

Curriculum Development Overview
Unit Planning for High School Mathematics

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| Unit Title | Finding your roots | | Length of Unit | 5 weeks |
| Focusing Lens(es) | Form Equivalence | Standards and Grade Level Expectations Addressed in this Unit | MA10-GR.HS-S.1-GLE.1 MA10-GR.HS-S.2-GLE.1 MA10-GR.HS-S.2-GLE.3 MA10-GR.HS-S.2-GLE.4 | |
| Inquiry Questions (Engaging-Debatable): | <ul style="list-style-type: none"> • What is the best way to model simple projectile motion? (MA10-GR.HS-S.2-GLE.1-EO.c.v.1) • How would shooting a basketball on the moon be different from Earth? | | | |
| Unit Strands | Algebra: Seeing Structure in Expressions Algebra: Reasoning with Equations and Inequalities Algebra: Arithmetic with Polynomials and Rational Functions Function: Interpreting Functions | | | |
| Concepts | Expression, structure, interpretation, single entity, quadratic, functions, graph, model, real world applications, roots, maximum, minimum, symmetry, equations, solutions, | | | |

| Generalizations My students will Understand that... | Guiding Questions | |
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| | Factual | Conceptual |
| Parts of an expression, interpreted as a single entity, reveal the underlying structure of an expression and illuminate ways to rewrite it. (MA10-GR.HS-S.2-GLE.3-EO.a.i) | What are the benefits of simplifying complicated expressions? What patterns exist when factoring quadratic equations? | How do you know if rewriting an expression will provide the information needed to solve the contextual problem? |
| The choice of an appropriate way to rewrite a quadratic expression can aid efficiency and accuracy when solving quadratic equations. (MA10-GR.HS-S.2-GLE.3-EO.b.i) | What is the difference between the methods for solving a quadratic equation? What does it mean if a function is not factorable? What information does completing the square for a quadratic function reveal? How do you know when a quadratic has a maximum or minimum? | Why is it beneficial to write quadratics in different forms? Why would you use a particular method for solving a quadratic equation? |
| Quadratic functions and their graphs model real-world applications by helping visualize symmetry and extreme values. (MA10-GR.HS-S.2-GLE.1-EO.c.v) | What do the zeros of a quadratic equation represent in terms of a model? How can you see the symmetry of a quadratic in its equation? | Why is a quadratic a good model for projectile motion and are there limits to its application? Why might you want to solve for the zeros of a quadratic? |

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| Polynomials form a closed system under the operations of addition, subtraction, and multiplication analogous to the integers. (MA10-GR.HS-S.2-GLE.3-EO.c.i) | What operations can be done to two polynomials that will result in another polynomial? How are rational and irrational numbers similar and different from integers with respect to closure? | Why is it important to know that polynomials are closed under these operations? |
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| Key Knowledge and Skills: My students will... | <i>What students will know and be able to do are so closely linked in the concept-based discipline of mathematics. Therefore, in the mathematics samples what students should know and do are combined.</i> |
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- Interpret parts of an expression, such as terms, factors, and coefficients in terms of its context. (MA10-GR.HS-S.2-GLE.3-EO.a.i.1)
- Interpret numerical expressions and polynomial expressions in one variable by viewing one or more of their parts as a single entity. (MA10-GR.HS-S.2-GLE.3-EO.a.i.2)
- Use the structure of an expression to identify ways to rewrite it. (MA10-GR.HS-S.2-GLE.3-EO.a.ii)
- Factor a quadratic expression to reveal the zeros of the function it defines. (MA10-GR.HS-S.2-GLE.3-EO.b.i.1)
- Complete the square in a quadratic expression to reveal the maximum or minimum value of the function it defines. (MA10-GR.HS-S.2-GLE.3-EO.b.i.2)
- Explain each step in solving a simple quadratic equations as following from the equality of numbers asserted at the previous step, starting from the assumption that the original equation has a solution and construct a viable argument to justify a solution method. (MA10-GR.HS-S.2-GLE.4-EO.b.i)
- Solve quadratic equations in one variable using the method of completing the square to transform any quadratic equation in x into an equation of the form $(x - p)^2 = q$ that has the same solutions and derive the quadratic formula from this form. (MA10-GR.HS-S.2-GLE.4-EO.c.ii.1)
- Solve quadratic equations by inspection, taking square roots, completing the square, the quadratic formula and factoring, as appropriate to the initial form of the equation. (MA10-GR.HS-S.2-GLE.4-EO.c.ii.2)
- Identify zeros of polynomials when suitable factorizations are available, and use the zeros to construct a rough graph of the function defined by the polynomial; including quadratic and cubic in which linear and quadratic factors are available. (MA10-GR.HS-S.2-GLE.3-EO.d.ii)
- Use the process of factoring and completing the square in a quadratic function to show zeros, extreme values, and symmetry of the graph, and interpret these in terms of a context. (MA10-GR.HS-S.2-GLE.1-EO.c.vi.1)
- Explain why the sum or product of two rational numbers is rational; that the sum of a rational number and an irrational number is irrational; and that the product of a nonzero rational number and an irrational number is irrational. (MA10-GR.HS-S.1-GLE.1-EO.b)
- Understand that polynomials form a system analogous to the integers, namely, they are closed under the operations of addition, subtraction, and multiplication; add, subtract, and multiply polynomials. (MA10-GR.HS-S.2-GLE.3-EO.c.i)

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| <p>Critical Language: includes the Academic and Technical vocabulary, semantics, and discourse which are particular to and necessary for accessing a given discipline. EXAMPLE: A student in Language Arts can demonstrate the ability to apply and comprehend critical language through the following statement: <i>“Mark Twain exposes the hypocrisy of slavery through the use of satire.”</i></p> | |
| <p>A student in _____ can demonstrate the ability to apply and comprehend critical language through the following statement(s):</p> | <p><i>I completed the square of the quadratic in order to find the vertex of the parabola. I also could find the line of symmetry by completing the square.</i> <i>I factored this equation in order to solve for its roots.</i></p> |
| <p>Academic Vocabulary:</p> | <p>Identify, symmetry, reveal, interpret, justify, explain, structure, graph, model, real world applications,</p> |
| <p>Technical Vocabulary:</p> | <p>Quadratic, parabola, complete the square, factor, expression, zeros, roots, square root, polynomial, extreme values, maximum, minimum, closed, vertex, equivalent, functions, roots, equations, solutions, axis of symmetry</p> |