

# Christopher J Harris

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Goal	Return to the <i>industrial sector</i> , to create new products or improve existing ones, whether the target entity involves material, equipment, software, or humans.																	
Profile	<p><i>Chemical Engineer</i> with over 20 years of graduate research in the semiconductor realm seeking to redefine opportunity:</p> <table><tr><td>crystal growth</td><td>plasma chemistry</td><td>computer modeling</td></tr><tr><td>surface science</td><td>laser excitation</td><td>python language</td></tr><tr><td>chemical vapor deposition</td><td>optical characterization</td><td>statistical analysis</td></tr><tr><td>molecular beam epitaxy</td><td>electrochemical methods</td><td>process control</td></tr><tr><td>semiconductor devices</td><td>applied neuroscience</td><td>laboratory automation</td></tr></table>			crystal growth	plasma chemistry	computer modeling	surface science	laser excitation	python language	chemical vapor deposition	optical characterization	statistical analysis	molecular beam epitaxy	electrochemical methods	process control	semiconductor devices	applied neuroscience	laboratory automation
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Literature	<p><i>Real-time Monitoring of Surface Processes by P-polarized Reflectance</i>, J. of Vacuum Science &amp; Technology: <b>1997</b>, A15, 807.</p> <p><i>Molecular Layer Epitaxy by Real-time Optical Process Monitoring</i>, Applied Surface Science: <b>1997</b>, 112, 38.</p> <p><i>Boron Incorporation in Hydrogenated Amorphous Silicon Films Prepared by Chemical Vapor Deposition</i>, J. of Noncrystalline Solids: <b>1987</b>, 97, 1419.</p> <p><i>Laser-induced Chemical Vapor Deposition of Hydrogenated Amorphous Silicon: Photovoltaic Devices and Material Properties</i>, Solar Cells: <b>1987</b>, 21, 177.</p>																	
Experience	<p><i>Engineering Consultant</i>, LocalSolo Freelance: Vancouver, BC, Canada (1/18 to present) Provide technical resources to help organizations reach their full potential.</p> <p><i>Substitute Teacher</i>, Source4Teachers: Cherry Hill, NJ (12/13 to 2/15) Deal with special ed students with behavioral issues under the guidance of a child psychologist; present math, science, general curricula to individuals ranging from preschool through high school.</p> <p><i>Research Assistant</i>, Maine Chemistry Dept: Orono, ME (8/03 to 5/06) Apply cyclic voltammetry, an electrochemical measurement, to find: catalytic activity in gold compounds for methanol oxidation, and electrochemiluminescence (ecl) in a ruthenium compound for DNA analysis.</p> <p><i>Research Assistant</i>, NCSU Materials Science Dept: Raleigh, NC (5/96 to 5/99) Grow GaP heterostructure films on Si in a chemical beam epitaxy system, analyze plane polarized reflectance spectroscopy (PRS) / laser light scattering (LLS) in-situ optical signals, develop a radio frequency nitrogen plasma source for GaN film growth, and do a substrate temperature calibration based on reflectivity measurements.</p> <p><i>Research Assistant</i>, NCSU Materials Science Dept: Raleigh, NC (1/87 to 5/89) Design / build a microwave plasma chemical vapor deposition chamber, achieve a unique ellipsoidal plasma advantageous for film growth over typical spherical plasmas, and grow polycrystalline diamond films on Si.</p> <p><i>Research Specialist</i>, MIT Advanced Energy Materials Lab: Cambridge, MA (11/84 to 1/87) Use infrared laser to produce ceramic powders, amorphous Si films, and alumina-based crystals. Analyze transmitted / scattered optical signals from ceramic powder process, giving rise to a computer monitoring scheme. Set up interferometer to measure film thickness, providing a realtime signal, to calibrate growthrate. Develop process control loop for laser cavity tuning, leading to more reliable film properties. Collect in-situ stress measurements of growing films, through deflection of an optical laser, as sample curvature evolves. Optimize growth parameters of amorphous Si solar cells, and scale-up new chemistry of ceramic powders.</p>																	
Education	MS <i>Physical Chemistry</i> MS <i>Material Science</i> BS <i>Chemical Engineering</i> HS <i>Diploma</i>	Rutgers: New Brunswick, NJ North Carolina State: Raleigh, NC Texas A&M: College Station, TX Waltham High: Waltham, MA	Jan 2003 unofficial May 1984 Jun 1979															
Honor	<i>Bausch &amp; Lomb Science Award</i>																	



