

Algebra 2 Information

Fluency Recommendations

A-APR.6 This standard sets an expectation that students will divide polynomials with remainder by inspection in simple cases.

A-SSE.2 The ability to see structure in expressions and to use this structure to rewrite expressions is a key skill in everything from advanced factoring (e.g., grouping) to summing series to the rewriting of rational expressions to examine the end behavior of the corresponding rational function.

F-IF.3 Fluency in translating between recursive definitions and closed forms is helpful when dealing with many problems involving sequences and series, with applications ranging from fitting functions to tables to problems in finance.

Mathematical Practice Standards for Algebra 2

Discussion of Mathematical Practices in Relation to Course Content

While all of the mathematical practice standards are important in all three courses, four are especially important in the Algebra II course:

* Construct viable arguments and critique the reasoning of others (MP.3). As in geometry, there are central questions in advanced algebra that cannot be answered definitively by checking evidence. There are important results about all functions of a certain type — the factor theorem for polynomial functions, for example — and these require general arguments (A-APR.2). Deciding whether two functions are equal on an infinite set cannot be settled by looking at tables or graphs; it requires arguments of a different sort (F-IF.8).

* Attend to precision (MP.6). As in the previous two courses, the habit of using precise language is not only a tool for effective communication but also a means for coming to understanding. For example, when investigating loan payments, if students can articulate something like, “What you owe at the end of a month is what you owed at the start of the month, plus $1/12$ of the yearly interest on that amount, minus the monthly payment,” they are well along a path that will let them construct a recursively defined function for calculating loan payments (A-SSE.4).

* Look for and make use of structure (MP.7). The structure theme in Algebra I centered on seeing and using the structure of algebraic expressions. This continues in Algebra II, where students delve deeper into transforming expressions in ways that reveal meaning. The example given in the standards — that $x^4 - y^4$ can be seen as the difference of squares — is typical of this practice. This habit of seeing subexpressions as single entities will serve students well in areas such as trigonometry, where, for example, the factorization of $x^4 - y^4$ described above can be used to show that the functions $\cos 4x - \sin 4x$ and $\cos 2x - \sin 2x$ are, in fact, equal (A-SSE.2).

In addition, the standards call for attention to the structural similarities between polynomials and integers (A-APR.1). The study of these similarities can be deepened in Algebra II: Like integers, polynomials have a division algorithm, and division of polynomials can be used to understand the factor theorem, transform rational expressions, help solve equations and factor polynomials.

* Look for and express regularity in repeated reasoning (MP.8). Algebra II is where students can do a more complete analysis of sequences (F-IF.3), especially arithmetic and geometric sequences, and their associated series. Developing recursive formulas for sequences is facilitated by the practice of abstracting regularity for how you get from one term to the next and then giving a precise description of this process in algebraic symbols (F-BF.2). Technology can be a useful tool here: Most Computer Algebra Systems allow one to model recursive function definitions in notation that is close to standard mathematical notation. And spreadsheets make natural the process of taking successive differences and running totals (MP.5).

The same thinking — finding and articulating the rhythm in calculations — can help students analyze mortgage payments, and the ability to get a closed form for a geometric series lets them make a complete analysis of this topic. This practice is also a tool for using difference tables to find simple functions that agree with a set of data.

Algebra II is a course in which students can learn some technical methods for performing algebraic calculations and transformations, but sense-making is still paramount (MP.1). For example, analyzing Heron's formula from geometry lets one connect the zeros of the expression to the degenerate triangles. As in Algebra I, the modeling practice is ubiquitous in Algebra II, enhanced by the inclusion of exponential and logarithmic functions as modeling tools (MP.4). Computer algebra systems provide students with a tool for modeling all kinds of phenomena, experimenting with algebraic objects (e.g., sequences of polynomials), and reducing the computational overhead needed to investigate many classical and useful areas of algebra (MP.5).

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Algebra 2 Websites:

[Illustrative Mathematics](#)

[Manga High's Wrecksfactor](#)