



MATHEMATICS 3-A

Numerals in parentheses designate individual content standards that are eligible for assessment in whole or in part. Underlined numerals (e.g., 1) indicate standards eligible for assessment on two or more end-of-course assessments.

Course emphases are indicated by:

- ⊙ Major Content;
- + Supporting Content;
- ✓ Additional Content.

Not all content standards in a listed domain or cluster are assessed.

Number and Quantity

Quantities« (N-Q)

- + Reason quantitatively and use units to solve problems (2)

The Complex Number System (N-CN)

- ⊙ Perform arithmetic operations with complex numbers
- ⊙ Use complex numbers in polynomial identities and equations

Vector and Matrix Quantities (N-VM)

- ⊙ Perform operations on matrices and use matrices in application.

Algebra

Seeing Structure in Expressions (A-SSE)

- ⊙ Interpret the structure of expressions (2)
- ⊙ Write expressions in equivalent forms to solve problems (4)

Arithmetic with Polynomials and Rational Expressions (A-APR)

- ⊙ Understand the relationship between zeros and factors of polynomials (2, 3)
- ✓ Use polynomial identities to solve problems (4)
- ✓ Rewrite rational expressions (6)

Creating Equations (A-CED)

- ⊙ Create equations that describe numbers or relationships (1, 2)

Reasoning with Equations and Inequalities (A-REI)

- ⊙ Understand solving equations as a process of reasoning and explain the reasoning (1, 2)
- ⊙ Represent and solve equations and inequalities graphically (11)

Functions

Interpreting Functions (F-IF)

- ⊙ Interpret functions that arise in applications in terms of the context (4, 6)
- + Analyze functions using different representations (7, 9)

Linear, Quadratic, and Exponential Models« (F-LE)

- + Construct and compare linear, quadratic, and exponential models and solve problems (4)

Trigonometric Functions (F-TF)

- ✓ Extend the domain of trigonometric functions using the unit circle (1, 2)
- ✓ Model periodic phenomena with trigonometric functions (5)
- ✓ Prove and apply trigonometric identities (8)

Geometry

Congruence (G-CO)

- + Make geometric constructions (12, 13)



Similarity, Right Triangles, and Trigonometry (G-SRT)

- + Apply trigonometry to general triangles

Circles (G-C)

- ✓ Understand and apply theorems about circles (1, 2, 3)
- ✓ Find arc lengths and areas of sectors of circles (5)

Expressing Geometric Properties with Equations (G-GPE)

- ✓ Translate between the geometric description and the equation of a conic section (1, 2)
- ⊙ Use coordinates to prove simple geometric theorems algebraically (4, 5, 6, 7)

Geometric Measurement and Dimension (G-GMD)

- ✓ Visualize relationships between two-dimensional and three-dimensional objects (4)

Modeling with Geometry (G-MG)

- ⊙ Apply geometric concepts in modeling situations (1, 2, 3)

Statistics

Interpreting Categorical and Quantitative Data (S-ID)

- + Summarize, represent, and interpret data on a single count or measurement variable (4)
- + Summarize, represent, and interpret data on two categorical and quantitative variables (6)

Making Inferences and Justifying Conclusions (S-IC)

- + Understand and evaluate random processes underlying statistical experiments (1, 2)
- ⊙ Make inferences and justify conclusions from sample surveys, experiments and observational studies (3, 4, 5, 6)

Key Advances from Mathematics 2-A (Examples)

- Students begin to see polynomials as a system that has mathematical coherence, not just as a set of expressions of a specific type. An analogy to the integers can be made (including operations, factoring, etc.). Subsequently, polynomials can be extended to rational expressions, analogous to the rational numbers.
- The understandings that students have developed with linear, exponential and quadratic functions are extended to considering a much broader range of classes of functions.
- In statistics, students begin to look at the role of randomization in statistical design.

Discussion of Mathematical Practices in Relation to Course Content

- **Modeling with mathematics** continues to be a particular focus as students see a broader range of functions, including **using appropriate tools strategically**.
- **Constructing viable arguments and critiquing the reasoning of others** continues to be a focus, as does **attention to precision** because students are expected to provide increasingly precise arguments.
- As students continue to explore a range of algebraic expressions, including polynomials, they should **look for and make use of structure**.
- Finally, as students solidify the tools they need to continue their study of mathematics, a focus on **making sense of problems and persevering in solving them** is an essential component for their future success.



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Fluency Recommendations

Algebra/Functions: Students should look at algebraic manipulation as a meaningful enterprise, in which they seek to understand the structure of an expression or equation and use properties to transform it into forms that provide useful information (e.g., features of a function or solutions to an equation). This perspective will help students continue to usefully apply their mathematical knowledge in a range of situations, whether their continued study leads them toward college or career readiness.

Modeling: Seeing mathematics as a tool to model real-world situations should be an underlying perspective in everything students do, including writing algebraic expressions, creating functions, creating geometric models, and understanding statistical relationships. This perspective will help students appreciate the importance of mathematics as they continue their study of it.

Number/Quantity: In particular, students should recognize that much of mathematics is concerned with understanding quantities and their relationships. They should pick appropriate units for quantities being modeled, using them as a guide to understand a situation, and be attentive to the level of accuracy that is reported in a solution.

Functions: Students should understand the effects of parameter changes and be able to apply them to create a rule modeling the function.

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