Randolph Township Schools
Randolph High School

Algebra IA, Algebra IB, Enriched Algebra I/II
Curriculum

“In modern mathematics, algebra has become so important that numbers will soon only have symbolic meaning.” - Unknown

Department of
Science, Technology, Engineering, & Mathematics
Michael Cascione
Supervisor

Curriculum Committee
Glenn Douglas, Brenda Leary
Ellen Mutz, Teresa Schuele

Curriculum Developed
July 2013

Curriculum Revised
July 2014

Revision Committee
Julie Green, Lara Hirshenson, Joe Monks
Mike Pignaloso, Teresa Schuele

Board APPROVAL
September 9, 2014
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Randolph Township Schools

Mission Statement

We commit to inspiring and empowering all students in Randolph schools to reach their full potential as unique, responsible and educated members of a global society.

Randolph Township Schools
Affirmative Action Statement

Equality and Equity in Curriculum

The Randolph Township School district ensures that the district’s curriculum and instruction are aligned to the state’s standards. The curriculum addresses the elimination of discrimination and the achievement gap, as identified by underperforming school-level AYP reports for state assessment. The curriculum provides equity in instruction, educational programs and provides all students the opportunity to interact positively with others regardless of race, creed, color, national origin, ancestry, age, marital status, affectional or sexual orientation, gender, religion, disability or socioeconomic status.

N.J.A.C. 6A:7-1.7(b): Section 504, Rehabilitation Act of 1973; N.J.S.A. 10:5; Title IX, Education Amendments of 1972
The statements represent the beliefs and values regarding our educational system. Education is the key to self-actualization, which is realized through achievement and self-respect. We believe our entire system must not only represent these values, but also demonstrate them in all that we do as a school system.

We believe:

• The needs of the child come first
• Mutual respect and trust are the cornerstones of a learning community
• The learning community consists of students, educators, parents, administrators, educational support personnel, the community and Board of Education members
• A successful learning community communicates honestly and openly in a non-threatening environment
• Members of our learning community have different needs at different times. There is openness to the challenge of meeting those needs in professional and supportive ways
• Assessment of professionals (i.e., educators, administrators and educational support personnel) is a dynamic process that requires review and revision based on evolving research, practices and experiences
• Development of desired capabilities comes in stages and is achieved through hard work, reflection and ongoing growth
Randolph Township Schools
Department of Science, Technology, Engineering, & Mathematics

Randolph Township Schools is committed to excellence. We believe that all children are entitled to an education that will equip them to become productive citizens of the 21st century. We believe that an education grounded in the fundamental principles of science, technology, engineering, and math (STEM) will provide students with the skills and content necessary to become future leaders and lifelong learners.

A sound STEM education is grounded in the principles of inquiry, rigor, and relevance. Students will be actively engaged in learning as they use real-world STEM skills to construct knowledge. They will have ample opportunities to manipulate materials and solve problems in ways that are developmentally appropriate to their age. They will work in an environment that encourages them to take risks, think critically, build models, observe patterns, and recognize anomalies in those patterns. Students will be encouraged to ask questions, not just the “how” and the “what” of observed phenomena, but also the “why”. They will develop the ability, confidence, and motivation to succeed academically and personally.

STEM literacy requires understandings and habits of mind that enable students to make sense of how our world works. As described in Project 2061’s Benchmarks in Science Literacy, The Standards for Technological Literacy, and Professional Standards for Teaching Mathematics, literacy in these subject areas enables people to think critically and independently. Scientifically and technologically literate citizens deal sensibly with problems that involve mathematics, evidence, patterns, logical arguments, uncertainty, and problem-solving.

Algebra IA, Algebra IB, Enriched Algebra I/II

Introduction

The content of Algebra I is arranged around families of functions, with special focus on linear and quadratic functions. As students compare and analyze families of functions, they will learn to represent them in different ways – as verbal descriptions, in function notation, equations, tables, and graphs. In addition to Algebra topics, extensions will include data analysis and Geometry. They will also learn to model real world situations using functions in order to solve real world problems.
### Algebra IA

<table>
<thead>
<tr>
<th>SUGGESTED TIME ALLOTMENT</th>
<th>UNIT NUMBER</th>
<th>CONTENT - UNIT OF STUDY</th>
</tr>
</thead>
<tbody>
<tr>
<td>6 weeks</td>
<td>I</td>
<td>Structure and Operations</td>
</tr>
<tr>
<td>10 weeks</td>
<td>II</td>
<td>Linear Relationships</td>
</tr>
<tr>
<td>10 weeks</td>
<td>III</td>
<td>Polynomials and Quadratics</td>
</tr>
<tr>
<td>6 weeks</td>
<td>IV</td>
<td>Exponential and Radical Functions</td>
</tr>
<tr>
<td>3 weeks</td>
<td>V</td>
<td>Transformations of Functions</td>
</tr>
<tr>
<td>1 weeks</td>
<td>VI</td>
<td>Data Analysis</td>
</tr>
</tbody>
</table>

### Algebra IB

<table>
<thead>
<tr>
<th>SUGGESTED TIME ALLOTMENT</th>
<th>UNIT NUMBER</th>
<th>CONTENT - UNIT OF STUDY</th>
</tr>
</thead>
<tbody>
<tr>
<td>7 weeks</td>
<td>I</td>
<td>Structure and Operations</td>
</tr>
<tr>
<td>11 weeks</td>
<td>II</td>
<td>Linear Relationships</td>
</tr>
<tr>
<td>9 weeks</td>
<td>III</td>
<td>Polynomials and Quadratics</td>
</tr>
<tr>
<td>5 weeks</td>
<td>IV</td>
<td>Exponential and Radical Functions</td>
</tr>
<tr>
<td>2 weeks</td>
<td>V</td>
<td>Transformations of Functions</td>
</tr>
<tr>
<td>2 weeks</td>
<td>VI</td>
<td>Data Analysis</td>
</tr>
</tbody>
</table>

### Enriched Algebra I/II

<table>
<thead>
<tr>
<th>SUGGESTED TIME ALLOTMENT</th>
<th>UNIT NUMBER</th>
<th>CONTENT - UNIT OF STUDY</th>
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</thead>
<tbody>
<tr>
<td>14 weeks</td>
<td>I</td>
<td>Structure and Operations</td>
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<td>22 weeks</td>
<td>II</td>
<td>Linear Relationships</td>
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<tr>
<td>18 weeks</td>
<td>III</td>
<td>Polynomials and Quadratics</td>
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<tr>
<td>10 weeks</td>
<td>IV</td>
<td>Exponential and Radical Functions</td>
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<tr>
<td>4 weeks</td>
<td>V</td>
<td>Transformations of Functions</td>
</tr>
<tr>
<td>4 weeks</td>
<td>VI</td>
<td>Data Analysis</td>
</tr>
</tbody>
</table>
**ENDURING UNDERSTANDINGS**

| Connecting strategies and foundational mathematical knowledge together help organize the steps necessary to solve problems. | • How do algebraic expressions apply to real-world situations? |
| Combining like terms, isolating the variable and using inverse operations are strategies to apply when solving equations. | • Is the solution to an equation related to a real world problem always a solution to the real world problem? |
| Polynomial expressions are the building blocks of polynomial functions, which are used to model, represent, and analyze many real world situations. | • What is algebraic thinking and how does it help solve real world problems? |

### KNOWLEDGE

<table>
<thead>
<tr>
<th>Students will know:</th>
<th>Students will be able to:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Proper use of order of operations.</td>
<td>Use the order of operations to evaluate expressions.</td>
</tr>
<tr>
<td>Foundational mathematical principles.</td>
<td>Find square roots and compare real numbers.</td>
</tr>
<tr>
<td>Relationships between variables and constants, and operations on algebraic expressions and equations.</td>
<td>Understand and apply the law of exponents to simplify expressions involving numbers raised to powers.</td>
</tr>
</tbody>
</table>

### SKILLS

<table>
<thead>
<tr>
<th>Students will be able to:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Extend understanding and use of operations to real numbers and algebraic procedures.</td>
</tr>
<tr>
<td>Apply the distributive property to real numbers.</td>
</tr>
<tr>
<td>Translate verbal phrases and sentences into expressions and equations.</td>
</tr>
<tr>
<td>Write and explain the steps necessary to solve multi-stop equations using algebraic operations.</td>
</tr>
</tbody>
</table>