## Education Philosophy

*Through the medium of verbal narrative and visual illustration, demonstrate how scientists think and test their hypotheses using basic logic.*

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A teacher plays a role comparable to an orchestra conductor, with dialogue between the leader and the band members. The maestro listens to the orchestra, then makes suggestions on how to improve the sound using an interpretation of a composer's intentions. Similarly, a teacher provides exercises, then shows the class the most acceptable way to solve a particular problem, consistent with the leader's perception of theory.

People learn things best if you present the subject matter like layers of an onion. No matter what the topic, explain things from first principles, start from common knowledge, and build up to the final result. Encourage note taking, provide a rational structure to the discussion, invite questions, and draw as many graphical representations as possible. With this approach, students engage the content, regardless of learning style. When the time comes to provide feedback, I maintain a policy of not marking an answer wrong, unless I can prove it, which avoids an awkward situation of arguing with the student, and promotes innovative solutions to the problem, based on the student's level of understanding.

In a democratic learning environment, if creativity represents the highest form of intelligence, I prefer not to compare one student's performance against another. Pupils who take longer to absorb educational content, could eventually develop a deeper understanding, as a consequence. Therefore, my vision of differential learning includes exposing all students to the same material, but assessing them according to their skill level. Polling class constituents on what they'd like to do each day provides a sense of unity among class members and strengthens instructor bonds, to yield a more effective teaching environment. When students perceive an activity with an element of fun, minds become more receptive to learning. Children never cease to amaze me with their imagination, suggesting better ideas than I would conceive alone.

Through the medium of verbal narrative and visual illustration, demonstrate how scientists think and test their hypotheses using basic logic. When volunteers attempt example problems on the board, it gives me insight where students need help, and reassures fellow class members their peers have similar struggles with the concepts. Place emphasis on:

	<i>define problem</i>	
	<i>list each assumption</i>	
	<i>specify known quantities</i>	
	<i>identify unknowns</i>	
	<i>propose strategy</i>	
	<i>carry units</i>	
	<i>show intermediate steps</i>	
	<i>challenge whether answer seems reasonable</i>	

according to original expectations. If circumstances warrant refinement, where did initial impressions fail, and how should next iteration proceed.

To prepare for an upcoming information age, middle schools should return to their traditional goal as trade exploration centers. Middle schools lay the foundation for high school in the same way that kindergarten programs set the stage for elementary school. Recently, learning institutions have come forward praising double sessions of English and Math as a means to prepare the masses for higher education. Without substantial context to apply these skills, dramatic behavior issues pervade the middle school atmosphere. According to child psychologists, kids act up when an imbalance exists between learning and fun. Ironically, teachers favor punishment over rewards, in response to student misbehavior. At the middle school age, hands-on classes in woodwork, metal fabrication, technical drawing, music, and art leave a more permanent impact on individuals than academic disciplines. These formative years represent a chance to let the students play with gadgets, just as they did in kindergarten with toys. Why not invite children of all educational genres to develop computer games, explore the boundaries of 3-D printing, or invent rudimentary robotic devices. Perhaps the student body will have an incentive to convey their ideas through English and Math.

