolas</i></p> <p>Parabola vertex and axis of symmetry</p> <p>Focus and directrix introduction</p> <p>Using the focus and directrix to find the equation of a parabola</p> <p>Equation for parabola from focus and directrix</p> <p>Finding focus and directrix from vertex</p> <p>Finding the vertex of a parabola example</p>
<i>Ellipses</i>	

<p>Activity 27 <i>Ellipses and Hyperbolas</i></p> <p>27-1 Learning Targets:</p> <ul style="list-style-type: none"> Define and sketch an ellipse. Determine the equation of an ellipse. Graph an ellipse using its characteristics. <p>27-2 Learning Targets:</p> <ul style="list-style-type: none"> Define and sketch a hyperbola. Determine the equation of a hyperbola. Graph a hyperbola using its characteristics. <p>27-3 Learning Targets:</p> <ul style="list-style-type: none"> Graph hyperbolas to represent a real-world problem. Use equations of hyperbolas to find intersection points. 	<p>Conic sections: Intro to ellipses</p> <p>Foci of an ellipse</p> <p>Identifying an ellipse from equation</p> <hr/> <p style="text-align: center;"><i>Hyperbolas</i></p> <p>Conic sections: Intro to hyperbolas</p> <p>Conic sections: Hyperbolas 2</p> <p>Conic sections: Hyperbolas 3</p> <p>Foci of a hyperbola</p> <p>Proof: Hyperbola foci</p> <p>Identifying a hyperbola from an equation</p> <p>Hyperbola and parabola examples</p>
<p>Activity 28 <i>Polar Graphs</i></p> <p>28-1 Learning Targets:</p> <ul style="list-style-type: none"> Understand and use the polar grid. Define polar coordinates. Plot and label points in the polar grid. <p>28-2 Learning Targets:</p> <ul style="list-style-type: none"> Convert rectangular coordinates to a polar point (r, θ). Convert polar coordinates to a rectangular point (x, y). <p>28-3 Learning Targets:</p> <ul style="list-style-type: none"> Express x and y in terms of r and θ. Sketch polar curves on the polar grid. Use polar functions to represent real-world situations. 	<p style="text-align: center;"><i>Polar Coordinates</i></p> <p>Polar coordinates 1</p> <p>Polar coordinates 2</p> <p>Polar coordinates 3</p>
<p>Activity 29 <i>Polar Curves and Polar Conics</i></p> <p>29-1 Learning Targets:</p> <ul style="list-style-type: none"> Sketch graphs represented by polar equations. Compare and contrast polar graphs. Write equivalent rectangular and polar equations. <p>29-2 Learning Targets:</p> <ul style="list-style-type: none"> Convert a polar equation to rectangular form. Convert a rectangular equation to polar form. 	<p style="text-align: center;">N/A</p>

<ul style="list-style-type: none"> Describe and sketch graphs of polar equations. <p>29-3 Learning Targets:</p> <ul style="list-style-type: none"> Classify different types of polar equations. Explore patterns in the graphs of polar curves. Predict the resulting graph for a polar equation. 	
<p>Activity 30 <i>Parametric Equations</i></p> <p>30-1 Learning Targets:</p> <ul style="list-style-type: none"> Use data points on a grid to write linear equations. Interpret the parameters of an equation in a real-world context. Write rules to describe the position of an object at time t. <p>30-2 Learning Targets:</p> <ul style="list-style-type: none"> Define and write parametric equations. Use parametric equations to solve real-world problems. <p>30-3 Learning Targets:</p> <ul style="list-style-type: none"> Convert equations from rectangular to parametric, and vice versa. Use parametric equations to solve real-world problems. 	<p style="text-align: center;"><i>Parametric Equations</i></p> <p>Parametric equations 1</p> <p>Parametric equations 2</p> <p>Parametric equations 3</p> <p>Parametric equations 4</p>
<p>Activity 31 <i>Parametric Equations Revisited</i></p> <p>31-1 Learning Targets:</p> <ul style="list-style-type: none"> Understand, calculate, and compare angular and linear velocities. Write equations to model circular motion. Sketch the graph of circular motion. <p>31-2 Learning Targets:</p> <ul style="list-style-type: none"> Sketch the graph of a moving object. Write parametric equations using trigonometry. Use technology to model motion. <p>31-3 Learning Targets:</p> <ul style="list-style-type: none"> Understand and apply the equations for projectile motion. Write and graph parametric equations. Solve real-world problems involving projectile motion. 	<p style="text-align: center;"><i>Parametric Equations</i></p> <p>Parametric equations 1</p> <p>Parametric equations 2</p> <p>Parametric equations 3</p> <p>Parametric equations 4</p>