### CCSS/SMP

<p>| HSN - RN.B.3 |
| HSN - Q.A.1 |
| HSN - Q.A.3 |
| HSA - SSE.A.1 |
| HSA - APR.A.1 |
| HSA - CED.A.1 |
| HSA - CED.A.2 |
| HSA - CED.A.3 |
| HSA - CED.A.4 |
| HSA - REL.B.3 |
| SMP.1 |
| SMP.2 |
| SMP.3 |
| SMP.4 |
| SMP.5 |
| SMP.6 |
| SMP.7 |
| SMP.8 |
| Literacy |
| RST.9-10.3 |
| RST.9-10.7 |</p>
<table>
<thead>
<tr>
<th>The difference between a relation and a function.</th>
<th>Problem solving requires a thoughtful, logical progression of mathematically sound processes.</th>
<th>Solve multi-step equations using algebraic operations.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Combine and multiply polynomials expressions.</td>
<td>Distinguish between relations and functions.</td>
<td>Represent functions as rules, tables and graphs</td>
</tr>
<tr>
<td>Translate quantitative information expressed in words into visual form.</td>
<td>Use functions to model real-world phenomena and solve problems that involve varying quantities: expressions, equations and/or inequalities.</td>
<td>Use a problem solving plan to solve problems using inductive and deductive reasoning.</td>
</tr>
<tr>
<td>WHST.9-10.2</td>
<td>WHST.9-10.4</td>
<td></td>
</tr>
<tr>
<td>SUGGESTED TIME ALLOTMENT</td>
<td>CONTENT-UNIT OF STUDY</td>
<td>SUPPLEMENTAL UNIT RESOURCES</td>
</tr>
<tr>
<td>--------------------------</td>
<td>-----------------------</td>
<td>-----------------------------</td>
</tr>
</tbody>
</table>
| Algebra IA 5 weeks       | Unit I: Structure and Operations  
   - Expressions  
   - Equations  
   - Functions  
   - Real Numbers and Properties  
   - Solving Linear Equations  
   - Polynomials and Operations | McDougal Littell Algebra Textbook (Algebra IA)  
Holt McDougal Algebra 1 Concepts and Skills Textbook (Algebra IB/Enriched)  
http://classzone.com  
http://illuminations.nctm.org  
Student resource worksheets  
http://www.kutasoftware.com  
Glencoe Algebra 1 Practice Masters and Study Guide Masters, Algebra with Pizzazz!, Kelly Wingate Algebra, Algebra Made Simple, Algebra Puzzlers  
Purple Math www.purplemath.com  
Graph generation tools: Winplot software  
http://math.exeter.edu/rparris/peanut/wp32z.exe, MathGV software  
www.mathgv.com/  
Algebra teaching materials, Alexandria City, VA:  
http://www.acps.k12.va.us/curriculum/design/sample-algebra-course.pdf  
West Virginia Department of Education:  
http://wveis.k12.wv.us/Teach21/public/Uplans/U_menu.cfm?tsele1=2&tsele2=116  
Common Core Curriculum Standards:  
Interactive math practice  
| Algebra IB 7 weeks       |                        |                             |
| Enriched Algebra I/II 14 weeks |                    |                             |

Appendix E – Pages 27 – 28
### ENDURING UNDERSTANDINGS

| Representations of linear equations, linear inequalities, and systems are used to model and solve real world problems. |
| Some mathematical statements have one or no solution, while others have an infinite number of solutions. |
| Functional relationships associate the value of one variable in relation to the value of another variable in a special manner. |

### ESSENTIAL QUESTIONS

- Why do certain real world situations require the modeling of two distinct quantities that vary at a constant rate?
- What does it mean in a real world context for an equation to have one solution, no solution, or infinitely many solutions?
- What is the best way to represent a function?

### KNOWLEDGE

**Students will know:**

Many real world situations can be modeled by linear relationships.

### SKILLS

**Students will be able to:**

- Find the slope of a line as a rate of change, and find it’s y-intercept.
- Write the equation of a line using the most appropriate form of a linear equation (i.e. Standard form, Slope-Intercept form, Point-Slope form).
- Graph linear equations and inequalities on a coordinate plane from given data (i.e. tables of values, different forms of equations, word problems).
- Analyze a graphical representation of a real-world situation and generate the corresponding linear equations or inequalities.
- Understand and write an explanation of the terms domain, range, function, slope, intercept, function notation.
- Write a linear equation in function notation and identify the domain and range.
- Use technology to write, model and graph linear equations and inequalities (compute and interpret correlation coefficients and residuals).

### CCSS/SMP

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
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<tr>
<td>HSA - CED.A.1</td>
<td>HSA - CED.A.2</td>
<td>HSA - CED.A.3</td>
</tr>
<tr>
<td>HSA - CED.A.4</td>
<td>HSA - REL.B.3</td>
<td>HSA - REL.C.5</td>
</tr>
<tr>
<td>HSA - REL.C.6</td>
<td>HSA - REL.D.10</td>
<td>HSA - REL.D.12</td>
</tr>
<tr>
<td>HSF - IF.A.1</td>
<td>HSF - IF.A.2</td>
<td>HSF - IF.A.3</td>
</tr>
<tr>
<td>HSF - IF.B.5</td>
<td>HSF - IF.B.6</td>
<td>HSF - IF.C.7</td>
</tr>
<tr>
<td>HSF - BF.A.1</td>
<td>HSF - BF.A.2</td>
<td>HSF - LE.A.2</td>
</tr>
<tr>
<td>HSF - LE.B.5</td>
<td>HSS - ID.B.6</td>
<td>HSS - ID.C.7</td>
</tr>
<tr>
<td>HSS - ID.C.8</td>
<td>HSF-BF.B.3</td>
<td></td>
</tr>
<tr>
<td>Equations of Horizontal and vertical lines are written in one variable.</td>
<td>Use functions to model real-world phenomena and solve problems that involve varying quantities.</td>
<td></td>
</tr>
<tr>
<td>Compound inequalities require a number line to visually represent solutions.</td>
<td>Write equations of given horizontal and vertical lines.</td>
<td></td>
</tr>
<tr>
<td>Isolation of variables.</td>
<td>Distinguish between the use of “AND” and “OR” when graphing solutions on a number line.</td>
<td></td>
</tr>
<tr>
<td>Certain situations can be modeled by multiple linear relationships.</td>
<td>Write a real world situation for an “AND” and an “OR” model.</td>
<td></td>
</tr>
<tr>
<td>Characteristics of transformations of the parent graphs in functional notation (vertical and horizontal shifts, vertical stretch/shrink, reflection).</td>
<td>Solve literal equations by isolating the appropriate variable or expression.</td>
<td></td>
</tr>
<tr>
<td>Special cases of systems of equations or inequalities will result in unique graphs in the coordinate plane.</td>
<td>Determine the most efficient method for solving a system of linear equations or inequalities (i.e. graphing, substitution, elimination).</td>
<td></td>
</tr>
<tr>
<td>Identify the number of solutions of a linear system.</td>
<td>Graph linear inequalities in two variables with constraints (Linear Programming).</td>
<td></td>
</tr>
<tr>
<td>Determine the transformations applied to the parent function graph using functional notation and graphical representation.</td>
<td>Solve real world linear programming problems.</td>
<td></td>
</tr>
<tr>
<td>Recognize and graph absolute value equations and inequalities in a coordinate plane.</td>
<td>Recognize and graph equations that will result in parallel and perpendicular lines in a coordinate plane.</td>
<td></td>
</tr>
</tbody>
</table>

**Literacy**
- RST.9-10.4
- RST.9-10.5
- WHST.9-10.2
- WHST.9-10.4
<table>
<thead>
<tr>
<th>SUGGESTED TIME ALLOTMENT</th>
<th>CONTENT-UNIT OF STUDY</th>
<th>SUPPLEMENTAL UNIT RESOURCES</th>
</tr>
</thead>
</table>
| **Algebra IA**           | **Unit II: Linear Relationships**  
  - Graphing Linear Equations and Functions  
  - Writing and Graphing Linear Equations and Inequalities  
  - Writing and Analyzing Linear Models  
  - Linear Programming  
  - Solve Absolute Value Functions  
  - Solving Systems of Linear Equations | McDougal Littell Algebra Textbook (Algebra IA)  
Holt McDougal Algebra 1 Concepts and Skills Textbook (Algebra IB/Enriched)  
http://classzone.com  
http://illuminations.nctm.org  
Student resource worksheets  
http://www.kutasoftware.com  
Glencoe Algebra 1 Practice Masters and Study Guide Masters, Algebra with Pizzazz!, Kelly Wingate Algebra, Algebra Made Simple, Algebra Puzzlers  
Purple Math www.purplemath.com  
Graph generation tools: Winplot software  
http://math.exeter.edu/rparris/peanut/wp32z.exe, MathGV software  
www.mathgv.com  
Algebra teaching materials, Alexandria City, VA:  
http://www.acps.k12.va.us/curriculum/design/sample-algebra-course.pdf  
West Virginia Department of Education:  
http://wveis.k12.wv.us/Teach21/public/Uplans/U_menu.cfm?tsele1=2&tsele2=116  
Common Core Curriculum Standards:  
Interactive math practice:  
Appendices |
| **Algebra IB**           | 11 weeks  
(37 sessions) |  |
| **Enriched Algebra I/II** | 22 weeks  
(100 sessions) |  |
**ENDURING UNDERSTANDINGS** | **ESSENTIAL QUESTIONS**
---|---
A relationship exists between polynomial factors, roots, zeros, and x-intercepts. | • How can we use polynomials to help solve real-world problems?
Special patterns can be used to factor polynomials more efficiently. | • How does the recognition of patterns aid in problem solving?
Each coefficient in a quadratic polynomial function determines unique characteristics of the graph of the function. | • How do graphs of quadratic equations relate to the real world?