## *Understanding by Design*

**Teacher** Christopher Harris  
**Date** 12 April 2014

**Grade** 11  
**Subject** Algebra II

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### **Stage 1** Desired Results

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<i>Established Goals</i>	Solve quadratic equations in one variable. CCSS.MATH.CONTENT.HSA.REI.B.4
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<i>Understandings</i>	Students will comprehend how to solve quadratic equations using the quadratic formula.
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<i>Essential Questions</i>	What role does the discriminant play? How many solutions are expected? What type of values anticipated? What parameters influence parabola shape?
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<i>Student will know...</i>	How to interpret numerical values of the discriminant. How to process coefficients to generate quadratic equation solutions. What the graphical representation looks like based on numerical solution.
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<i>Student will be able to...</i>	Determine the discriminant. Predict solutions from the quadratic formula. Graph the results.
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### **Stage 2** Assessment Evidence

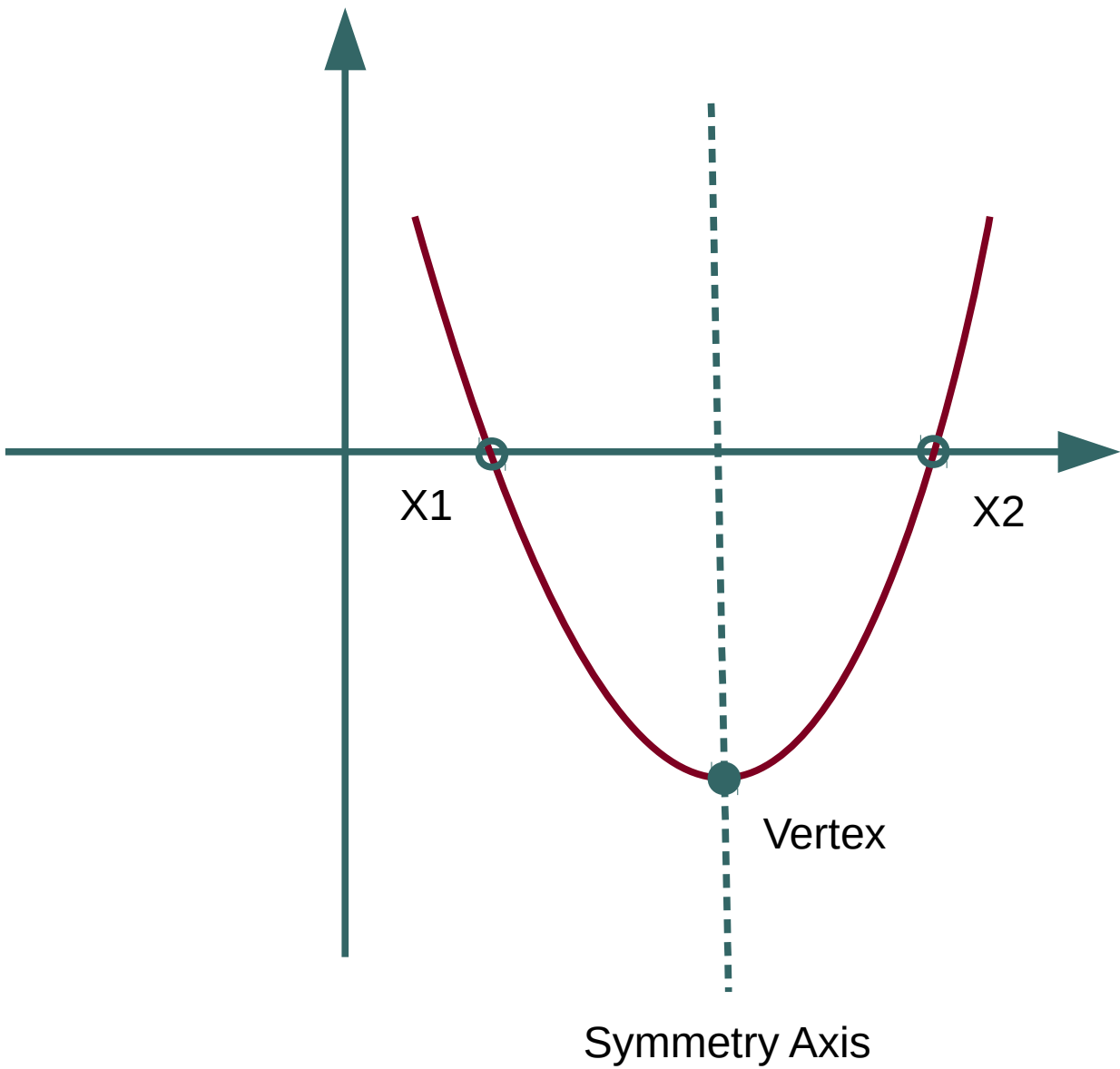
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<i>Performance Tasks</i>	Set up the quadratic equation in the proper format. Evaluate the discriminant. Determine whether there are real or imaginary solutions. Solve the quadratic equation. Determine the symmetry axis, intercepts, vertex, and orientation.
