

Black Horse Pike Regional School District Curriculum Template

ENGAGING STUDENTS • FOSTERING ACHIEVEMENT • CULTIVATING 21ST CENTURY GLOBAL SKILLS

Course Name: Pre-Calculus/ Pre-Calculus Honors

Course Number: 034300/ 034200

PART I: Unit Rationale

WHY ARE STUDENTS LEARNING THIS CONTENT AND THESE SKILLS?

<p>Course/Unit Title: Polynomial and Rational Functions Chapter 2</p>	<p>Unit Summary: In this Unit students learn to analyze and graph polynomial and rational functions. The chapter begins with identifying key characteristics and creating graphs of quadratic and other polynomial functions. Students then learn to use polynomial division to find both real and complex roots. Next they learn how to find asymptotes, intercepts and holes as they graph rational functions. Students will use specific math vocabulary associated with polynomial and rational functions.</p>
<p>Grade Level(s): 10-12</p>	
<p>Essential Question(s):</p> <ul style="list-style-type: none"> • How do you sketch the graphs of polynomial functions? • How do you divide a polynomial by another polynomial and use polynomial division to find the rational and real zeros of polynomials? • How do you perform operations with complex numbers? • How do you find all the zeros of a polynomials function? • How do you find the domain and asymptotes of a rational function? • How do you sketch the graph of a rational function? 	<p>Enduring Understanding(s):</p> <ul style="list-style-type: none"> • Use transformations to sketch graphs of polynomial functions. • Use the Leading Coefficient Test to determine end behavior of graphs of polynomial functions. • Find and use zeros of polynomial functions as sketching aids. • Use the Intermediate Value Theorem to help locate zeros of polynomial functions. • Use synthetic division to divide polynomials by binomials of the form $(x - k)$. • Use the imaginary unit i to write complex numbers. • Add, subtract, and multiply complex numbers. • Use complex conjugates to write the quotient of two complex numbers in standard form.

PART II: INSTRUCTIONAL STRATEGIES AND RESOURCES

DESCRIBE THE LEARNING TARGETS.

After each target, identify the New Jersey Student Learning Standards that are applicable.

Learning Target	NJSLs
1. Use the structure of an expression to identify ways to rewrite it. For example, see $x^4 - y^4$ as $(x^2)^2 - (y^2)^2$, thus recognizing it as a difference of squares that can be factored as $(x^2 - y^2)(x^2 + y^2)$.	1. NJSLs-A-SSE.A.2
2. 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.	2. NJSLs-N-CN.A.1
3. Use the relation $i^2 = -1$ and the commutative, associative, and distributive properties to add, subtract, and multiply complex numbers.	3. NJSLs-N-CN.A.2
4. Find the conjugate of a complex number; use conjugates to find moduli and quotients of complex numbers.	4. NJSLs-N-CN.A.3
5. Solve quadratic equations with real coefficients that have complex solutions.	5. NJSLs-SN-CN.C.7
6. Solve quadratic equations by inspection (e.g., for $x^2 = 49$), taking square roots, completing the square, the quadratic formula and factoring, as appropriate to the initial form of the equation. Recognize when the quadratic formula gives complex solutions and write them as $a \pm bi$ for real numbers a and b .	6. NJSLs-A-REI.B.4b
7. Solve quadratic equations with real coefficients that have complex solutions.	7. NJSLs-N-CN.C.7
8. Know the Fundamental Theorem of Algebra; show that it is true for quadratic polynomials.	8. NJSLs-N-CN.C.9
9. Interpret complicated expressions by viewing one or more of their parts as a single entity. For example, interpret $P(1+r)^n$ as the product of P and a factor not depending on P .	9. NJSLs-A-SSE.A.1b
10. Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales.	10. NJSLs-A-CED.A.2
11. Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases.	11. NJSLs-F-IF.C.7
12. Graph rational functions, identifying zeros and asymptotes when suitable factorizations are available, and showing end behavior.	12. NJSLs-F-IF.C.7d
13. Graph polynomial functions, identifying zeros when suitable factorizations are available, and showing end behavior.	13. NJSLs-F-IF.C.7c