### KNOWLEDGE
**Students will know:**
- Factoring is the opposite operation of the Distributive property.
- Quadratic and other Polynomials equations can be solved by several methods.
- The discriminant can be used to determine the number of solutions of a quadratic equation.
- Characteristics of transformations of the parent graphs in functional notation (vertical and horizontal shifts, vertical stretch/shrink, reflection).

### SKILLS
**Students will be able to:**
- Use the greatest common factor (GCF) to remove common factors from polynomial terms.
- Factor trinomials in standard form or special binomial patterns into the product of two binomials.
- Combine above skills to factor polynomials completely.
- Solve quadratic equations by choosing the most efficient method (i.e. graphing, square roots, factoring, completing the square, quadratic formula).
- Write an explanation of the discriminant and its significance.
- Evaluate the discriminant and use the value to determine the number and type of solutions of a quadratic equation.
- Determine the transformations applied to the parent function graph using functional notation and graphical representation.

### CCSS
- HSA - SSE.A.2
- HSA - SSE.B.3
- HSA - APR.A.1
- HSA - APR.A.3
- HSA - CED.A.2
- HSA - REI.B.4
- HSA - REI.D.11
- HSF - IF.B.4
- HSF - IF.C.7
- HSF - IF.C.8
- HSF - IF.C.9
- HSF - BF.B.3
- SMP.1
- SMP.2
- SMP.4
- SMP.5
- SMP.7
- SMP.8
- Literacy
  - RST.9-10.4
  - WHST.9-10.2
  - WHST.9-10.4
<table>
<thead>
<tr>
<th>SUGGESTED TIME ALLOTMENT</th>
<th>CONTENT-UNIT OF STUDY</th>
<th>SUPPLEMENTAL UNIT RESOURCES</th>
</tr>
</thead>
</table>
| **Algebra IA** 9 weeks   | **Unit III: Polynomials and Quadratics**  
  o Factoring Polynomials  
  o Solving Quadratic Equations  
  o Graphing Quadratic Functions  
  o Compare Linear, Quadratic and Exponential Modeling | McDougal Littell Algebra Textbook (Algebra IA)  
  Holt McDougal Algebra 1 Concepts and Skills Textbook (Algebra IB/Enriched)  
  [http://classzone.com](http://classzone.com)  
  [http://illuminations.nctm.org](http://illuminations.nctm.org)  
  Student resource worksheets  
  [http://www.kutasoftware.com](http://www.kutasoftware.com)  
  Glencoe Algebra 1 Practice Masters and Study Guide Masters, Algebra with Pizzazz!, Kelly Wingate Algebra, Algebra Made Simple, Algebra Puzzlers  
  Purple Math [www.purplemath.com](http://www.purplemath.com)  
  Graph generation tools: Winplot software  
  [http://math.exeter.edu/rparris/peanut/wp32z.exe](http://math.exeter.edu/rparris/peanut/wp32z.exe), MathGV software  
  [www.mathgv.com](http://www.mathgv.com)  
  Algebra teaching materials, Alexandria City, VA:  
  West Virginia Department of Education:  
  Common Core Curriculum Standards:  
  Interactive math practice  
  [www.mathgoodies.com](http://www.mathgoodies.com)  
  Appendices |
| **Algebra IB** 9 weeks |                       |                             |
| **Enriched Algebra I/II** 18 weeks |                       |                             |
## ENDURING UNDERSTANDINGS

Non-linear functions are used in real-world applications.

### ESSENTIAL QUESTIONS

- Why are most real world function non-linear?

## KNOWLEDGE

**Students will know:**

- Radical expressions must be written in simplest form.
- Square root functions have unique, recognizable graphs.
- In exponential functions, the exponent contains the variable.
- Growth and decay functions are inversely related.

## SKILLS

**Students will be able to:**

- Simplify radical expressions by adding, subtracting, multiplying and/or dividing.
- Use square roots functions to model real world problems.
- Graph square root functions.
- Distinguish and apply numeric and variable exponents, as well as numeric and variable bases for given situations.
- Recognize, write and graph exponential growth and decay models.
- Use growth and decay exponential functions to model real world problems.
- Write a scenario for a real-world situation that would illustrate exponential growth.
- Write a scenario for a real-world situation that would illustrate exponential decay.
- Generate and rewrite a finite geometric series into an exponential function.

## CCSS

- HSN - RN.A.1
- HSN - RN.A.2
- HSA - SSE.A.2
- HSA - SSE.B.3
- HSA - CED.A.2
- HSA - REI.A.1
- HSA - REI.A.2
- HSF - BF.A.2
- HSF - BF.B.3
- SMP.1
- SMP.2
- SMP.3
- SMP.4
- SMP.5
- SMP.7
- SMP.8
- Literacy
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  - WHST.9-10.2
  - WHST.9-10.4
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<tbody>
<tr>
<td>Algebra IA</td>
<td><strong>Unit IV: Exponential and Radical Functions</strong></td>
<td></td>
</tr>
<tr>
<td>5 weeks</td>
<td>o Graphing Square Root Functions</td>
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</tr>
<tr>
<td>(18 sessions)</td>
<td>o Simplifying Radical Expressions</td>
<td></td>
</tr>
<tr>
<td></td>
<td>o Solving Radical Equations</td>
<td></td>
</tr>
<tr>
<td></td>
<td>o Properties and Operations of Exponents</td>
<td></td>
</tr>
<tr>
<td></td>
<td>o Writing and Graphing Growth and Decay Functions</td>
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<tr>
<td>Algebra IB</td>
<td>McDougal Littell Algebra Textbook (Algebra IA)</td>
<td></td>
</tr>
<tr>
<td>5 weeks</td>
<td>Holt McDougal Algebra 1 Concepts and Skills Textbook (Algebra IB/Enriched)</td>
<td></td>
</tr>
<tr>
<td>(18 sessions)</td>
<td><a href="http://classzone.com">http://classzone.com</a></td>
<td></td>
</tr>
<tr>
<td></td>
<td><a href="http://illuminations.nctm.org">http://illuminations.nctm.org</a></td>
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<tr>
<td>Enriched</td>
<td><a href="http://www.kutasoftware.com">Student resource worksheets</a></td>
<td></td>
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<tr>
<td>Algebra I/II</td>
<td>Glencoe Algebra 1 Practice Masters and Study Guide Masters, Algebra with Pizzazz!, Kelly Wingate Algebra, Algebra Made Simple, Algebra Puzzlers</td>
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<tr>
<td>10 weeks</td>
<td>Purple Math <a href="http://www.purplemath.com">www.purplemath.com</a></td>
<td></td>
</tr>
<tr>
<td>(36 sessions)</td>
<td>Graph generation tools: Winplot software</td>
<td></td>
</tr>
<tr>
<td></td>
<td><a href="http://math.exeter.edu/rparris/peanut/wp32z.exe">http://math.exeter.edu/rparris/peanut/wp32z.exe</a></td>
<td>MathGV software</td>
</tr>
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<td></td>
<td><a href="http://www.mathgv.com/">www.mathgv.com/</a></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Algebra teaching materials, Alexandria City, VA:</td>
<td></td>
</tr>
<tr>
<td></td>
<td><a href="http://www.acps.k12.va.us/curriculum/design/sample-algebra-course.pdf">http://www.acps.k12.va.us/curriculum/design/sample-algebra-course.pdf</a></td>
<td></td>
</tr>
<tr>
<td></td>
<td>West Virginia Department of Education:</td>
<td></td>
</tr>
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<td></td>
<td>Common Core Curriculum Standards:</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Interactive math practice</td>
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<td></td>
<td><a href="http://www.mathgoodies.com">www.mathgoodies.com</a></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Appendices</td>
<td></td>
</tr>
</tbody>
</table>
### ENDURING UNDERSTANDINGS
- Functions can be created by identifying the pattern of a relationship or by applying transformations to an existing function.
- Linear, exponential, and quadratic functions each describe a specific pattern of change.

