

Unit 4 - Polynomials

Overview

Students will be extremely proficient and confident at factoring in order to be able to solve polynomials later in this unit and to facilitate ease with Unit 5: simplifying rational expressions and solving rational equations. Complex numbers are briefly touched on, as is the quadratic formula, but only as tools for solving higher degree polynomial equations. Students should know by the end of this unit that the number of solutions to a polynomial equation is the same as the degree of the polynomial (The Fundamental Theorem of Algebra). Students will graph polynomials with attention to intercepts and end behavior. Quadratics are considered an optional topic.

21st Century Capacities: Analyzing

Stage 1 - Desired Results

<p>ESTABLISHED GOALS/ STANDARDS</p> <p>MP 1 Make sense sense of problems and persevere in solving them</p> <p>MP2 Reason abstractly and quantitatively</p> <p>MP7 Look for and make use of structure</p> <p>MP8 Look for and express regularity in repeated reasoning</p> <p>Perform arithmetic operations with complex numbers.</p> <p>CCSS.MATH.CONTENT.HSN.CN.A.1 Know there is a complex number i such that $i^2 = -1$, and every complex number has the form $a + bi$ with a and b real.</p> <p>Use complex numbers in polynomial identities and equations.</p> <p>CCSS.MATH.CONTENT.HSN.CN.C.7 Solve quadratic equations with real coefficients that have complex solutions.</p>	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th colspan="2" style="background-color: #D3D3D3; text-align: center; padding: 5px;">Transfer:</th> </tr> <tr> <td colspan="2" style="padding: 5px;"><i>Students will be able to independently use their learning in new situations to...</i></td> </tr> <tr> <td colspan="2" style="padding: 5px;"> <ol style="list-style-type: none"> 1. Manipulate equations/expressions or objects to create order and establish relationships. 2. Draw conclusions about graphs, shapes, equations, or objects. (Analyzing) 3. Make sense of a problem, initiate a plan, execute it, and evaluate the reasonableness of the solution. (Analyzing) </td> </tr> <tr> <th colspan="2" style="background-color: #D3D3D3; text-align: center; padding: 5px;">Meaning:</th> </tr> <tr> <td style="width: 50%; padding: 5px; vertical-align: top;"> <p>UNDERSTANDINGS: <i>Students will understand that:</i></p> <ol style="list-style-type: none"> 1. Mathematicians examine relationships to discern a pattern, generalizations, or structure. 2. Mathematicians examine the impact of operations and how they relate to one another. 3. Mathematicians can describe patterns, relations, and/or functions to access strategies to solve problems. 4. Mathematicians represent and analyze mathematical situations and structures using algebraic symbols to communicate thinking. </td> <td style="width: 50%; padding: 5px; vertical-align: top;"> <p>ESSENTIAL QUESTIONS: <i>Students will explore & address these recurring questions:</i></p> <ol style="list-style-type: none"> A. How can I simplify the problem? B. How do predictable patterns help us? C. Have I used what I understand about numbers to make this easier? D. How do I decide if my answer makes sense, and if not, what do I do? </td> </tr> </table>	Transfer:		<i>Students will be able to independently use their learning in new situations to...</i>		<ol style="list-style-type: none"> 1. Manipulate equations/expressions or objects to create order and establish relationships. 2. Draw conclusions about graphs, shapes, equations, or objects. (Analyzing) 3. Make sense of a problem, initiate a plan, execute it, and evaluate the reasonableness of the solution. (Analyzing) 		Meaning:		<p>UNDERSTANDINGS: <i>Students will understand that:</i></p> <ol style="list-style-type: none"> 1. Mathematicians examine relationships to discern a pattern, generalizations, or structure. 2. Mathematicians examine the impact of operations and how they relate to one another. 3. Mathematicians can describe patterns, relations, and/or functions to access strategies to solve problems. 4. Mathematicians represent and analyze mathematical situations and structures using algebraic symbols to communicate thinking. 	<p>ESSENTIAL QUESTIONS: <i>Students will explore & address these recurring questions:</i></p> <ol style="list-style-type: none"> A. How can I simplify the problem? B. How do predictable patterns help us? C. Have I used what I understand about numbers to make this easier? D. How do I decide if my answer makes sense, and if not, what do I do?
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PreCollege Algebra & Trigonometry Curriculum

<p>CCSS.MATH.CONTENT.HSN.CN.C.8(+) Extend polynomial identities to the complex numbers.</p> <p>CCSS.MATH.CONTENT.HSN.CN.C.9 (+) Know the Fundamental Theorem of Algebra; show that it is true for quadratic polynomials.</p> <p>CCSS.MATH.CONTENT.HSA.SSE.A.1.A Interpret parts of an expression, such as terms, factors, and coefficients.</p> <p>CCSS.MATH.CONTENT.HSA.SSE.A.1.B Interpret complicated expressions by viewing one or more of their parts as a single entity.</p> <p>CCSS.MATH.CONTENT.HSA.SSE.A.2 Use the structure of an expression to identify ways to rewrite it. Write expressions in equivalent forms to solve problems.</p> <p>CCSS.MATH.CONTENT.HSA.SSE.B.3 Choose and produce an equivalent form of an expression to reveal and explain properties of the quantity represented by the expression.*</p> <p>CCSS.MATH.CONTENT.HSA.SSE.B.3.A Factor a quadratic expression to reveal the zeros of the function it defines. Understand the relationship between zeros and factors of polynomials.</p> <p>CCSS.MATH.CONTENT.HSA.APR.B.3 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.</p> <p>CCSS.MATH.CONTENT.HSF.IF.C.7.A Graph functions and show intercepts, maxima, and minima.</p>	Acquisition:	
<p><i>Students will know...</i></p> <ol style="list-style-type: none"> 1. When a polynomial is completely factored the product of the first term of all those factors is the first term of the polynomial 2. When a polynomial is completely factored the product of the second term of all those factors is the last term of the polynomial 3. The degree of the polynomial tells you how many solutions the equation has (Fundamental Theorem of Algebra) 4. The factors of the polynomial correspond to the x intercept of the graph 5. Vocabulary: factor, term, trinomial, Greatest Common Factor, Long Division, Synthetic Division, Complex Number, Imaginary, End Behavior, 	<p><i>Students will be skilled at...</i></p> <ol style="list-style-type: none"> 1. Factoring polynomials (trinomials, difference of squares, difference of cubes) 2. Division of polynomials 3. Solving polynomial equations up to degree 4 4. Solving equations by factoring 5. Working with complex numbers 6. Graphing polynomials of degree 2 and higher 7. Estimating the value of a function at the ends of the graph 8. Creating an equation from a given equation 	