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) |