### ESSENTIAL QUESTIONS
- In what ways can functions be constructed?
- In what ways can congruence of functions be useful?
- How do we determine which function best models a given real-world scenario?

### KNOWLEDGE

**Students will know:**

- Functional notation for all the following functions: linear, quadratic, absolute value, square root, exponential and step.

- Characteristics of transformations of the parent graphs in functional notation (vertical and horizontal shifts, vertical stretch/shrink, reflection).

- Piece-wise functions can be used to represent special graphs (e.g. absolute value).

- Two different graphs on the same set of axes result in one, two, none or an infinite number of intersecting points.

- The reflection across the y-axis using functional notation (f(-x)).

### SKILLS

**Students will be able to:**

- Compare functions in different representations – graphically, numerically, and algebraically.

- Determine the domain and range from function notation representations and from graphs of functions.

- Compare and contrast linear, exponential, quadratic models, absolute value, square root, exponential and step functions.

- Construct in function notation transformations of the above functions using \(a, h, k\).

- Interpret graphs and build the functions.

- Apply knowledge of systems of equations to graph absolute value functions.

- Justify the number of expected intersection(s) of the graphs of a given set of equations.

- Determine the graph of the function when a horizontal reflection, is applied.

### CCSS/SMP

- HSA - CED.A.1
- HSA - CED.A.2
- HSA - CED.A.3
- HSA - REI.D.10
- HSF - IF.A.1
- HSF - IF.A.2
- HSF - IF.B.4
- HSF - IF.B.5
- HSF - IF.C.7
- HSF - IF.C.9
- HSF - BF.B.3
- HSF - LE.A.1
- HSF - LE.A.2
- HSF - LE.A.3
- HSF - LE.B.5
- SMP.1
- SMP.2
- SMP.3
- SMP.4
- SMP.5
- SMP.7
- SMP.8
<table>
<thead>
<tr>
<th>SUGGESTED TIME ALLOTMENT</th>
<th>CONTENT-UNIT OF STUDY</th>
<th>SUPPLEMENTAL UNIT RESOURCES</th>
</tr>
</thead>
</table>
| Algebra IA                | Unit V: Transformations of Functions  
 o Parent Function Graphs  
 o Function Transformations | McDougal Littell Algebra Textbook (Algebra IA)  
 Holt McDougal Algebra 1 Concepts and Skills Textbook (Algebra IB/Enriched)  
 [http://classzone.com](http://classzone.com)  
 [http://illuminations.nctm.org](http://illuminations.nctm.org)  
 Student resource worksheets  
 [http://www.kutasoftware.com](http://www.kutasoftware.com)  
 Glencoe Algebra 1 Practice Masters and Study Guide Masters, Algebra with Pizzazz!, Kelly Wingate Algebra, Algebra Made Simple, Algebra Puzzlers  
 Purple Math [www.purplemath.com](http://www.purplemath.com)  
 Graph generation tools: Winplot software  
 [http://math.exeter.edu/rparris/peanut/wp32z.exe](http://math.exeter.edu/rparris/peanut/wp32z.exe), MathGV software  
 [www.mathgv.com/](http://www.mathgv.com/)  
 Algebra teaching materials, Alexandria City, VA:  
 [http://www.acps.k12.va.us/curriculum/design/sample-algebra-course.pdf](http://www.acps.k12.va.us/curriculum/design/sample-algebra-course.pdf)  
 West Virginia Department of Education:  
 Common Core Curriculum Standards:  
 Interactive math practice  
 [www.mathgoodies.com](http://www.mathgoodies.com)  
 Appendices |
| 4 weeks (15 sessions)     |                       |                             |
| Algebra IB                |                       |                             |
| 2 weeks (8 sessions)      |                       |                             |
| Enriched Algebra I/II     |                       |                             |
| 4 weeks (16 sessions)     |                       |                             |
# RANDOLPH TOWNSHIP SCHOOL DISTRICT
Algebra IA, Algebra IB, Enriched Algebra I/II
UNIT VI: Data Analysis

## ENDURING UNDERSTANDINGS
Statisticians summarize, represent, and interpret categorical and quantitative data in multiple ways since one method can reveal or create a different view than another.

## ESSENTIAL QUESTIONS
- How can data be analyzed and represented to reveal information enabling a better understanding of the phenomena from which the data was generated?

<table>
<thead>
<tr>
<th>KNOWLEDGE</th>
<th>SKILLS</th>
<th>CCSS/SMP</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Students will know:</strong></td>
<td><strong>Students will be able to:</strong></td>
<td></td>
</tr>
<tr>
<td>Many types of sampling methods exist.</td>
<td>Identify populations sampling methods.</td>
<td>HSS - ID.A.1</td>
</tr>
<tr>
<td>Data can be visually represented in different forms.</td>
<td>Choose and construct the best representation of a given data set (i.e., line-plot, histogram and box-and-whisker).</td>
<td>HSS - ID.A.2</td>
</tr>
<tr>
<td></td>
<td>Write an explanation of the factors determining your choice of representation.</td>
<td>HSS - ID.A.3</td>
</tr>
<tr>
<td>Sample data can be biased.</td>
<td>Write a statement to compare and contrast multiple data sets in the same format.</td>
<td>HSS - ID.B.4</td>
</tr>
<tr>
<td></td>
<td>Compare measures of central tendency and dispersion.</td>
<td>HSS - ID.B.5</td>
</tr>
<tr>
<td></td>
<td>Calculate the mean and standard deviation of a data set.</td>
<td>HSS - ID.C.9</td>
</tr>
<tr>
<td></td>
<td>Fit the data to a normal curve.</td>
<td>HSS - IC.A.1</td>
</tr>
<tr>
<td></td>
<td>Distinguish outliers within a data set.</td>
<td>SMP.1</td>
</tr>
<tr>
<td></td>
<td>Distinguish between correlation and causation.</td>
<td>SMP.2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>SMP.4</td>
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<tr>
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<td><strong>Literacy</strong></td>
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<tr>
<td></td>
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<td>RST.9-10.5</td>
</tr>
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<td></td>
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<td>WHST.9-10.2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>WHST.9-10.4</td>
</tr>
</tbody>
</table>
# Curriculum Pacing Chart

## Algebra IA, Algebra IB, Enriched Algebra I/II

<table>
<thead>
<tr>
<th>SUGGESTED TIME ALLOTMENT</th>
<th>CONTENT-UNIT OF STUDY</th>
<th>SUPPLEMENTAL UNIT RESOURCES</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Algebra IB</strong></td>
<td>2 weeks&lt;br&gt;(8 sessions)</td>
<td></td>
</tr>
<tr>
<td><strong>Enriched Algebra I/II</strong></td>
<td>4 weeks&lt;br&gt;(16 sessions)</td>
<td></td>
</tr>
</tbody>
</table>
RESOURCES:

Textbooks:
  Algebra 1
  Authors: Larson, et al.
  Copyright 2007 McDougal Littell

  Algebra 1 Concepts and Skills
  Authors: Larson, et al.
  Copyright 2010 Holt McDougal

Associated textbook resources:
  Algebra 1
  Authors: Burger, et al.
  ISBN: 978-0-547-64712-8
  Copyright 2012 Holt McDougal

  Algebra 1 Common Core
  Authors: Charles, et al.
  Copyright 2012 Person Education, Inc.

  Glencoe Algebra 1
  Authors: Collins, et al.
  ISBN 0-02-825328-0
  Copyright 1998 Glencoe/McGraw-Hill
  Practice Masters ISBN 0-02-824857-0
Other Learning Resources:

- Algebra Made Simple
  Author: Theresa Kane McKell
  ISBN 0-7682-0260-4
  Copyright 1999 McGraw-Hill Children’s Publishing

- Kelley Wingate Algebra
  Author: Dawn Talluto Jacobi
  Copyright 1995 Kelley Wingate Publications, Inc.

