In **Model Algebra II**, instructional time should focus on four critical areas:

1. **Relating arithmetic and structure of rational expressions to arithmetic and structure of rational numbers (A)**
2. **Expanding understandings of functions and graphing to include modeling trigonometric functions (F)**
3. **Synthesizing and generalizing functions and extending understanding/problem solving of exponential functions to logarithmic functions (F)**
4. **Relating data display and summary statistics to probability and exploring a variety of data collection methods and designs (S)**

### Mathematical Practices

- Making sense of problems and persevering in solving them
- Reasoning abstractly and quantitatively
- Constructing viable arguments and critiquing the reasoning of others
- Modeling with mathematics
- Using appropriate tools strategically
- Looking for and making use of structure
- Looking for and expressing regularity in repeated reasoning

### Content Standards

#### Number and Quantity (N-CN, N-VM)
- Performing arithmetic operations with complex numbers *(imaginary numbers)*
- Using complex numbers in polynomial identities and equations
- Representing and modeling with vector quantities *(magnitude, direction, velocity)* (+)
- Performing operations on matrices and using matrices in applications *(represent and manipulate data)* (+)

- Interpreting the structure of expressions *(polynomial, rational, functional)*
- Writing expressions in equivalent forms to solve problems «
- Performing arithmetic operations on polynomials
- Understanding the relationship between zeros and factors of polynomials
- Using polynomial identities to solve problems
- Rewriting simple rational expressions in different forms
- Creating equations and inequalities that describe numbers or relationships «
- Representing constraints by equations or inequalities *(including systems and interpreting solutions as viable or non-viable options)* «
- Explaining the process of reasoning when solving rational and radical equations
- Representing and solving equations and inequalities graphically *(polynomial, rational, logarithmic, trigonometric)* «

#### Functions (F-IF, F-BF, and F-LE)
- Recognizing and interpreting functions *(polynomial, rational, square root and cube root, trigonometric, logarithmic)* that arise in applications in terms of the context *(increasing/decreasing, max/minimum, symmetry, end behavior, periodicity, domain, rate of change)* «
- Analyzing functions using different representations *(algebraically, graphically, tables, verbal description)* and translate between them «
- Building a function *(simple rational, radical, logarithmic, trigonometric, and including inverse functions)* that models a relationship between two quantities or building new functions from existing functions
- Constructing and comparing linear, quadratic, and exponential models to solve problems «
- Using the *unit circle* to understand domain of trigonometric functions as they relate to real numbers
- Modeling periodic phenomena *(amplitude, frequency, midline)* with trigonometric functions «
- Proving the Pythagorean identity and using it to find other trigonometric functions *(sin(θ), cos(θ), tan(θ))*

#### Statistics and Probability (S-ID)
- Summarizing, representing, and interpreting data on a single count or measurement variable *(mean, standard deviation, normal curve)* «
- Recognizing the purposes of and differences among sample surveys, experiments and observational studies and explaining how randomization relates to each «
- Deciding if a specified model *(simulation)* is consistent with results
- Understanding and evaluating random processes that underlie statistical experiments *(margin of error, significance)* «
- Making inferences and justify conclusions from sample surveys, experiments, and observational studies
- Analyzing decision and strategies using probability concepts (+)«

### NOTES

(«) designates a modeling standard
(+) Designates standards that go beyond course level
Mathematics What to Look For

The example below features three Indicators from the Standards of Effective Practice. These Indicators are just a sampling from the full set of Standards and were chosen because they create a sequence: the educator plans a lesson that sets clear and high expectations, the educator then delivers high quality instruction, and finally the educator uses a variety of assessments to see if students understand the material or if re-teaching is necessary. This example highlights teacher and student behaviors aligned to the three Indicators that you can expect to see in a rigorous Model Algebra 1 math classroom.

<table>
<thead>
<tr>
<th>Expectations</th>
<th>Plans and implements lessons that set clear and high expectations and also make knowledge accessible for all students.</th>
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</table>
| **What is the teacher doing?** | • Communicating a lesson's objectives and their connections to unit essential questions and goals.  
• Creating culturally responsive lessons that engage and sustain student attention  
• Establishing classroom routines that require students to defend their thinking using a logical progression  
• Demonstrating the development of sophisticated mathematical models (e.g., flow charts, formulas) |
| **What are the students doing?** | • Applying mathematical strategies and concepts when engaging with meaningful real-world problems  
• Using mathematical language precisely to convey meaning and understanding of concepts  
• Justifying a solution method using a logical progression of arguments and critiquing the reasoning of others  
• Using sophisticated mathematical models (e.g., computer models) |

<table>
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<tr>
<th>Instruction</th>
<th>Uses instructional practices that reflect high expectations regarding content and quality of effort and work; engage all students; and are personalized to accommodate diverse learning styles, needs, interests, and levels of readiness.</th>
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</table>
| **What is the teacher doing?** | • Modeling incorporating others into discussions  
• Encouraging students to interpret structures and formulate conjectures about mathematical situations  
• Provide students with opportunities to evaluate different approaches to a problem from different perspectives and/or for efficiency |
| **What are the students doing?** | • Referencing mathematical elements in context while logically providing claims and counter-claims  
• Negotiating with others in response to new ideas, preferences, or contributions  
• Actively incorporating others into discussions about mathematical ideas |

<table>
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<tr>
<th>Assessment</th>
<th>Uses a variety of informal and formal methods of assessments to measure student learning, growth, and understanding to develop differentiated and enhanced learning experiences and improve future instruction.</th>
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| **What is the teacher doing?** | • Conducting frequent checks for student understanding and adjusting instruction accordingly  
• Prompting students to explain their reasoning and listening to their responses to identify misconceptions  
• Providing exemplars that convey mathematical reasoning and understanding (both teacher and student generated) |
| **What are the students doing?** | • Purposefully incorporating feedback from teacher and peers into actions  
• Demonstrating learning in multiple ways (e.g., mid-unit assessment, group work)  
• Engaging in challenging learning tasks regardless of learning needs (e.g., linguistic background, disability, academic gifts) |