Christopher J Harris

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Goal

Return to the *industrial sector*, to create new products or improve existing ones, whether the target entity involves material, equipment, software, or humans.

Profile

Chemical Engineer with over 20 years of graduate research in the semiconductor realm seeking to redefine opportunity:

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

Literature

Real-time Monitoring of Surface Processes by P-polarized Reflectance, J. of Vacuum Science & Technology: **1997**, *A15*, 807.

Molecular Layer Epitaxy by Real-time Optical Process Monitoring, Applied Surface Science: **1997**, *112*, 38.

Boron Incorporation in Hydrogenated Amorphous Silicon Films Prepared by Chemical Vapor Deposition, J. of Noncrystalline Solids: **1987**, *97*, 1419.

Laser-induced Chemical Vapor Deposition of Hydrogenated Amorphous Silicon: Photovoltaic Devices and Material Properties, Solar Cells: **1987**, *21*, 177.

Milestone

Invent a new approach for process control to optimize laser power.

Write a Pascal based data acquisition program for DOS environment in 1986, long before LabView enters the Windows market.

Analyze optical signals from a ceramic powder reaction chamber, leading to a computer monitoring scheme, which replaces a human operator.

Construct interferometer to measure film thickness, providing a realtime signal, to calibrate growthrate.

Refine process control loop to stabilize laser power, producing a steady deposition rate with reliable material properties.

Collect in-situ stress measurements of growing films, through deflection of an optical laser, as sample curvature evolves.

Grow the first laser-induced, chemical vapor deposition, amorphous silicon solar cell.

Develop a microwave plasma, chemical vapor deposition system, to create polycrystalline diamond from methane gas, in a regime where kinetics dominates over thermodynamics.

Achieve a unique ellipsoidal plasma advantageous for film growth over spherical plasmas.

Monitor the surface evolution of compound semiconductor heterostructure films, in a chemical beam epitaxy system, with plane polarized reflectance spectroscopy.

Design a radio frequency nitrogen plasma source for GaN film growth.

Measure substrate temperature derived from plane polarized reflectance.

Apply cyclic voltammetry to find: catalytic activity in gold compounds for methanol oxidation, and electrochemiluminescence in a ruthenium compound for DNA analysis.

Experience

Engineering Consultant, Communo: Philadelphia, PA (1/18 to present)
Research Assistant, Maine Chemistry Dept: Orono, ME (8/03 to 5/06)
Research Assistant, NCSU Materials Science Dept: Raleigh, NC (1/87 to 5/99)
Research Specialist, MIT Advanced Energy Materials Lab: Cambridge, MA (11/84 to 1/87)

Education

MS *Physical Chemistry*	Rutgers: New Brunswick, NJ	Jan 2003
MS *Material Science*	North Carolina State: Raleigh, NC	unofficial
BS *Chemical Engineering*	Texas A&M: College Station, TX	May 1984
HS *Diploma*	Waltham High: Waltham, MA	Jun 1979

Honor

Bausch & Lomb Science Award

Education Philosophy

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

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:

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

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

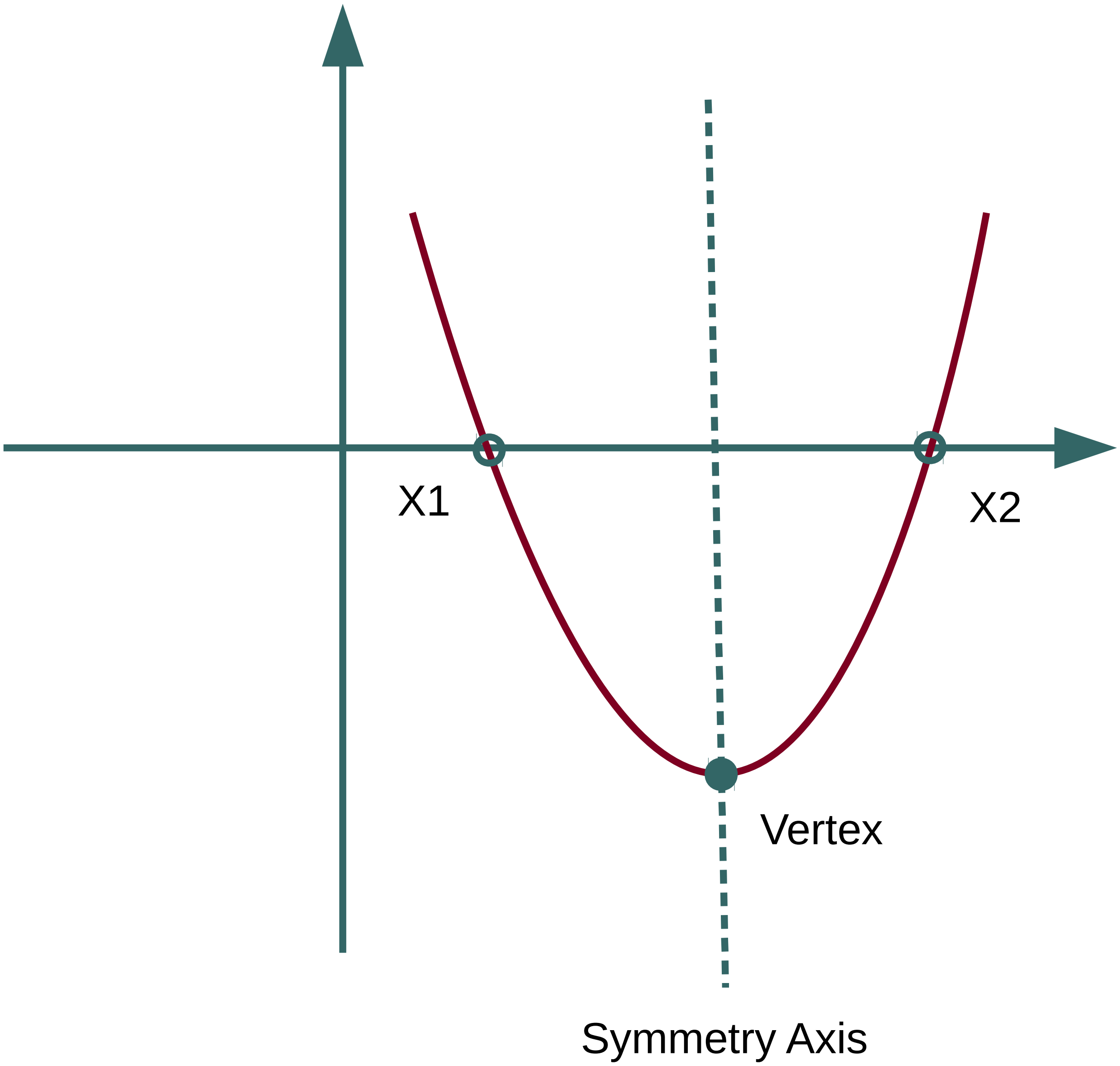
Teacher	Christopher Harris	**Grade**	11
Date	12 April 2014	**Subject**	Algebra II

Stage 1 Desired Results	
Established Goals	Solve quadratic equations in one variable. CCSS.MATH.CONTENT.HSA.REI.B.4
Understandings	Students will comprehend how to solve quadratic equations using the quadratic formula.
Essential Questions	What role does the discriminant play? How many solutions are expected? What type of values anticipated? What parameters influence parabola shape?
Student will know…	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.
Student will be able to…	Determine the discriminant. Predict solutions from the quadratic formula. Graph the results.
Stage 2 Assessment Evidence	
Performance Tasks	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.

Other Evidence	$y=f(x)=ax^2+bx+c=0$ $D=b^2-4ac$ > 0 2 real : x-axis cross $= 0$ 1 real : tangent to x-axis < 0 2 complex : no x-axis cross x-intercept(s): $x=\frac{-b\pm\sqrt{D}}{2a}; y=0$ y-intercept: $y=f(0)=c$ symmetry axis: $x=\frac{-b}{2a}$ vertex: $[\frac{-b}{2a}, f(\frac{-b}{2a})]$ orientation: deduce from vertex & intercept positions.
Evidence Summary	Recognize critical values derived from quadratic formula.
Self-Assessments	Compare results with solution set. Identify where bottlenecks or mistakes took place. Write a journal entry outlining universal procedures to accomplish goals and achieve success.

Stage 3 Learning Plan

Learning Activities	Warmup Objective Feedback Key concepts Derivation: *www.mathsisfun.com/algebra/quadratic-equation-derivation.html* Guided practice Independent exercise Assessment: *www.mathwarehouse.com/quadratic/discriminant-in-quadratic-equation.php* Journal Entry