- Algebra with Pizzazz!
  Authors: Steve Marcy and Janis Marcy
  ISBN 0-88488-244-6
  Copyright 1983 Creative Publications, Inc.

- Algebra Puzzlers
  Authors: Theresa Kane McKell
  Copyright 1998 McGraw-Hill Children’s Publishing

- Write! Mathematics
  Multiple Intelligences & Cooperative Learning Writing Activities
  Author: Virginia DeBott
  ISBN: 978-1-879097-38-4
  Copyright 1998 Kagan Publishing

Technology:
- Presentation software such as Powerpoint
- TI-83+ Graphing calculators
- iPad graphing technology
- Computer room access
Web addresses:
  Student and teacher online resource: http://classzone.com
  and West Virginia Department of Education: http://wveis.k12.wv.us/Teach21/public/Uplans/U_menu.cfm?tsele1=2&tsele2=116
  Online quiz resource: http://www.quia.com
  Online video resource: http://www.khanacademy.com
RANDOLPH TOWNSHIP SCHOOL DISTRICT
Algebra IA, Algebra IB, Enriched Algebra I/II

APPENDIX B

ASSESSMENT:

- Quiz
- Test
- Individual Projects
- Group Projects
- Homework
- Online Resources
- Exit Tickets
- Journals
- Informal teacher observation
Opportunities exist for interdisciplinary units with courses such as Business, Science, Technology, Social Studies and Reading/Language Arts.
Students have successfully completed Mathematics, Grade 8.
STEPPING STONE EXPONENTS – Simplify each stepping stone as you progress across the group.

1. 
2. 
3. 
4. 
5. 

6. 
7. 
8. 
9. 
10.
Linear Inequalities Project!

Completed Project Due Friday, March 1, 2013

You want to open your own store. However, you need to persuade a business partner to help finance your venture to get your store running. To show your potential partner your business qualifications, you will first need to describe in detail the stocking of your product. You are currently trying to decide how much of product A and product B you want to buy. Product A takes up less space than Product B, but it also yields a smaller profit. The total storage area in your store is 600 cubic feet. Note: Assume there will be no problem selling any amount of either product.

You need to name your store and decide what you want to sell. Product A and Product B are up to you (name and describe each product—realistically!). Be sure to describe in detail the dimensions of your products. Now, assign an appropriate amount of profit for each of your two products and decide how much profit you want to make each month.

Write two inequalities for the storage of your products and the profits per month. Define your constraints and explain what they represent. Note: These two inequalities must have a point of intersection, so you may need to adjust profit or dimensions of your products for an intersection to occur. Graph the inequalities and label all important points and axes. Demonstrate, by example, the solutions to the system.

Your project may be in the form of a poster, a report, or an electronic format. Please limit the poster size to 11x17 inches. It must include all the aspects mentioned above, plus include a reflection. The reflection should address the following points:

- Why was the use of a system of linear inequalities necessary for this problem?
- Is it practical to assume there will be no problem selling any amount of either product?
- What other factors would influence the person’s decision to become your business partner?
- If you were to receive this proposal, would you want to invest in the store?
- What other costs would you need to consider if you were really opening up your own store?
- What was your favorite part of this project and why?
- Is there anything you might have liked to do differently the next time?

Milestone Deliveries:

Your store name, product descriptions and dimensions, and your set of inequalities is due on Friday, February 22, 2013.

Final project including reflection is due on Friday, March 1, 2013.

The project will be graded using the rubric on the following page. The total possible score is 80 points.
UADRATIC FUNCTION (IN STANDARD FORM ax\(^2\) + bx + c) MATCHING CHAIN ACTIVITY Y-INSTURCTIONS

Attachyfara 12 squares, as.h' with a quadratic function on the left edge and a quadratic graph on the upper portion of the square (except for the START and END squares).

You select the END square.
Also attached is a template I had the students use to demonstrate the y-value looking at all the data associated with each function and graph.
Y-value also included: two photos of each chain from my Algebra 1A class.

Happy Chaining!

Template for Quadratic Fwction Chain Activity
Fill in all the information for each function in the cells below. Use the information to determine the next.

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>(a)</td>
<td>(b)</td>
<td>(c)</td>
</tr>
<tr>
<td>Opens (\text{UP or 00/VN})</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Axis of Symmetry (x) =</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vertex (( , ))</td>
<td></td>
<td></td>
</tr>
<tr>
<td>y-intercept ((0, ))</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

\[ y = ax^2 + bx + c \]
\[ y = 3x^2 + 1 \]

\[ y = -x^2 + 6 \]

\[ y = \frac{-x^2 - 2}{4} \]

\[ y = 3x^2 - 1 \]

\[ y = -x^2 - 4x \]
$y = x^2 + x + 2$

$y = \frac{1}{3} x^2 + 4x + 9$

$y = -\frac{1}{3} x^2 + x + 4$

$y = -\frac{1}{2} x^2 + 2x + 3$

$y = \frac{1}{2} x^2 + 2x + 3$

$y = 6x^2 + 6x$
DO NOW
Sort the following polynomials into categories:

