

Board Approved August 2017

Department Mathematics

Algebra IB

Week	Marking Period 1	Week	Marking Period 3
1	Systems by graphing, substitution 7.1-7.2	11	Test, graphing parabolas standard/vertex form 10.1-10.3
2	Systems by elimination 7.3-7.4	12	Solving by factoring/square roots
3	Word problems and systems of linear inequalities 7.6	13	Solve by completing the square, rewrite standard into vertex form 10.5
4	Test, Rules of exponents (products/quotients) 8.1-8.2	14	
5	Zero and negative exponents and scientific notation 8.3-8.4	15	Solving by quadratic formula and analyzing the discriminant 10.6-10.7
Week	Marking Period 2	Week	Marking Period 4
6	Exponential growth and decay (writing and graphing) 8.5-8.6 Arithmetic & Geometric sequences	16	Graphing square root functions, simplify radicals and add/subtract radicals 11.1-11.2
7	Add/subtract/multiply special products and classify polynomials, 9.1-9.3	17	Multiply/div radicals, using conjugates, and solving radical equations 11.2-11.3
8	Factoring using GCF, product/sum, difference of squares 9.4-9.5, 9.7	18	Pythagorean theorem, distance/midpoint formula 11.4-11.5
9	Factoring with a not equal to 1, perfect square trinomials, factor completely 9.6-9.8	19	Simplifying, multiplying, dividing rational expressions 12.4-12.5
10		20	Graphing square root functions, simplify radicals and add/subtract radicals 11.1-11.2

<b>Time Frame</b>	<i>3 weeks</i>						
<b>Topic</b>							
<b>SYSTEM OF EQUATIONS</b>							
<b>Essential Questions</b>							
<p>How do you solve a system by graphing?</p> <p>How do you solve a system by substitution?</p> <p>How do you solve a system by eliminating a variable?</p> <p>What kind of application problem can be solved using a system?</p> <p>How do you determine the number of solutions of a system?</p>							
<b>Enduring Understandings</b>							
<p>The point of intersection of two linear equations can be determined by several methods (graphing, substitution, elimination).</p> <p>Systems of equations can have no solutions, 1 solution or infinite solutions depending on the equations in the system.</p> <p>In some cases one method may be difficult and another method may be a better choice. In some cases the lines may be parallel or the same line.</p> <p>Solving a system of equations is a useful way to find solutions to real world problems (ie break even point and other applications)</p>							
<b>Alignment to NJSL</b>							
<b>A.CED.2, A.CED.3, A.REI.6, A.REI.5</b>							
<b>Key Concepts and Skills</b>							
<p>The student will be able to solve a system of linear equations by graphing, and the algebraic methods of substitution and elimination (including multiplying a row), and recognize when one method is superior to another.</p> <ul style="list-style-type: none"> <li>• Some systems have no solution, some infinite solutions.</li> <li>• To be able to solve a real world problem by writing the system in algebraic form, then finding the solution by various methods</li> </ul>							
<b>Learning Activities</b>							
<ul style="list-style-type: none"> <li>• Video tutor – phschool.com</li> <li>• TI 83 – tables, graphs</li> <li>• Partner lab activity – pilot rescue mission</li> <li>• Modeling real world problems</li> <li>• Partner Activity – Solve all three ways.</li> <li>• Relay Race Activity</li> <li>• Scavenger Hunt</li> </ul>							
<b>Assessments</b>							
<p>Lab activities Experiment (partners) Tests, quizzes</p> <p>Homework Derive computer lab on systems</p>							
<b>21<sup>st</sup> Century Skills</b>							
	Creativity	<b>X</b>	Critical Thinking	<b>x</b>	Communication	<b>x</b>	Collaboration
<b>x</b>	Skills	<b>x</b>	Information Literacy		Media Literacy		
<b>Interdisciplinary Connections</b>							
Financial literacy: when is one cell phone plan cheaper than another?							

**Technology Integration**

8.1 Educational Technology: All students will use digital tools to access, manage, evaluate, and synthesize information in order to solve problems individually and collaborate and to create and communicate knowledge

**Time Frame** | 3 weeks

**Topic**

**EXPONENTS & EXPONENTIAL FUNCTIONS**

**Essential Questions**

How do you use exponent properties involving products and quotients?  
 How do you simplify expressions using zero and negative exponents?  
 How do you transform into scientific notation?  
 How do you simplify exponential expressions with multiple variables?  
 How do you simplify a power to a power?  
 What does an exponential function look like? How do you write and graph an exponential growth/decay function?