<p>Activity 32 <i>Vectors and Complex Numbers</i></p> <p>32-1 Learning Targets:</p> <ul style="list-style-type: none"> • Understand and model rectilinear motion. • Define and use vectors. • Use the notation for position vectors. <p>32-2 Learning Targets:</p> <ul style="list-style-type: none"> • Understand and model rectilinear motion. • Define and use vectors. • Use the notation for position vectors. <p>32-3 Learning Targets:</p> <ul style="list-style-type: none"> • Find the direction angle of a vector. • Resolve a vector into its components. • Sketch vectors and vector sums in the coordinate plane <p>32-4 Learning Targets:</p> <ul style="list-style-type: none"> • Represent complex numbers as vectors. • Find the conjugate of a complex number. • Add, subtract, multiply, and divide complex numbers. <p>32-5 Learning Targets:</p> <ul style="list-style-type: none"> • Find the polar form of a complex number. • Represent complex numbers in polar form in the complex plane. 	<p><i>Introduction to Vectors</i></p> <p>Vector representations exercise example</p> <p>Classifying vectors and quantities example</p> <hr/> <p><i>Operations with Vectors</i></p> <p>Multiplying a vector by a scalar</p> <p>Visualizing vector addition examples</p> <p>Adding vectors</p> <p>Adding vectors exercise example</p> <p>Subtracting vectors exercise example</p> <hr/> <p><i>Vector Components</i></p> <p>Breaking down vectors into components</p> <p>Magnitude and direction of vector sums</p> <p>Magnitude of vector sums</p> <hr/> <p><i>Complex Numbers and Operations</i></p> <p>Introduction to complex numbers</p> <p>Plotting complex numbers on the complex plane</p> <p>Adding complex numbers</p> <p>Subtracting complex numbers</p> <p>Multiplying complex numbers</p> <p>Dividing complex numbers</p> <hr/> <p><i>Polar Form</i></p> <p>Complex number polar form intuition exercise</p> <p>Rectangular to polar form of complex number</p>
<p>Activity 33 <i>Applications of Vectors</i></p> <p>33-1 Learning Targets:</p> <ul style="list-style-type: none"> • Write equations to describe rectilinear motion. • Use vectors to describe velocity of an object. • Interpret speed as the magnitude of a velocity vector. <p>33-2 Learning Targets:</p> <ul style="list-style-type: none"> • Use vectors to describe planar motion. • Graph position vectors in the coordinate plane. • Write a vector equation to model a real-world context. 	<p style="text-align: center;">N/A</p>
<p>Unit 6: Matrices, Systems of Equations, and Volume</p>	

<p>Activity 34 <i>Matrix Operations</i></p> <p>34-1 Learning Targets:</p> <ul style="list-style-type: none"> • Use matrices to represent numeric data. • Add and subtract matrices. • Define and use scalar multiplication. <p>34-2 Learning Targets:</p> <ul style="list-style-type: none"> • Determine if two matrices can be multiplied. • Find the matrix product of two matrices. • Explore properties of matrix operations. <p>34-3 Learning Targets:</p> <ul style="list-style-type: none"> • Determine if a matrix has an inverse. • Find the determinant and inverse of a matrix. • Justify properties of matrix operations. 	<p style="text-align: center;"><i>Representing Data with Matrices</i></p> <p>Introduction to the matrix</p> <p>Representing data with matrices</p> <p>Matrix addition and subtraction</p> <p>Scalar multiplication</p> <hr/> <p style="text-align: center;"><i>Matrix Multiplication</i></p> <p>Matrix multiplication introduction</p> <p>Multiplying a matrix by a matrix</p> <p>Defined and undefined matrix operations</p> <hr/> <p style="text-align: center;"><i>Inverse Matrices</i></p> <p>Finding the determinant of a 2x2 matrix</p> <p>Inverse of a 2x2 matrix</p> <p>Idea behind inverting a 2x2 matrix</p> <p>Finding the determinant of a 3x3 matrix method 1</p> <p>Finding the determinant of a 3x3 matrix method 2</p>
<p>Activity 35 <i>Matrices and Transformations</i></p> <p>35-1 Learning Targets:</p> <ul style="list-style-type: none"> • Use matrices as vectors to translate figures in the plane. • Use matrices as vectors to reflect figures in the plane. <p>35-2 Learning Targets:</p> <ul style="list-style-type: none"> • Use matrices as vectors to rotate figures in the plane. • Use matrices as vectors to dilate figures in the plane. <p>35-3 Learning Targets:</p> <ul style="list-style-type: none"> • Work with matrices to represent real-world situations. • Interpret absolute value of determinants as areas. 	<p style="text-align: center;"><i>Linear Transformations</i></p> <p>Linear transformation examples: Scaling and reflections</p> <p>Linear transformation examples: Rotations in R²</p>
<p>Activity 36 <i>Matrices and Systems of Equations</i></p> <p>36-1 Learning Targets:</p> <ul style="list-style-type: none"> • Write a linear system of equations as a matrix equation. • Represent a real-world situation with a matrix equation. • Identify the coefficient matrix, variable matrix, and constant matrix. 	<p style="text-align: center;"><i>Matrices and Systems of Equations</i></p> <p>Matrices to solve a system of equations</p> <p>Matrix equations and systems</p>

<p>36-2 Learning Targets:</p> <ul style="list-style-type: none"> • Use an inverse matrix to solve a matrix equation. • Connect the existence of an inverse matrix to solutions of systems. <p>36-3 Learning Targets:</p> <ul style="list-style-type: none"> • Use technology to solve large linear systems. • Solve a 3×3 matrix equation using technology. 	
<p>Activity 37 <i>Volume</i></p> <p>37-1 Learning Targets:</p> <ul style="list-style-type: none"> • Understand Cavalieri’s Principle. • Relate Cavalieri’s Principle to volume formulas. <p>37-2 Learning Targets:</p> <ul style="list-style-type: none"> • Informally derive the formula for the volume of a sphere. • Use volume formulas to solve real-world problems. <p>37-3 Learning Targets:</p> <ul style="list-style-type: none"> • Informally derive the formula for the volume of a sphere. • Understand the concept of a limit. • Represent a volume using sums and limits 	<p style="text-align: center;"><i>Volume of Spheres</i></p> <p>Volume of a sphere</p> <hr/> <p style="text-align: center;"><i>Limits</i></p> <p>Introduction to limits</p> <p>Limit examples (part 1)</p> <p>Limit examples (part 2)</p> <p>Limit examples (part 3)</p>