Unit 2. Topics 1 – 2. Activities 9-13: Objectives and Khan Academy Video Links

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| **Unit 2: Functions and Their Graphs** | |
| **Activity 9**  *Polynomials*  9-1 Learning Targets:   * Compare models to best fit a data set. * Use a polynomial regression to make predictions.   9-2 Learning Targets:   * Describe and analyze graphs of polynomial functions. * Graph polynomial functions using technology. | ***Polynomial Functions: End Behavior*** |
| [**Polynomial end behavior**](https://www.khanacademy.org/math/algebra2/polynomial_and_rational/polynomial-end-behavior/v/polynomial-end-behavior)  [**Polynomial end behavior example**](https://www.khanacademy.org/math/algebra2/polynomial_and_rational/polynomial-end-behavior/v/polynomial-end-behavior-example)  [**Another polynomial end behavior example**](https://www.khanacademy.org/math/algebra2/polynomial_and_rational/polynomial-end-behavior/v/another-polynomial-end-behavior-example)  [**Polynomial end behavior exercise example**](https://www.khanacademy.org/math/algebra2/polynomial_and_rational/polynomial-end-behavior/v/polynomial-end-behavior-exercise-example) |
| **Activity 10**  *Analyzing Polynomial Functions*  10-1 Learning Targets:   * Analyze end behavior and zeros to sketch polynomial functions. * Understand the Fundamental Theorem of Algebra. * Understand the Linear Factorization Theorem.   10-2 Learning Targets:   * Apply the Rational Root Theorem to find zeros. * Use the Factor Theorem. * Apply the Remainder Theorem.   10-3 Learning Targets:   * Use Descartes’ Rule of Signs. * Accurately graph polynomial functions. | ***Fundamental Theorem of Algebra*** |
| [**Fundamental theorem of algebra**](https://www.khanacademy.org/math/algebra2/polynomial_and_rational/fundamental-theorem-of-algebra/v/fundamental-theorem-of-algebra-intro)  [**Fundamental theorem of algebra for quadratic**](https://www.khanacademy.org/math/algebra2/polynomial_and_rational/fundamental-theorem-of-algebra/v/fundamental-theorem-algebra-quadratic) |
| ***Factoring Polynomials*** |
| [**Factoring sum of cubes**](https://www.khanacademy.org/math/algebra2/polynomial_and_rational/factoring-higher-deg-polynomials/v/factoring-sum-of-cubes)  [**Difference of cubes factoring**](https://www.khanacademy.org/math/algebra2/polynomial_and_rational/factoring-higher-deg-polynomials/v/difference-of-cubes-factoring)  [**Factoring special products**](https://www.khanacademy.org/math/algebra/multiplying-factoring-expression/factoring-special-products/v/factoring-special-products)  [**Example: Factoring a fourth degree expression**](https://www.khanacademy.org/math/algebra2/polynomial_and_rational/factoring-higher-deg-polynomials/v/factoring-special-products-2) |
| ***Roots of Polynomial Functions*** |
| [**Possible number of real roots**](https://www.khanacademy.org/math/algebra2/polynomial_and_rational/fundamental-theorem-of-algebra/v/possible-real-roots)  [**Identifying graph based on roots**](https://www.khanacademy.org/math/algebra2/polynomial_and_rational/factoring-higher-deg-polynomials/v/identifying-graph-based-on-roots) |
| **Activity 11**  *Complex Polynomial Roots and Inequalities*  11-1 Learning Targets:   * Maximize volume in applications. * Apply the Complex Conjugate Theorem.   11-2 Learning Targets:   * Rewrite polynomial functions in factored form. * Find all of the zeros of a polynomial function.   11-3 Learning Targets:   * Solve polynomial inequalities. * Represent solutions using interval notation and graphs. | ***Complex Conjugates*** |
| [**Complex conjugates example**](https://www.khanacademy.org/math/algebra2/complex-numbers-a2/complex_numbers/v/complex-conjugates-example) |
| ***Roots of Polynomials*** |
| [**Factoring 5th degree polynomial to find real zeros**](https://www.khanacademy.org/math/algebra2/polynomial_and_rational/factoring-higher-deg-polynomials/v/factoring-5th-degree-polynomial-to-find-real-zeros) |
| **Activity 12**  *Rational Expressions and the Reciprocal Function*  12-1 Learning Targets:   * Write ratios of variable expressions. * Write a rational function based on a real-world scenario.   12-2 Learning Targets:   * Write equations for vertical and horizontal asymptotes. * Sketch the graph of a rational function. | ***Asymptotes*** |
| [**Asymptotes of rational functions**](https://www.khanacademy.org/math/algebra2/rational-expressions/rational-function-graphing/v/asymptotes-of-rational-functions)  [**Horizontal and vertical asymptotes of function**](https://www.khanacademy.org/math/algebra2/rational-expressions/rational-function-graphing/v/horizontal-vertical-asymptotes)  [**Finding horizontal and vertical asymptotes**](https://www.khanacademy.org/math/algebra2/rational-expressions/rational-function-graphing/v/finding-asymptotes-example) |
| ***Rational Functions and Their Gaphs*** |
| [**Matching rational functions to their graphs**](https://www.khanacademy.org/math/algebra2/rational-expressions/rational-function-graphing/v/example-rational-functions-graphs) |
| **Activity 13**  *Rational Functions*  13-1 Learning Targets:   * Compare and contrast graphs of rational functions. * Write and sketch graphs of transformations of rational functions.   13-2 Learning Targets:   * Determine horizontal, vertical, or oblique asymptotes. * Accurately graph rational functions. * Solve rational inequalities.   13-3 Learning Targets:   * Write the equation of a rational function given certain attributes. * Solve rational inequalities. | ***Graphing Rational Functions*** |
| [**Another rational function graph example**](https://www.khanacademy.org/math/algebra2/rational-expressions/rational-function-graphing/v/another-rational-function-graph-example)  [**A third example of graphing a rational function**](https://www.khanacademy.org/math/algebra2/rational-expressions/rational-function-graphing/v/a-third-example-of-graphing-a-rational-function) |
| ***Rational Inequalities*** |
| [**Rational inequalities**](https://www.khanacademy.org/math/algebra2/rational-expressions/solving-rational-equations/v/rational-inequalities)  [**Rational inequalities 2**](https://www.khanacademy.org/math/algebra2/rational-expressions/solving-rational-equations/v/rational-inequalities-2) |