**Enduring Understandings**

To simplify algebraic expressions with exponents.  
 Recognize and graph exponential functions with a table of values.  
 Real world situations involving exponential relationships can be solved using multiple representations

**Alignment to NJSL**

**A.SSE.3c, N.RN.1, A.CED.2, F.IF.7e, F.BF.3, F.LE.1, F.LE.2, F.LE.5**

**Key Concepts and Skills**

To simplify expressions with zero and negative exponents

- To write numbers in scientific notation
- To add powers of like bases when multiplying monomials, and apply this to various geometric areas
- To raise a power to a power.
- To divide monomials with exponents.
- To apply various combinations of these rules for exponents.
- • To graph an exponential function with a table of values.

**Learning Activities**

- TI 83 – explore exponential graphs
- Experiment – exponential growth or decay model (ie m&m activity)
- Worksheets
- Bingo
- Jeopardy
- Color Activity
- Scavenger Hunt

**Assessments**

Tests, quizzes Homework Derive computer lab on exponents

**21<sup>st</sup> Century Skills**

	Creativity	<b>X</b>	Critical Thinking	<b>X</b>	Communication	<b>X</b>	Collaboration
<b>X</b>	Skills		Information Literacy		Media Literacy		

### Interdisciplinary Connections

Chemistry: use of scientific notation  
History: trends in growth and decay  
Biology: bacterial growth and decay

### Technology Integration

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<b>Time Frame</b>	<i>3.5 weeks</i>					
<b>Topic</b>						
POLYNOMIAL EXPRESSIONS AND FACTORING						
<b>Essential Questions</b>						
How do you factor using the greatest common factor? How do you add, subtract, and multiply polynomials? How do you use special product patterns to multiply binomials? How do you factor a difference of squares? How do you factor a perfect square trinomial? How do you factor a trinomial with a leading coefficient? How do you factor completely?						
<b>Enduring Understandings</b>						
Understanding the properties of real numbers can be used to multiply a monomial by a polynomial or simplify the product of binomials. Factoring is the opposite of the distributive property. What does it mean to find a factor of a number? Explain why a factored expression is useful-what can we do with it?						
<b>Alignment to NJSLs</b>						
A.APR.1, F.IF.7c, A.SSE.2, A.APR.4, A.SSE.3a, A.CED.1, A.REI.4b, F.IF.8a, A.APR.3, A.SSE.3						
<b>Key Concepts and Skills</b>						
Students should be able to identify types of expressions and determine what type of factoring needs to occur. • Students will categorize polynomials by their degree and number of terms and learn to add, subtract, multiply and divide them. • Factoring is the inverse process for multiplying polynomials.						
<b>Learning Activities</b>						
Factoring Relay Game • <a href="http://www.hippocampus.org">www.hippocampus.org</a> • Algebra Tiles Activity • Using Models to Factor • Small group practice • Communicators						
<b>Assessments</b>						
Partner Quiz Exit Card Homework Quiz Chapter Test						
<b>21<sup>st</sup> Century Skills</b>						
Creativity	X	Critical Thinking	X	Communication	X	Collaboration

<b>X</b>	Skills		Information Literacy		Media Literacy
<b>Interdisciplinary Connections</b>					
Genetics- Punnett squares (multiplying binomials)					
Construction- building a porch around two sides of a house					
<b>Technology Integration</b>					
8.1 Educational Technology: All students will use digital tools to access, manage, evaluate, and synthesize information in order to solve problems individually and collaborate and to create and communicate knowledge					