Inter-Disciplinary Connections:

Mathematical Modeling:

- Students can use polynomial functions to model various aspects of nature, such as the growth of a red oak tree, as shown in Ex.112 pg. 111.
- Students will use complex numbers to model numerous aspects of the natural world, such as the impedance of an electrical circuit, as shown in Ex. 89 pg. 134.
- Students will be able to determine whether a football kicked with a given velocity can reach a certain height, as shown in Ex. 69 pg. 141.
- Students can determine the cost of supplying recycling bins to the population of a rural township, as shown in Ex. 49 pg. 150.
- Students can model the concentration of a chemical in the bloodstream after injection, as shown in Ex. 89 pg. 159.

Students will engage with the following text:

Pre-Calculus With Limits A Graphing Approach- 7e Ron Larson

Resources : Coursemate; A variety of technology tools, other texts as per teacher discretion.

Students will write:

Students will write notes and copy class examples to better comprehend the skills being taught. Students will write solutions to open-ended math problems and word problems dealing with real-world applications. Students will graph interpretations of functions.

PART III: TRANSFER OF KNOWLEDGE AND SKILLS

DESCRIBE THE LEARNING EXPERIENCE.

How will students uncover content and build skills.

Section 2.2		
	Regular	Honors
Standards for Mathematical Practice	MP 1- Make sense of problems and persevere in solving them MP 2- Reason abstractly and quantitatively MP 3- Construct viable arguments and critique MP 4- Model with mathematics MP 5- Use appropriate tools strategically MP 6- Attend to precision MP 7- Look for and make use of structure MP 8- Look for and express regularity in repeated reasoning.	MP 1- Make sense of problems and persevere in solving them MP 2- Reason abstractly and quantitatively MP 3- Construct viable arguments and critique MP 4- Model with mathematics MP 5- Use appropriate tools strategically MP 6- Attend to precision MP 7- Look for and make use of structure MP 8- Look for and express regularity in repeated reasoning.
Practice and Apply Assigning Homework (Tasks are assigned as per the discretion of the teacher.)	Day 1: pp. 109-110 Ex. 1 – 19, 23-79 odd Day 2: pp. 110-112 Ex. 81-109 odd, 111-120, 123-131 odd	Day 1: pp. 109-110 Ex. 1 – 16, 21-28, 30-36 even, 44-80 even Day 2: pp. 110-112 Ex. 81-84, 90-108 even, 109-113, 121-131
Section 2.4		
	Regular	Honors
Standards for Mathematical Practice	MP 1- Make sense of problems and persevere in solving them MP 2- Reason abstractly and quantitatively MP 3- Construct viable arguments and critique MP 4- Model with mathematics MP 5- Use appropriate tools strategically MP 6- Attend to precision MP 7- Look for and make use of structure MP 8- Look for and express regularity in repeated reasoning.	MP 1- Make sense of problems and persevere in solving them MP 2- Reason abstractly and quantitatively MP 3- Construct viable arguments and critique MP 4- Model with mathematics MP 5- Use appropriate tools strategically MP 6- Attend to precision MP 7- Look for and make use of structure MP 8- Look for and express regularity in repeated reasoning.
Practice and Apply Assigning Homework (Tasks are assigned as per the discretion of the teacher.)	Day 1: pp. 133-134 Ex. 1 – 10, 11-95 odd 97-100	Day 1: pp. 133-134 Ex. 7-10, 12-30 even, 36-48 even, 52-88 even, 89-100