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<i>Other Evidence</i>	$y=f(x)=ax^2+bx+c=0$ $D=b^2-4ac \quad > 0 \quad 2 \text{ real :} \quad \text{x-axis cross}$ $\quad \quad \quad = 0 \quad 1 \text{ real :} \quad \text{tangent to x-axis}$ $\quad \quad \quad < 0 \quad 2 \text{ complex :} \quad \text{no x-axis cross}$ <p>x-intercept(s): <math>x=\frac{-b\pm\sqrt{D}}{2a}; y=0</math></p> <p>y-intercept: <math>y=f(0)=c</math></p> <p>symmetry axis: <math>x=\frac{-b}{2a}</math></p> <p>vertex: <math>[\frac{-b}{2a}, f(\frac{-b}{2a})]</math></p> <p>orientation: deduce from vertex &amp; intercept positions.</p>
<i>Evidence Summary</i>	Recognize critical values derived from quadratic formula.
<i>Self-Assessments</i>	<p>Compare results with solution set.</p> <p>Identify where bottlenecks or mistakes took place.</p> <p>Write a journal entry outlining universal procedures to accomplish goals and achieve success.</p>
<b>Stage 3 Learning Plan</b>	
<i>Learning Activities</i>	<p>Warmup</p> <p>Objective</p> <p>Feedback</p> <p>Key concepts</p> <p>Derivation:</p> <p><i><a href="http://www.mathsisfun.com/algebra/quadratic-equation-derivation.html">www.mathsisfun.com/algebra/quadratic-equation-derivation.html</a></i></p> <p>Guided practice</p> <p>Independent exercise</p> <p>Assessment:</p> <p><i><a href="http://www.mathwarehouse.com/quadratic/discriminant-in-quadratic-equation.php">www.mathwarehouse.com/quadratic/discriminant-in-quadratic-equation.php</a></i></p> <p>Journal Entry</p>