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

Figure 1: Basic Parabola Features

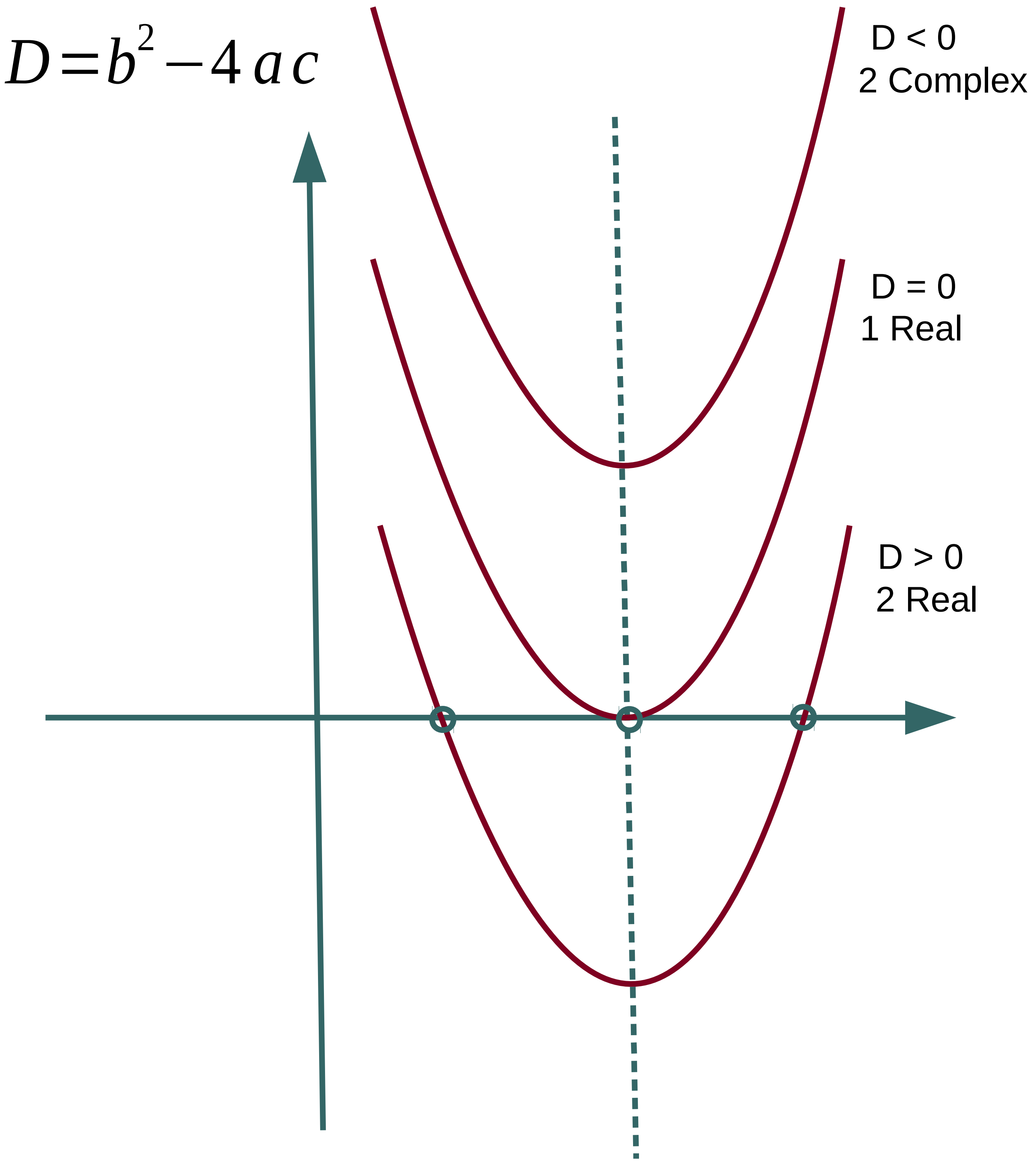


Figure 2 : Discriminant Role in Solutions

The PRAXIS Series

TEST TAKER SCORE REPORT

Telephone: 800-772-9476 or 609-771-7395

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

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

Test Code	Test Name	Your Score	Possible Score Range	Average Performance Range**	Score Recipient Code(s) from Current Administration: R7065	R7403	R7666	R8425	R8033	
5712	CORE ACAD SKILLS FOR EDUC: READING	196	100-200	160-184	Y	Y	Y	Y	Y	
5732	CORE ACAD SKILLS FOR EDUC: MATH	200	100-200	140-168	Y	Y	Y	Y	Y	

HIGHEST SCORE AS OF: 06/09/2017

Test Date	Test Code	Test Name	Your Highest Score	Possible Score Range	Score Recipient Code(s): R7065	R7403	R7666	R8425	R8033	
03/14/2015	5051	TECHNOLOGY EDUCATION	191	100-200	Y	Y	Y	Y	Y	
06/06/2017	5712	CORE ACAD SKILLS FOR EDUC: READING	196	100-200	Y	Y	Y	Y	Y	
06/06/2017	5732	CORE ACAD SKILLS FOR EDUC: MATH	200	100-200	Y	Y	Y	Y	Y	

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.
Y = SCORE REPORTED TO RECIPIENT LISTED.