Section 2.5

	Regular	Honors
Standards for Mathematical Practice	MP 1- Make sense of problems and persevere in solving them MP 2- Reason abstractly and quantitatively MP 3- Construct viable arguments and critique MP 4- Model with mathematics MP 5- Use appropriate tools strategically MP 6- Attend to precision MP 7- Look for and make use of structure MP 8- Look for and express regularity in repeated reasoning.	MP 1- Make sense of problems and persevere in solving them MP 2- Reason abstractly and quantitatively MP 3- Construct viable arguments and critique MP 4- Model with mathematics MP 5- Use appropriate tools strategically MP 6- Attend to precision MP 7- Look for and make use of structure MP 8- Look for and express regularity in repeated reasoning.
Practice and Apply Assigning Homework (Tasks are assigned as per the discretion of the teacher.)	Day 1 pp. 140-141 Ex. 2-4, 5-27 odd, 45-61 odd, 65-71 odd, 72, 74-78	Day 1: pp. 140-141 Ex. 10-16 even, 34-44 even, 53-58, 62-65, 69-73 odd, 74-78 even

Section 2.6

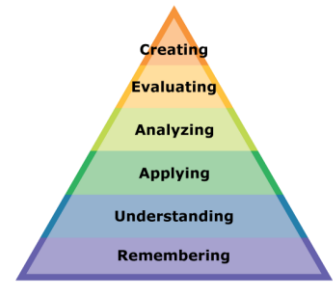
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Practice and Apply Assigning Homework (Tasks are assigned as per the discretion of the teacher.)	Day 1: pp. 147-148 Ex. 2-16, 17-43 odd, Day 2: pp. 148-150 Ex. 45-48, 50-52, 56-62	Day 1: pp. 147-148 Ex. 6-10 even, 11-16, 18-32 even, 33-36, 42-44 Day2: pp. 148-150 Ex 45-49, 50-56 even, 57-64

Section 2.7

Standards for Mathematical Practice	MP 1- Make sense of problems and persevere in solving them MP 2- Reason abstractly and quantitatively MP 3- Construct viable arguments and critique MP 4- Model with mathematics MP 5- Use appropriate tools strategically MP 6- Attend to precision MP 7- Look for and make use of structure MP 8- Look for and express regularity in repeated reasoning.	MP 1- Make sense of problems and persevere in solving them MP 2- Reason abstractly and quantitatively MP 3- Construct viable arguments and critique MP 4- Model with mathematics MP 5- Use appropriate tools strategically MP 6- Attend to precision MP 7- Look for and make use of structure MP 8- Look for and express regularity in repeated reasoning.
Practice and Apply Assigning Homework (Tasks are assigned as per the discretion of the teacher.)	Day 1: pp. 157-158 Ex. 1-4, 5-23 odd, 33-53 odd, 57-60, 61-67 odd Day 2: pp. 158-160 Ex. 71-77 odd, 83-85, 87-89, 91, 93-96, 99-104	Day 1: pp. 157-158 Ex. 5-8, 13-16, 22-48 even, 68-70 Day 2: pp. 158-160 Ex. 79-86, 89-92, 95-107

PART IV: EVIDENCE OF LEARNING

**IDENTIFY THE METHODS BY WHICH STUDENTS WILL DEMONSTRATE THEIR UNDERSTANDING OF CONTENT AND THEIR ABILITY TO APPLY SKILLS.
IDENTIFY BLOOM'S LEVELS.**



Formative Assessments:

The effectiveness of the instructional program will be based on numerous activities and strategies including the following: teacher observations, students collaborating with peers, questioning strategies, student record-keeping, quizzes, exit/admit assignments, peer/self assessments, learning/response logs, discussions and practice presentations.

Accommodations/Modifications:

As per student IEP or 504 Plan

Summative Assessments:

The following assessments will be used to evaluate student learning, skill acquisition and academic achievement of the Standards of Mathematical Practice and the New Jersey Student Learning Standards for Mathematics listed under each chapter in the Pre-Calculus curriculum/syllabus at the conclusion of an instructional time period.

- Diagnostic Pre-Test
- Chapter Tests
- Periodic Benchmark Tests
- End of Course Assessment
- Standardized Tests

Accommodations/Modifications:

As per student IEP or 504 Plan

Performance Assessments:

The following assessments requires students to utilize various strands of mathematics.

- Projects
- Performance Tasks

- Homework
- Classwork

Accommodations/Modifications:

As per student IEP or 504 Plan