Unit 1. Topic 1. Activities 1 – 3: Objectives and Khan Academy Video Links

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| **Unit 1: Sequences, Series, Exponential and Logarithmic Functions** | |
| **Activity 1**  *Arithmetic Sequences*  1-1 Learning Targets:   * Write an expression for a sequence. * Use subscript notation.   1-2 Learning Targets:   * 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:   * Understand the method of mathematical induction. * Use mathematical induction to prove statements. | ***Sequences and Subscript Notation*** |
| [**Arithmetic sequences**](http://www.khanacademy.org/math/precalculus/seq_induction/seq_and_series/v/arithmetic-sequences)  [**Finding the 100th term in a sequence**](http://www.khanacademy.org/math/precalculus/seq_induction/seq_and_series/v/finding-the-100th-term-in-a-sequence)  [**Equations of sequence patterns**](http://www.khanacademy.org/math/precalculus/seq_induction/seq_and_series/v/equations-of-sequence-patterns) |
| ***Sigma Notation*** |
| [**Sigma notation for sums**](http://www.khanacademy.org/math/precalculus/seq_induction/geometric-sequence-series/v/sigma-notation-sum) |
| ***Mathematical Induction*** |
| [**Proof by induction**](http://www.khanacademy.org/math/precalculus/seq_induction/proof_by_induction/v/proof-by-induction)  [**Alternate proof to induction for integer sum**](http://www.khanacademy.org/math/precalculus/seq_induction/proof_by_induction/v/alternate-proof-to-induction-for-integer-sum) |
| **Activity 2**  *Geometric Sequences*  2-1 Learning Targets:   * Identify a geometric sequence. * Determine the common ratio of a geometric sequence.   1. Learning Targets: * Write the algebraic form of a geometric sequence. * Calculate the sum of a finite geometric series.   2-3 Learning Targets:   * Determine if a sequence converges or diverges. * Find the sum of an infinite geometric series. | ***Identifying Geometric Sequences*** |
| [**Geometric sequences introduction**](http://www.khanacademy.org/math/precalculus/seq_induction/precalc-geometric-sequences/v/geometric-sequences-introduction)  [**Geometric sequences**](http://www.khanacademy.org/math/precalculus/seq_induction/precalc-geometric-sequences/v/geometric-sequences) |
| ***Finite Geometric Sequences and Series*** |
| [**Geometric series**](http://www.khanacademy.org/math/precalculus/seq_induction/geometric-sequence-series/v/geometric-series-introduction)  [**Formula for a finite geometric series**](http://www.khanacademy.org/math/precalculus/seq_induction/geometric-sequence-series/v/geometric-series)  [**Series as sum of sequence**](http://www.khanacademy.org/math/precalculus/seq_induction/seq_and_series/v/series-as-sum-of-sequence)  [**Constructing a geometric series for new users**](http://www.khanacademy.org/math/precalculus/seq_induction/geometric-sequence-series/v/geometric-series-word-problem)  [**Geometric series sum to figure out mortgage payments**](http://www.khanacademy.org/math/precalculus/seq_induction/geometric-sequence-series/v/geometric-series-sum-to-figure-out-mortgage-payments) |
| ***Infinite Geometric Sequences and Series*** |
| [**Sum of an infinite geometric series**](http://www.khanacademy.org/math/precalculus/seq_induction/infinite-geometric-series/v/infinite-geometric-series)  [**Another derivation of the sum of an infinite geometric series**](http://www.khanacademy.org/math/precalculus/seq_induction/infinite-geometric-series/v/deriving-geometric-series-sum-formula)  [**Geometric series convergence and divergence examples**](http://www.khanacademy.org/math/precalculus/seq_induction/infinite-geometric-series/v/geometric-series-convergence-divergence)  [**Repeating decimal as infinite geometric series**](http://www.khanacademy.org/math/precalculus/seq_induction/infinite-geometric-series/v/repeating-decimal-geometric-series)  [**Vertical distance of bouncing ball**](http://www.khanacademy.org/math/precalculus/seq_induction/infinite-geometric-series/v/bouncing-ball-distance) |
| **Activity 3**  *Modeling Recursive Relationships*  3-1 Learning Targets:   * Represent arithmetic and geometric sequences recursively. * Determine the explicit form of a recursive sequence.   3-2 Learning Targets:   * Represent arithmetic and geometric sequences recursively. * Determine the explicit form of a recursive sequence. | ***Explicit and Recursive Formulas*** |
| [***Explicit and recursive definitions of sequences***](http://www.khanacademy.org/math/precalculus/seq_induction/seq_and_series/v/explicit-and-recursive-definitions-of-sequences)  [***Converting an explicit function to a recursive function***](http://www.khanacademy.org/math/precalculus/seq_induction/recursive-functions/v/converting-an-explicit-function-to-a-recursive-function) |