- $x^2 + bx + c$ with GCF
- $x^2 + bx + c$ with GCF
- $ax^2 + bx + c$ with GCF

Special cases:
- Difference of squares
- Perfect square trinomial

$\begin{align*}
\text{b}^2 &- \text{b} - 10 \\
\text{x}^3 &+ 3\text{x}^2 - 40\text{x} \\
5\text{b}^2 &+ 6\text{b} + 1 \\
\text{x}^2 &+ 14\text{x} + 49 \\
15\text{y}^2 &- 19\text{y} + 6 \\
3\text{f}^2 &- 6\text{f} - 9 \\
\text{x}^2 &- 2\text{x} + 24 \\
\text{x}^2 &- 16\text{x} + 64 \\
2\text{x}^2 &- 2\text{x} - 4 \\
4\text{p}^2 &- 64 \\
6\text{f}^2 &- 6\text{f} - 9
\end{align*}$
<table>
<thead>
<tr>
<th>Name</th>
<th>Factoring Quadratics</th>
<th>Algebra IA</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>$3x^2 - 16x + 20$</td>
<td>$3x^2 - 2x - 8$</td>
</tr>
<tr>
<td>2.</td>
<td>$5x^2 - 19x + 12$</td>
<td>$3x^2 - 2x - 8$</td>
</tr>
<tr>
<td>3.</td>
<td>$7x^2 + 16x - 20$</td>
<td>$8x^2 + 16x - 5$</td>
</tr>
<tr>
<td>4.</td>
<td>$4x^2 + 3x - 9$</td>
<td>$11.7x^2 + 29x + 24$</td>
</tr>
<tr>
<td>5.</td>
<td>$5x^2 + 42x + 19$</td>
<td>$14. x^2 + 11x + 24$</td>
</tr>
<tr>
<td>6.</td>
<td>$6x^2 - 4x - 18$</td>
<td>$18.10x^2 - 13x - 3$</td>
</tr>
<tr>
<td>7.</td>
<td>$7x^2 + 2x - 36$</td>
<td>$21.4x^2 + 60x + 225$</td>
</tr>
<tr>
<td>8.</td>
<td>$8x^2 - 9x + 20$</td>
<td>$27. x^2 + 2x - 24$</td>
</tr>
<tr>
<td>9.</td>
<td>$9x^2 + 12x + 35$</td>
<td>$30. 2x^2 - 9x - 35$</td>
</tr>
<tr>
<td>10.</td>
<td>$10x^2 + 43x + 3$</td>
<td>$33.8x^2 + 10x - 3$</td>
</tr>
<tr>
<td>11.</td>
<td>$11x^2 - 12x + 16$</td>
<td>$36.8x^2 + 14x + 15$</td>
</tr>
<tr>
<td>12.</td>
<td>$12x^2 - 71x + 30$</td>
<td>$38.5x^2 - 21x + 30$</td>
</tr>
<tr>
<td>13.</td>
<td>$13x^2 - 36x - 20$</td>
<td>$43. x^2 + 4x + 3$</td>
</tr>
<tr>
<td>14.</td>
<td>$14x^2 + 6x - 16$</td>
<td>$47. x^2 + 4x + 3$</td>
</tr>
<tr>
<td>15.</td>
<td>$15x^2 - 10x + 16$</td>
<td>$51. x^2 - 8x + 48$</td>
</tr>
<tr>
<td>16.</td>
<td>$16x^2 - 9x + 14$</td>
<td>$55. x^2 - 8x + 14$</td>
</tr>
<tr>
<td>17.</td>
<td>$17x^2 - 7x - 18$</td>
<td>$59. x^2 - 20x + 64$</td>
</tr>
<tr>
<td>18.</td>
<td>$18x^2 - 10x + 21$</td>
<td>$63. x^2 - 7x - 30$</td>
</tr>
<tr>
<td>19.</td>
<td>$19x^2 - 5x - 50$</td>
<td>$66. x^2 + 2x - 24$</td>
</tr>
<tr>
<td>20.</td>
<td>$20x^2 + 22x + 3$</td>
<td>$70. x^2 - 5x + 15$</td>
</tr>
<tr>
<td>21.</td>
<td>$21x^2 - 18x + 32$</td>
<td>$74. x^2 - 14x + 48$</td>
</tr>
<tr>
<td>22.</td>
<td>$22x^2 - 9x + 5$</td>
<td>$78. x^2 + 24x + 180$</td>
</tr>
<tr>
<td>23.</td>
<td>$23x^2 - 3x + 2$</td>
<td>$82. x^2 - 13x + 7$</td>
</tr>
<tr>
<td>24.</td>
<td>$24x^2 + 5x - 2$</td>
<td>$86. -x^2 + x + 20$</td>
</tr>
<tr>
<td>25.</td>
<td>$25x^2 + 6x + 1$</td>
<td>$90. -3x^2 - 10x + 3$</td>
</tr>
<tr>
<td>26.</td>
<td>$26x^2 - 7x + 3$</td>
<td>$94. 5x^2 - 17x + 10$</td>
</tr>
<tr>
<td>27.</td>
<td>$27x^2 - 3x - 27$</td>
<td>$98. 4x^2 + 9x + 5$</td>
</tr>
<tr>
<td>28.</td>
<td>$28x^2 + 6x + 15$</td>
<td>$102. -5x + 7x + 2$</td>
</tr>
<tr>
<td>29.</td>
<td>$29x^2 + 6x + 11$</td>
<td>$106. 4x^2 + 11x - 3$</td>
</tr>
<tr>
<td>30.</td>
<td>$30x^2 - 5x - 14$</td>
<td>$110. 20x^2 - 3x - 2$</td>
</tr>
<tr>
<td>31.</td>
<td>$31x^2 - 2x - 90$</td>
<td>$114. 10x^2 - 14x + 4$</td>
</tr>
<tr>
<td>32.</td>
<td>$32x^2 + 7x + 11$</td>
<td>$118. 30x^2 + 25x - 20$</td>
</tr>
<tr>
<td>33.</td>
<td>$33x^2 + 6x + 40$</td>
<td>$122. -x^2 + 9x + 22$</td>
</tr>
<tr>
<td>34.</td>
<td>$34x^2 - 19x + 3$</td>
<td>$126. -7x^2 - 23x - 6$</td>
</tr>
<tr>
<td>35.</td>
<td>$35x^2 - 20x + 50$</td>
<td>$130. x^2 - 25$</td>
</tr>
<tr>
<td>36.</td>
<td>$36x^2 - 4x + 4$</td>
<td>$134. x^2 - 4x + 4$</td>
</tr>
<tr>
<td>37.</td>
<td>$37x^2 - 12x + 4$</td>
<td>$138. 6x^2 + 5x - 4$</td>
</tr>
<tr>
<td>38.</td>
<td>$38x^2 + 14x + 3$</td>
<td>$142. 21x^2 + 8x - 4$</td>
</tr>
<tr>
<td>39.</td>
<td>$39x^2 - 10x - 11$</td>
<td>$146. x^2 - 5x - 14$</td>
</tr>
<tr>
<td>40.</td>
<td>$40x^2 + 4x - 2$</td>
<td>$150. x^2 + 9x + 14$</td>
</tr>
<tr>
<td>41.</td>
<td>$41x^2 - 10x + 21$</td>
<td>$152. x^2 - 10x + 21$</td>
</tr>
</tbody>
</table>
Fill in the blanks by giving examples.

1. A polynomial of degree \( \geq \) _____

2. A monomial ________________

3. A trinomial ________________

4. A monomial times a binomial ________________

5. A linear polynomial ___

6. A quadratic polynomial______________

7. Two binomials multiplied together ________________

Write the following in standard form:

8. \( 3 + x^2 - 7x \) ________________

9. \( 8x - 9x^2y + 5 - 2x5 \) __
STATION 2 - DALLAS

Add or subtract as indicated in the problems.

1. \((4a^2 + 7a - 12) + (-9a^2 - 6 + 2a) =\)

2. \(6a^2 - 8a + 12b^3\)
   \((-) - a^2 + 6a + 2b^3\)

Find the perimeter of the following polygons.

3. \(\begin{array}{c}
6c + 1 \\
2c^2 + 3c
\end{array}
\)
\(\overline{4c^2 - 2c + 13}\)

4. \(\begin{array}{c}
x^2 + 3x - 1
\end{array}\)
\(\overline{2x}\)

STATION 3 - SANFRANCISCO

Find the following products:

1. \(2a^2(a^3 - 1) =\)

2. \(-x(x^2 - 2t + 3) =\)

3. \((n + 4X^2 - c - 4) =\)

4. \((x - 6)^2 =\)

5. \((2x - 1)(t + 5) =\)

6. \(2m^2(5m^2 - 7m + 8) =\)

7. \(3x(x - 27) =\)

8. \((t^2 + 3x - 4X^3x^2 - 4x + 6) =\)
Find the special products without using FOIL or 4-square

1. \((x + 8)(x - 8) = \) 

2. \((4x + 5)(4x + 5) = \) 

3. \((3x - 2)^2 = \) 

4. \((9x - 4)(9x + 4) = \) 

5. \((5x + 1)^2 = \) 

6. \((x^2 + 10)(x^2 - 10) = \)

Factor out the GCF in each of the following:

1. \(2a^5 - 2a^2 = \) 

2. \(-x^3 + 2x^2 - 3x = \) 

3. \(10m^4 - 14m^3 + 16m^2 = \) 

Find the roots of the following polynomials by solving the equations:

4. \(8x^2 - 24x = 0\) 

5. \(30x^1 = -15x\) 

6. \(6n^1 - 15n = 0\)
PASSPORT to the USA

STATION 1 - ATLANTA
Fill the blanks by plugging examples.

10. A polynomial of degree 3: \( x^3 + 2x^2 \)
11. A monomial: \( 4x \) or \( 7x^3 \)
12. A trinomial: any 3 terms separated by + or -.
13. A monomial times a binomial: \( 2x(x-4) \)
14. A linear polynomial: \( 3x - 5 \)
15. A quadratic polynomial: \( 5x^2 + 40x + 25 \)
16. Two binomials multiplied together: \((x-2)(3x + 6)\)

Write the following in standard form:

17. \( 3 + x^2 - 7x: x^2 - 7x + 3 \)
18. \( 8x - 9x^2y + 5 - 2x^2: -2x^2 - 9x^2y + 8x + 5 \)

STATION 2 - DALLAS
Add or subtract as indicated in the problems.

5. \( (4a^3 + 7a^2 - 12a + (-9a^3 - 6a + 2a)) = 5a^3 + 9a - 18 \)
6. \( 6a^2 - 9a + 12b^3 \)
\( = -a^2 + 6a + 1b^3 \)
\( 7a^1 - 14a + 10b^3 \)

Find the perimeter of the following polygons.

STATION 3 - SAN FRANCISCO
Find the following products:

9. \( 2a'(a' - 1) = 2a' - 1a' \)
10. \( -x'(x' - 2x + 3) = -x' + 2x^2 - 3x \)
11. \( (x + 4Xx - 4) = x' - 16 \)
12. \( (x - 6) = x' - 12x + 36 \)
13. \( (ix - iXx + 5) = ix' + 9ix - 5 \)
14. \( 2m^5(5m^1 - 7m + S) = Hm^5 - 14m^4 + 16m^3 \)
15. \( x(x - 27)m^1 - 9x \)
\( 3 \)
16. \( (x' + 3x - 4)(3x' - 6x + 6) = 3x' + 8x^2 - 14x + 2 + 3x - 14 \)

STATION 4 - NEW YORK
Find the special products without using FOIL or square.

