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) |