<b>Time Frame</b>	<i>4 weeks</i>
<b>Topic</b>	
<b>QUADRATIC EQUATIONS AND FUNCTIONS</b>	
<b>Essential Questions</b>	
<p>How do you graph a quadratic function in standard form?</p> <p>How do you graph a quadratic in vertex form?</p> <p>How do you solve a quadratic using factoring?</p> <p>How do you solve a quadratic using graphing?</p> <p>How do you solve a quadratic using square roots?</p> <p>How do you solve by completing the square?</p> <p>How do you solve a quadratic using the quadratic formula?</p> <p>What does the discriminant tell you about the solutions of a quadratic function?</p>	
<b>Enduring Understandings</b>	
<p>Students will be able to distinguish second degree equations (quadratic) from first degree (linear). Students will be able to a compare and identify applications of linear, quadratic or exponential functions as models of real world situations.</p> <p>The quadratic formula is most appropriately used when factoring a quadratic equation is not possible.</p>	
<b>Alignment to NJSL</b>	
<b>A.APR.3, A.CED.1, A.REI.4b, F.IF.8a, A.CED.2, A.CED.3, F.IF.4, F.IF.5, F.IF.7a, F.IF.7c, F.BF.3, A.REI.11</b>	
<b>Key Concepts and Skills</b>	
<p>To plot standard form of quadratic functions from a table.</p> <ul style="list-style-type: none"> <li>• Compare basic transformations of parent function.</li> <li>• Identify the vertex.</li> <li>• Explore real world problem solving involving quadratic functions. (ie projectile motion max height, crash point)</li> <li>• Determine zeros of a quadratic function by factoring, graphing and quadratic formula.</li> </ul>	
<b>Learning Activities</b>	
<p>TI 83 – compare transformations of parent function, compare linear, quadratic, exponential • Green globs • Activity lab p 564 • Internet project on power point to determine applications of parabolas. • Excel /TI 83 activity to find linear, quadratic, exponential regression trend line. • Worksheets • Communicators</p>	
<b>Assessments</b>	
Lab activities Experiment (partners) Tests, quizzes, homework	

21 <sup>st</sup> Century Skills							
	Creativity	X	Critical Thinking	X	Communication	X	Collaboration
X	Skills		Information Literacy		Media Literacy		
Interdisciplinary Connections							
Physics: Many formulas in physics are quadratic equations, such as projectile motion							
Technology Integration							
8.1 Educational Technology: All students will use digital tools to access, manage, evaluate, and synthesize information in order to solve problems individually and collaborate and to create and communicate knowledge							

<b>Time Frame</b>	<i>3 weeks</i>						
Topic							
RADICAL EXPRESSIONS AND EQUATIONS							
Essential Questions							
How do you simplify a radical? How do you estimate a radical? How do you simplify radicals involving products and quotients? How do you simplify sums and differences? How do you graph a radical function? How do you solve an equation with a radical in it?							
Enduring Understandings							
Operations can be performed with radical expressions. Radical expressions can be simplified by using factoring of the number into primes. Square roots are the reverse of perfect squares. Why can simplifying a radical first help when combining radical expressions? Why would we want to write 5 instead of $\sqrt{25}$ ?							
Alignment to NJSL							
A.REI.2							
Key Concepts and Skills							
Students should be able to determine whether a radical is in simplified form. Students will simplify radicals by finding the greatest perfect square. How to add, subtract, multiply and divide two or more radicals.							
Learning Activities							
Create a table of and compare different radicals • Small group practice • Jeopardy • Student presentation • Communicators							
Assessments							
Team teaching activity Partner Quiz Entrance and Exit Cards Homework Quiz Chapter Test							
21 <sup>st</sup> Century Skills							
X	Creativity	X	Critical Thinking	X	Communication	X	Collaboration
	Skills		Information Literacy		Media Literacy		
Interdisciplinary Connections							
Geometry: distance formula, Pythagorean theorem							

**Technology Integration**

8.1 Educational Technology: All students will use digital tools to access, manage, evaluate, and synthesize information in order to solve problems individually and collaborate and to create and communicate knowledge

<b>Time Frame</b>	<i>1 week</i>						
<b>Topic</b>							
RATIONAL EXPRESSIONS							
<b>Essential Questions</b>							
How do you simplify rational expressions? How do you multiply rational expressions? How do you divide rational expressions? How do you add and subtract rational expressions with common denominators?							
<b>Enduring Understandings</b>							
A rational function can be written as the ratio of two polynomials. The domain of a rational function is defined as the set of all numbers except those that make the denominator equal to zero. Factoring the numerator and denominator and canceling out the common factors is how to simplify.							
<b>Alignment to NJSL</b>							
<b>A.APR.7</b>							
<b>Key Concepts and Skills</b>							
Factoring polynomials Simplifying fractions Multiplying and dividing fractions							
<b>Learning Activities</b>							
Bingo Scavenger hunt Color activity to help simplify							
<b>Assessments</b>							
Calculator quizzes Pencil and paper quizzes Homework Test							
<b>21<sup>st</sup> Century Skills</b>							
<b>x</b>	Creativity	<b>x</b>	Critical Thinking		Communication	<b>x</b>	Collaboration
	Skills		Information Literacy		Media Literacy		
<b>Interdisciplinary Connections</b>							
<b>Technology Integration</b>							
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