$$y = f(x) = ax^2 + bx + c = 0$$

Figure 1: Basic Parabola Features

$$D = b^2 - 4ac$$

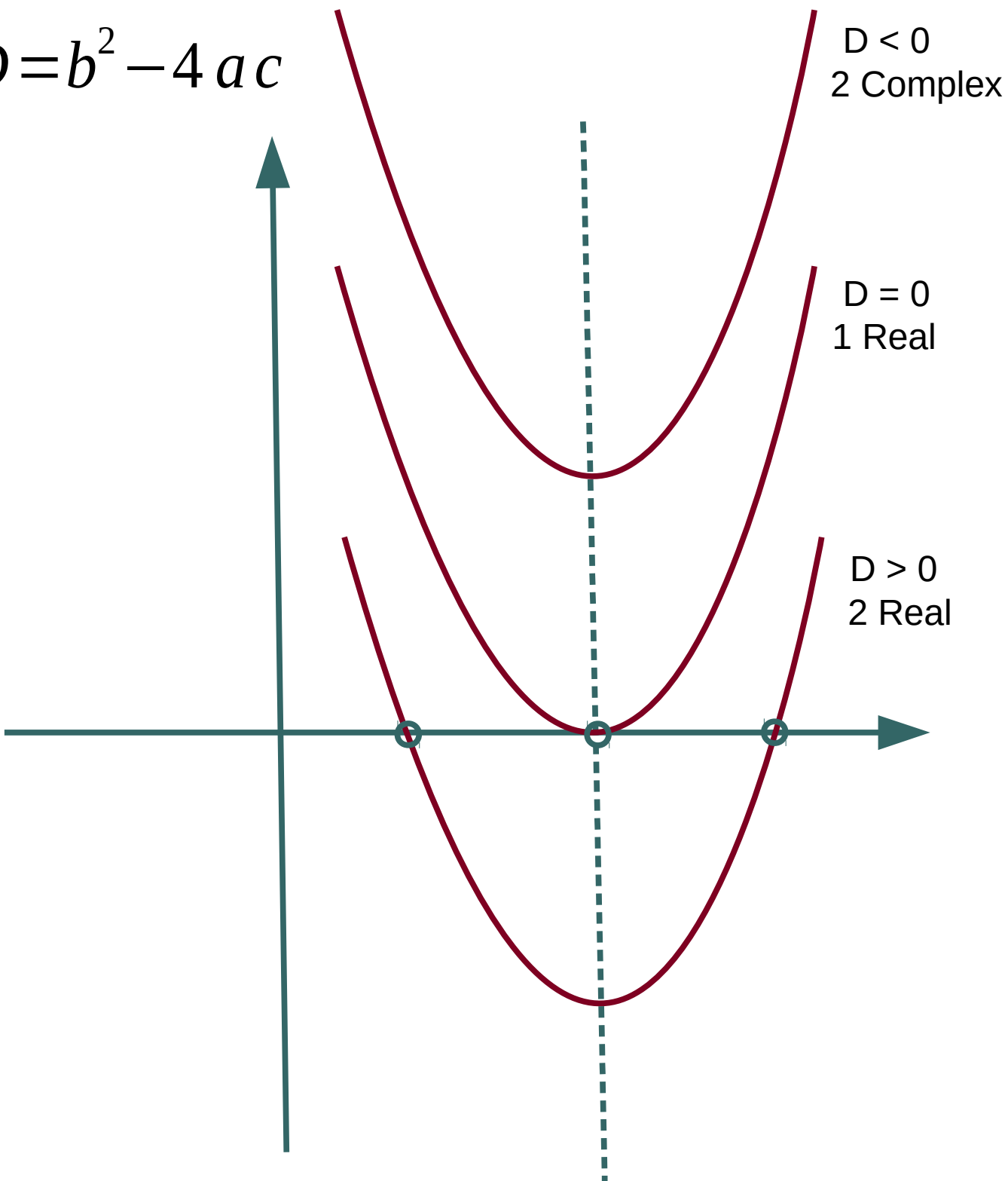


Figure 2 : Discriminant Role in Solutions

## BACKGROUND INFORMATION

Test Taker's Name: HARRIS, CHRISTOPHER J

Candidate ID Number: 10520493

Social Security Number: 5549  
(Last 4 Digits)

Sex: M

Date of Birth: 07/11/1961

## EDUCATIONAL INFORMATION

College Where Relevant Training Was Received:	TEXAS A&M UNIV COLLEGE STATION
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Undergraduate Major: ENGINEERING

Graduate Major: CHEMISTRY

Educational Level: EARNED MASTER'S DEGREE

GPA: 3.0 - 3.49

**SCORE RECIPIENT(S) REQUESTED**

Code #	Recipient Name	Code #	Recipient Name
R7065	DELAWARE DEPT OF EDUCATION	R7403	MARYLAND DEPT OF EDUCATION
R7666	NEW JERSEY DEPT OF EDUCATION	R8425	VIRGINIA STATE DEPT EDUCATION
R8033(A)	PENNSYLVANIA DEPT OF EDUCATION		

**CURRENT TEST DATE:** 06/06/2017

[illegible]

<b>HIGHEST SCORE AS OF:</b>	<b>06/09/2017</b>
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[illegible]

ETS will retain your score for ten years for reporting purposes.

\*\* For more details on Average Performance Range refer to footnote on last page of this score report.

**Message Codes:** A = SCORE AUTOMATICALLY REPORTED TO STATE LICENSING AGENCY.

**Message Codes:** A = SCORE AUTOMATICALLY  
Y = SCORE REPORTED TO RECIPIENT LISTED.