



CALIFORNIA STATE SCIENCE FAIR  
2002 PROJECT SUMMARY

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<b>Project Title</b> Computer Algorithm Design and Linear Algebra: How to Solve Chemical Equations as Linear Systems	
<b>Objectives/Goals</b> The objective of my project is to design algorithms based on concepts of linear algebra and apply the algorithms to solve chemical equations. <b>Abstract</b> <b>Methods/Materials</b> A standard C or C++ compiler is required for the project. I used Microsoft's Visual C++ compiler on a Dell Dimension 8100 PC running a 1.4 Ghz Processor with 384 megabytes of SDRAM on Microsoft's Windows ME operating system. I did research from a number of references on specific topics of linear algebra to help me design effective algorithms to complete the design of the program. Once the design of the program was developed I began the actual coding process. I ran through multiple releases of my program and developed better algorithms until I finished the final program. <b>Results</b> Algorithms designed based on principles of linear algebra can be effectively applied to balancing chemical equations set up as a system of linear equations. <b>Conclusions/Discussion</b> The algorithms performed their functions as designed. The only problem came from balancing double replacement reactions because the polyatomic ions involved in double replacement reactions usually have more than one element. As a result an extra equation is added to the system of linear equations. The solution to the problem is to count a polyatomic ion as a single element instead of counting each individual element that makes up the polyatomic ion.	
<b>Summary Statement</b> This project explores concepts in both linear algebra and algorithm development and their applications to solving chemical equations.	
<b>Help Received</b> My dad supplied a few of the books that I used for my research. My mom helped me purchase the compiler. Mr. Robert Ferazzi helped test the program.	