1. \( (x + S)(x - S) = x' - 64 \)
2. \( (4x + 5)(4x + 5) = 16x^2 + 40x + 25 \)
3. \( (3x - 2)^2 = 9x^2 - 12x + 4 \)
4. \( (9x - 4)(9x + 4) = 81x^2 - 16 \)
5. \( (5x + 1)^1 = 25x^2 + 10x + 1 \)
6. \( (x' + 1O)(x' - 1O) = x^2 - 100 \)

STATION 5 - BOSTON
Factor out the GCF in each of the following:

1. \( 6a^3 - 4a = 2a(3a^2 - 2) \)
2. \( -x^3 + Zx^2 - 3x = -x(x^2 - k + 3) \)
3. \( lnt - 1... +1 n! = 2m^2(sm^2 - 7m + 8) \)

Find the roots of the following polynomials by solving the equations:

4. \( 8x^2 - 24x = 0 \)
\( x = 0, x = 3 \)
5. \( 30x^2 - 15x = 0 \)
\( x = 0, x = -1 \)
6. \( 6m^2 - 15m = 0 \)
\( m = 0, m = 512 \)
**ALCEBA1A - QUADRATIC EQUATION ASSESSMENT ACTIVITY**

This activity will demonstrate your understanding of the graph of a quadratic equation (parabolas) using the axis of symmetry $y = -x^2 + 4$. Utilize the tasks for this activity as follows:

1. Your drawing must include at least 7 different parabolas. Portions of parabolas may be used to make your shapes, but they should be visible and not overlap. Follow these steps:
   - Plot a vertex at $(4,1)$ and $p$. Adjust the ordinates to $a = b = 2$.
   - Find the $y$-intercept of the quadratic, so $y = a(x - h)^2 + k$. Determine the axis of symmetry from the equation.
   - Use the vertex form of the quadratic. Note: $y = a(x - h)^2 + k$. Substitute all these values into the vertex form of the quadratic, so $y = a(x - h)^2 + k$ becomes.

2. Your drawing must include a grid of axes and a scale.
3. Each parabola in your drawing must be identified by allowing
4. In your drawing, separate the vertices of the parabola into the following categories:
   - Equation:
   - Axis of Symmetry:
   - Vertex:
   - Table of values used to find the equation of the parabola:

For example, I want to use the right-hand portion of the graph of $y = (x - 1)^2$ with the vertex at $(1,0)$. If we would look like this:

The vertex for this $y = (x - 1)^2$ would look like this:

**The vertex is:**

$V = (1,0)$

**Equation:**

$y = (x - 1)^2$

**Axis of Symmetry:**

$x = 1$

**Vertex:**

$(1,0)$

**Table of values used to find the equation of the parabola:**

<table>
<thead>
<tr>
<th>$x$</th>
<th>$y$</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>4</td>
<td>9</td>
</tr>
</tbody>
</table>

**HOW TO FIND THE EQUATION:**

You may find the $a$, $h$, and $k$'s to the right of the equation. $y = a(x - h)^2 + k$.

First, you can draw a parabola. Make sure it is the correct one when you draw it. The vertex of the parabola must be through the vertex of the parabola. And the rest of the parabola must go through the vertex of the parabola.

Substitute the value into the equation. Also, substitute the values of the parabola. Solve for $a$ using the equation in vertex form. $a = \frac{b}{4c}$. Then solve for $x$.
**RUBRIC FOR QUADRATIC ASSESSMENT ACTIVITY**

1. A filestone (Sketch of drawing and at least one parabola solved for bis of Symmetry, vertex and Table of values used) DUE Friday, Afay 10/2 2013

**FINAL PROJECT** DUE Friday, Afay 24/2 2013

<table>
<thead>
<tr>
<th>IS</th>
<th>6-10</th>
<th>IHS</th>
<th>16-10</th>
<th>S&lt;&lt;0</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>SS</strong></td>
<td>b:E:de l el 1 1 3 9 4 84!&gt;4 $4 $!</td>
<td>b:E:de l el 1 1 3 9 4 84!&gt;4 $4 $!</td>
<td>b:E:de l el 1 1 3 9 4 84!&gt;4 $4 $!</td>
<td>b:E:de l el 1 1 3 9 4 84!&gt;4 $4 $!</td>
</tr>
<tr>
<td><strong>Y d; of C»,?</strong></td>
<td>Oe 4 $ d; d; of Ve??:l 1 £e=44: d; of 4k 41d&amp;k.</td>
<td>Oe 4 $ d; d; of Ve??:l 1 £e=44: d; of 4k 41d&amp;k.</td>
<td>Oe 4 $ d; d; of Ve??:l 1 £e=44: d; of 4k 41d&amp;k.</td>
<td>Oe 4 $ d; d; of Ve??:l 1 £e=44: d; of 4k 41d&amp;k.</td>
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<tr>
<td><strong>Ac-:.RCY</strong></td>
<td>$Ld: Ll 60% 44:.00% 44k;: b of A;li; of 'm!at!e. Ve?!x 44!d;: 1 $y V41d;: of \1 $</td>
<td>$Ld: Ll 60% 44:.00% 44k;: b of A;li; of 'm!at!e. Ve?!x 44!d;: of \1 $</td>
<td>$Ld: Ll 60% 44:.00% 44k;: b of A;li; of 'm!at!e. Ve?!x 44!d;: of \1 $</td>
<td>$Ld: Ll 60% 44:.00% 44k;: b of A;li; of 'm!at!e. Ve?!x 44!d;: of \1 $</td>
</tr>
<tr>
<td><strong>Q-e:4;w.</strong></td>
<td>Oe 4 $1: k d;3 'ee of C 4e:4;w.</td>
<td>Oe 4 $4; e 43 d;3 'ee of C 4e:4;w.</td>
<td>Oe 4 $Pisi d:3 'ee of C 4e:4;w.</td>
<td>Oe 4 $ exe 1 d:3 'ee of C 4e:4;w.</td>
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<td><strong>?e !£;ixi= TIIU C 4C?!Lixi $1)4 4C!te, 2) 4: 3\c;41! opid</strong></td>
<td>bc:Oe:3 C4! I! Lixi</td>
<td>:E.6 !1! ) of } C 4C?!Lixi</td>
<td>:E.6 &amp; 4$ 2 of 11! c!l! ac!l!iiit</td>
<td>:E.6 &amp; 4$!13 C4! I! Lixi</td>
</tr>
</tbody>
</table>

Your score: ___________ / 100
Lesson Plan

Square Root Activity

Goal:
This lesson is designed to reinforce conceptual understanding of the square root.

Grade:
8, Algebra 1.

CA Standards:
Understand and use operations such as finding a square root. (2.0)

Description:
The students work individually. They need to find the correct answer for each question, and write down the letter that corresponds to the answer. When they have all the 23 letters, they can read them together to get the punch line.

Materials Needed:
Worksheets (given below), and pencils

The answer (punch line) is:
I DID NOT KNOW IT WAS MISSING

Lesson Plan Source:
California Algebra 1, Concepts and Skills book, by Larson, Boswell, Kanold, and Stiff
Chapter 9.1

Source of the cartoon:
Made by Jeff Macnelly
FIND THE PUNCHLINE BY SOLVING THE MULTIPLE CHOICE QUESTIONS

Directions: Find the solution for the questions. Each question has a correct answer. Write down the letter that corresponds to the right answer. When you have all the 23 letters, read them and you will have the punch line.

1. \( x^2 = 64 \)
   - A: \( x = -8 \)
   - M: \( x = 8 \)
   - T: \( x = 9 \)
   - L: \( x = \pm 8 \)

2. \( x = \sqrt{100} \)
   - E: \( x = -10 \)
   - D: \( x = 10 \)
   - A: \( x = -100 \)
   - T: \( x = 100 \)

3. \( x = \sqrt{36} \)
   - I: \( x = -6 \)
   - S: \( x = 6 \)
   - T: \( x = \pm 6 \)
   - B: \( x = -18 \)

4. \( x = \sqrt{25} \)
   - D: \( x = 3 \)
   - C: \( x = -3 \)
   - M: \( x = 9 \)
   - L: \( x = -9 \)

5. \( x = \frac{1}{28} \)
   - I: \( 20 < x < 30 \)
   - N: \( 5 < x < 6 \)
   - E: \( -6 < x < -5 \)
   - P: \( -30 < x < -20 \)

6. \( x = \sqrt{53} \)
   - A: \( x = \sqrt{25} \)
   - I: \( x = -8 \)
   - S: \( x = -18 \)
   - O: \( x = 7 \)

7. \( n = 16 \)
   - T: \( i^2 = 256 \text{ and } \sqrt{n} = 4 \)
   - P: \( n^2 = 156 \text{ and } \sqrt{n} = 4 \)
   - R: \( i^2 = 32 \text{ and } \sqrt{n} = -4 \)
   - Z: \( n^2 = 4 \text{ and } \sqrt{n} = \pm 4 \)