| **Activity 4**  *Exponential Functions*  4-1 Learning Targets:   * Write, graph, analyze, and model with exponential functions. * Solve exponential equations.   4-2 Learning Targets:   * Write, graph, analyze, and model with exponential functions. * Calculate compound interest. * Solve exponential equations.   4-3 Learning Targets:   * Write, graph, analyze, and model with exponential functions. * Calculate compound interest. * Solve exponential equations. | ***Exponential Functions and Equations*** |
| [**Exponential growth functions**](https://www.khanacademy.org/math/algebra2/exponential_and_logarithmic_func/exp_growth_decay/v/exponential-growth-functions)  [**Graphing exponential functions**](https://www.khanacademy.org/math/algebra2/exponential_and_logarithmic_func/exp_growth_decay/v/graphing-exponential-functions)  [**Solving exponential equation**](https://www.khanacademy.org/math/algebra2/exponential_and_logarithmic_func/exponential-modeling/v/solve-exponentials) |
| ***Modeling with Exponential Functions*** |
| [**Exponential growth and decay word problems**](https://www.khanacademy.org/math/algebra2/exponential_and_logarithmic_func/exponential-modeling/v/word-problem-solving-exponential-growth-and-decay)  [**Decay of cesium 137 example**](https://www.khanacademy.org/math/algebra2/exponential_and_logarithmic_func/exponential-modeling/v/decay-of-cesium-137-example)  [**Modeling ticket fines with exponential function**](https://www.khanacademy.org/math/algebra2/exponential_and_logarithmic_func/exponential-modeling/v/modeling-ticket-fines-with-exponential-function) |
| ***Compound Interest*** |
| [**Introduction to compound interest and e**](https://www.khanacademy.org/math/algebra2/exponential_and_logarithmic_func/continuous_compounding/v/introduction-to-compound-interest-and-e)  [**Compound interest and e (part 2)**](http://www.khanacademy.org/math/algebra2/exponential_and_logarithmic_func/continuous_compounding/v/compound-interest-and-e-part-2)  [**Compound interest and e (part 3)**](http://www.khanacademy.org/math/algebra2/exponential_and_logarithmic_func/continuous_compounding/v/compound-interest-and-e-part-3)  [**Compound interest and e (part 4)**](http://www.khanacademy.org/math/algebra2/exponential_and_logarithmic_func/continuous_compounding/v/compound-interest-and-e-part-4) |
| **Activity 5**  *Logarithms*  5-1 Learning Targets:   * Explore the inverse relationship between exponents and logarithms. * Graph logarithmic functions and analyze key features of the graphs.   5-2 Learning Targets:   * Apply the Change of Base Formula. * Use properties of logarithms to evaluate and transform expressions.   5-3 Learning Targets:   * Solve exponential equations by taking the logarithm of both sides. * Use properties of exponents and logarithms to solve logarithmic equations. | ***Common and Natural Logarithms*** |
| [**Comparing exponential and logarithmic functions**](https://www.khanacademy.org/math/algebra2/exponential_and_logarithmic_func/log_functions/v/comparing-exponential-logarithmic-functions)  [**Graphing logarithmic functions**](https://www.khanacademy.org/math/algebra2/exponential_and_logarithmic_func/log_functions/v/graphing-logarithmic-functions)  [**Matching functions to their graphs**](https://www.khanacademy.org/math/algebra2/exponential_and_logarithmic_func/log_functions/v/matching-exponential-functions)  [**Graphs of logarithmic functions**](https://www.khanacademy.org/math/algebra2/exponential_and_logarithmic_func/log_functions/v/logarithmic-function-graphs) |
| ***Using Properties and the Change of Base Formula*** |
| [**Introduction to logarithm properties**](https://www.khanacademy.org/math/algebra2/logarithms-tutorial/logarithm_properties/v/introduction-to-logarithm-properties)  [**Introduction to logarithm properties (part 2)**](https://www.khanacademy.org/math/algebra2/logarithms-tutorial/logarithm_properties/v/introduction-to-logarithm-properties-part-2)  [**Logarithm of a power**](https://www.khanacademy.org/math/algebra2/logarithms-tutorial/logarithm_properties/v/logarithm-of-a-power)  [**Sum of logarithms with same base**](https://www.khanacademy.org/math/algebra2/logarithms-tutorial/logarithm_properties/v/sum-of-logarithms-with-same-base)  [**Using multiple logarithm properties to simplify**](https://www.khanacademy.org/math/algebra2/logarithms-tutorial/logarithm_properties/v/using-multiple-logarithm-properties-to-simplify)  [**Change of base formula**](https://www.khanacademy.org/math/algebra2/logarithms-tutorial/logarithm_properties/v/change-of-base-formula) |
| ***Solving Logarithmic Equations*** |
| [**Solving exponential equation with logarithm**](https://www.khanacademy.org/math/algebra2/logarithms-tutorial/logarithm_basics/v/exponential-equation)  [**Solving exponential equation**](https://www.khanacademy.org/math/algebra2/exponential_and_logarithmic_func/exponential-modeling/v/solve-exponentials)  [**Solving logarithmic equations**](https://www.khanacademy.org/math/algebra2/logarithms-tutorial/logarithm_properties/v/solving-logarithmic-equations)  [**Solving logarithmic equations**](https://www.khanacademy.org/math/algebra2/logarithms-tutorial/logarithm_properties/v/solving-logarithmic-equations_dup_1) |
| **Activity 6**  *Transformations of Functions*  6-1 Learning Targets:   * 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:   * Add, subtract, multiply, and divide functions. * Transform and perform operations with piecewise-defined functions. | ***Transforming Functions*** |
| [**Recognizing odd and even functions**](https://www.khanacademy.org/math/algebra2/functions_and_graphs/analyzing_functions/v/recognizing-odd-and-even-functions)  [**Connection between even and odd numbers and functions**](https://www.khanacademy.org/math/algebra2/functions_and_graphs/analyzing_functions/v/connection-between-even-and-odd-numbers-and-functions)  [**Recognizing features of functions (example 1)**](https://www.khanacademy.org/math/algebra2/functions_and_graphs/analyzing_functions/v/recognizing-features-of-functions-example-1)  [**Recognizing features of functions (example 2)**](https://www.khanacademy.org/math/algebra2/functions_and_graphs/analyzing_functions/v/recognizing-features-of-functions-2-example-2)  [**Recognizing features of functions (example 3)**](https://www.khanacademy.org/math/algebra2/functions_and_graphs/analyzing_functions/v/recognizing-features-of-functions-2-example-3) |
| ***Function Operations*** |
| [**Sum of functions**](https://www.khanacademy.org/math/algebra2/functions_and_graphs/function_expressions/v/sum-of-functions)  [**Difference of functions**](https://www.khanacademy.org/math/algebra2/functions_and_graphs/function_expressions/v/difference-of-functions)  [**Product of functions**](https://www.khanacademy.org/math/algebra2/functions_and_graphs/function_expressions/v/product-of-functions)  [**Quotient of functions**](https://www.khanacademy.org/math/algebra2/functions_and_graphs/function_expressions/v/quotient-of-functions) |
| **Activity 7**  *Modeling with Power Functions*  7-1 Learning Targets:   * 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:   * Graph power functions. * Identify and analyze key features of the graphs of power functions. | ***Finding a regression Line*** |
| [**Fitting a line to data**](https://www.khanacademy.org/math/probability/regression/regression-correlation/v/fitting-a-line-to-data)  [**Squared error of regression line**](https://www.khanacademy.org/math/probability/regression/regression-correlation/v/squared-error-of-regression-line)  [**Regression line example**](https://www.khanacademy.org/math/probability/regression/regression-correlation/v/regression-line-example)  [**Second regression example**](https://www.khanacademy.org/math/probability/regression/regression-correlation/v/second-regression-example) |
| **Activity 8**  *Compositions of Functions and Inverses*  8-1 Learning Targets:   * Determine the composition of two functions. * Determine the inverse of a function.   8-2 Learning Targets:   * Find the inverse of a function. * Restrict the domain of a function so that its inverse is also a function. | ***Composition of Functions*** |
| [**Introduction to function composition**](https://www.khanacademy.org/math/algebra2/functions_and_graphs/composing-functions/v/function-composition)  [**Creating new function from composition**](https://www.khanacademy.org/math/algebra2/functions_and_graphs/composing-functions/v/new-function-from-composition)  [**Evaluating composite functions example**](https://www.khanacademy.org/math/algebra2/functions_and_graphs/composing-functions/v/evaluating-composite-functions-example-1)  [**Modeling with function composition**](https://www.khanacademy.org/math/algebra2/functions_and_graphs/composing-functions/v/modeling-with-composite-functions) |
| ***Inverse Functions*** |
| [**Introduction to function inverses**](https://www.khanacademy.org/math/algebra2/functions_and_graphs/function_inverses_2/v/introduction-to-function-inverses)  [**Function inverse example 1**](https://www.khanacademy.org/math/algebra2/functions_and_graphs/function_inverses_2/v/function-inverse-example-1)  [**Function inverses example 2**](https://www.khanacademy.org/math/algebra2/functions_and_graphs/function_inverses_2/v/function-inverses-example-2)  [**Function inverses example 3**](https://www.khanacademy.org/math/algebra2/functions_and_graphs/function_inverses_2/v/function-inverses-example-3) |