8. \( a = \sqrt{10000} \)
   - N: \( a = 100 \)
   - M: \( a = 100 \)
   - K: \( a = 100 \)
   - T: \( a = 100000 \)

9. \( y = \sqrt{15} \)
   - N: \( \sqrt{15} \)
   - U: \( y = 5 \)
   - V: \( y = 5 \)
   - L: \( y = \pm 5 \)

10. \( b = 6 \) ± \( \sqrt{4} \)
    - E: \( b = 17 \)
    - A: \( b = 127 \)
    - C: \( II = 5, 11 = -17 \)
    - O: \( II = 5, 11 = 17 \)

11. \( y = -4 \pm \sqrt{4} + 5 \)
    - W: \( y' = -1, y = -7 \)
    - B: \( y' = 5, y = -13 \)
    - S: \( y' = -5, y = 13 \)
    - T: \( y' = 5, y = -7 \)

12. \( x = \sqrt{900} \)
    - C: \( x = 30 \)
    - K: \( x = -30 \)
    - I: \( x = \pm 30 \)
    - L: \( x = 300 \)

13. Which number is a perfect square?
    - A: \( 124 \)
    - T: \( 64 \)
    - V: \( 46 \)
    - N: \( 48 \)

4
15. \( a \cdot b = 6, c = 5. \) Then \( \sqrt{b^2 - 4ac} = \)

\[
\begin{array}{cc}
A: & 4 \\
B: & 16 \\
D: & -4 \\
F: & -16
\end{array}
\]

16. \( x = 2 \pm \sqrt{25} \)

\[
\begin{array}{ccc}
F: & x \cdot 1, x = 3 \\
S: & x = 1, x = -3 \\
M: & X = -7, c = 3 \\
R: & X = -7, 1 = -3
\end{array}
\]

17. Which number is a perfect square?

\[
\begin{array}{cccc}
N: & S & P: & 9 \\
M: & 49 & T: & 121
\end{array}
\]

18. \( y = \frac{4}{5} \)

\[
\begin{array}{ccc}
A: & v = \frac{4}{5} \\
B: & y = \frac{4}{5} \\
D: & v = \frac{5}{4}
\end{array}
\]

19. \( x = \lceil 3 \rceil \)

\[
\begin{array}{cc}
V: & 120 < x < 130 \\
Y: & 50 < x < 60 \\
F: & 21 < x < 31 \\
S: & 10 < x < 12
\end{array}
\]

20. \( b = \frac{23}{2} \pm \sqrt{169} \)

\[
\begin{array}{cccc}
S: & b = \frac{23}{2} \\
& b = \frac{15}{2} \\
& b = \frac{2}{2} \\
& b = \frac{17}{2} \\
& b = \frac{2}{2}
\end{array}
\]

21. \( x = 5 + \sqrt{2} \)

\[
\begin{array}{cccc}
E: & \ldots g7 \\
A: & x = 41 \\
C: & x = 8 \\
I: & x = 14
\end{array}
\]

22. \( y = \frac{-11}{11} + 21 \)

\[
\begin{array}{ccccc}
G: & Y = -130 \\
N: & y = 10 \\
H: & y = 44 \\
M: & Y = 44
\end{array}
\]

23. \( a = 2, b = 4. \) Then \( \sqrt{b^2 + 10a} = \)

\[
\begin{array}{ccc}
P: & 5 \\
G: & 6 \\
R: & -5 \\
V: & -6
\end{array}
\]
Using your graphing calculator, graph the parent square root function $y = \sqrt{x}$ as $Y1$. 

| Y2: $y = \sqrt{x} - 3$ Chng-: |
| Y3: $y = \sqrt{x} + 5$ Chng-: |
| Y4: $y = \sqrt{x} - 2$ Chng-: |
| Y5: $y = \sqrt{x} - 3x$ Chng-: |
| Y6: $y = -2\sqrt{x} + 1$ Chng-: |
| Y7: $y = \sqrt{x} - 1$ Chng-: |

Using the information above, verify the equation $f(x) = \sqrt{x}$ as a root function. Hint: Use $\alpha, \beta, \delta, \kappa$ and $\psi$ in the $\text{xy} = \text{xy}$ function. 

$y =$ __________________________}
The Square Root Function

In this exercise you will explore the graph of the square root function. You should use a calculator to get the Y values. A suggested table is provided for the first two functions. Please fill in a table of your own for the remaining functions.

Step 1: Graph the function \( y = \sqrt{x} \)

Step 2: Graph the function \( y = -\sqrt{x} \)

What do you notice about the differences in the graphs? What is the domain and range of both graphs?

Step 3: For example, if we add or subtract 2 to/from the original functions we get the functions
\[ Y = Fx + 2 \] and \[ Y = Jx - 2 \]. Graph these functions.

Graph the function \( y = -fx + 2 \)

Graph the function \( y = -fx - 2 \)

Domain:

Range:

How does the \( y = \sqrt{x} + 2 \) shift as a result of adding 2 to the original function?

How does the \( y = -\sqrt{x} \) shift as a result of subtracting 2 to the original function?

What can we conclude about the shifting of the square root graph when we add or subtract a constant from the original square root graph?
Step 4: essay substituting \( x = 3 \) and \( x + 3 \) for \( x \) in the original function. These functions would be \( y = \sqrt{x - 3} \) and \( y' = x + 3 \). Graph these functions.

Graph the function \( y = \sqrt{x - 3} \)

Graph the function \( y' = x + 3 \)

Domain: \( \ldots \)

Domain: \( \ldots \)

How does the \( y' = \sqrt{x - 3} \) shift as a result of subtracting a constant within the original function?

How does the \( y' = x + 3 \) shift as a result of subtracting a constant within the original function?

What can we conclude about the shifting of the square root graph when we add or subtract a constant inside the original radical?

Step 5: essay multiplying the original function by \( y' = 2, y = \sqrt{x} \) and \( y' = \frac{1}{3}, y = \sqrt{x} \). Graph these functions.

Graph the function \( y = 2 \sqrt{x} \)

Graph the function \( y' = \frac{1}{3}, y = \sqrt{x} \)

How are the graphs shifted when multiplying the original function by a constant? How do the two graphs \( y' = 2, y = \sqrt{x} \) and \( y' = \frac{1}{3}, y = \sqrt{x} \) differ?

The "shifts" that we explored in the square root graphs can be grouped into two categories:

1. Translation shifts the original function graph horizontally or vertically.

2. Reflection creates a mirror image of the original function across the line of reflection (for example across the \( x \)-axis).

Using the information from your discoveries, write the general equation for a square root function. Hint: use \( a, h, k \) as was used in the vertex form of a quadratic.

\[
y = \ldots \]
Pan I

Complete the table of values.

<table>
<thead>
<tr>
<th>x</th>
<th>-4</th>
<th>-3</th>
<th>-2</th>
<th>-1</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td>x^2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Use the table of values to draw the graph of \( f(x) = x^2 \). Be sure to label the \( x \)-axis, \( y \)-axis, axis of symmetry, concavity, and min. and max. values.

Pan II

1. Sketch and label the following graphs using the graphing calculator.
   a) \( y = 2x^2 \)
   b) \( y = -3x^2 \)
   c) \( y = \frac{1}{2}x^2 \)
   d) \( y = 5x^2 \)
   e) \( y = -\frac{1}{2}x^2 \)

2. What are the similarities among the graphs?
3. What are the different lines?
4. How do the \( f(x) = x^2 \) and \( f(x) = -x^2 \) differ from the graph in Part I?
5. Generalize your answer.

\[
y = (x-h)^2
\]

1. Sketch and label the following graphs using the graphing calculator.
   a) \( y = (x-2)^2 \)
   b) \( y = (x-5)^2 \)
   c) \( y = (x+1)^2 \)
   d) \( y = (x-4)^2 \)

2. What are the similarities among the graphs?
3. What are the differences?
4. How do the \( f(x) = (x-h)^2 \) differ from the graph in Part I?
5. Generalize your answer.

\[
y = x^2 + k
\]

1. Sketch and label the following graph using the graphing calculator.
   a) \( y = x^2 + 2 \)
   b) \( y = x^2 + 4 \)
   c) \( y = x^2 + 2 \)
   d) \( y = x^2 + 5 \)

2. What are the similarities among the graphs?
3. What are the differences?
4. How do the \( f(x) = x^2 + h \) differ from the graph in Part I?
5. Generalize your answer.