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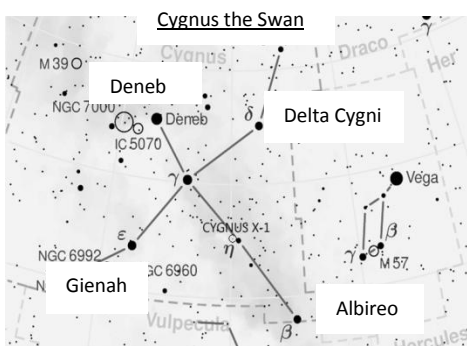
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### Reflective Writing

Physics is a very difficult subject for me and I struggle greatly to understand many of the concepts. This project helped me to understand physics a little better through reviewing and researching the information. It gave me a better understanding of physics and its practical applications in the real world. The equation analysis section forced me to look at the laws and principles of physics and consider them in a new way. I realized that to be able to write about the different parts of an equation it takes a different understanding than just reading about them does. With this project I really had to re-read the concepts and thoroughly examine what the equations, laws, and principles were really saying so I could understand it well enough to write about.

For this physics project, I researched information on several different physics concepts. It helped me to learn about the individual stars of the constellation Cygnus the Swan, about analyzing equations, about how thermal expansion and its practical uses, and about Fermi's paradox and its possible resolutions. This project made it very clear how many concepts of physics are actually used in everyday life. It is amazing how many things in our homes and lives rely on the concepts of physics like our kitchen appliances, heaters, car engines, thermostats, and even televisions.



I found it very interesting to research the information to identify and write about the stars in the constellation Cygnus the Swan. I am not very familiar with many of the constellations and this research was not only informative but also sparked an interest in me to learn about the other constellations as well. It is incredible how astronomers are able to use physics to find out how far away a star is from the Earth, how brightly a star shines, and even the relationship of stars and planets to the sun. I never thought of the practical uses of physics for beyond our planet. It is now easy to see that physics is a

necessary part of astronomy.

For my equation analysis, I analyzed Galileo's equation  $d=gt^2/2$ , which shows how far an object falls. It is the distance an object falls in relation to its acceleration and time squared. This equation was built on the idea that an object falls to the ground at different times because of air resistance, not because of the actual mass of the object. In a vacuum environment objects of all sizes and mass will land at the same time. Another equation I examined during this project was  $e=mc^2$ . Although this is an equation that most people have heard of, I really had to take the time to consider the relationship between energy and mass. I discovered that all energy has mass and all mass had energy. They are directly proportional to each other. I also researched the equation  $V=gt$ . This equation means that the velocity of an object falling from rest is equal to the objects acceleration multiplied by the time falling.

During free fall objects will fall in regular intervals of time, in a straight line downward, and at a constant speed regardless of their mass.

Picture taken from:  
[http://www.schenectady.k12.ny.us/users/patterson/IBDT%20Website/Page\\_Generators/ThermalExpansion.html](http://www.schenectady.k12.ny.us/users/patterson/IBDT%20Website/Page_Generators/ThermalExpansion.html)



Expansion joint on a bridge

For the section learning about a Law of physics, I choose to write about the principle of thermal expansion. Thermal expansion is when an object expands due to an increase of temperature and contracts due to a decrease in temperature. It is a principle that is used so often in our lives and yet it is barely even realized. I thought it was very interesting to read about how many real world things are built with expanding and contracting in mind. Bridges would collapse without expansion joints made to adjust with thermal expansion. Also, when we run hot water over the metal lid of a jar that we can't open, we are using physics. What we are actually doing is causing the temperature of the lid to rise and the molecules to move faster and farther apart. This causes the metal lid to expand making it so much easier to open. I have been using thermal expansion in the kitchen and haven't even realized it.

In doing this project, Fermi's Paradox was a whole new idea for me. I had never heard of this paradox before. It was interesting to read about how the paradox first became discussed and the many possible resolutions that people have come up with for it. As someone who has never paid much attention to UFOs or alien sightings, I never really considered what alien life would be like. I had no idea that our universe's age and size could allow for aliens to exist or that our planet is probably not unique in its characteristics. It does make sense to me that if there were extraterrestrial civilizations out there that we would have seen some signs or proof of their existence. This paradox certainly gave me something to think about.

This project has increased my interest in physics. It's one thing to see equations and laws on paper in books but is another to consider their real world applications. I have discovered that physics is happening all around us. I am taking this class to fulfill a general education requirement and I went into it thinking when I am I really going to use this information. This class has changed my mind. Physics is everywhere and is used in a variety of fields of work. Without physics we wouldn't have many modern day conveniences.

I thought that the most challenging part of this project was taking the concepts and understanding them well enough to write about them in my own explanations. For me, while reading an equation or concept on paper it is much easier to understand it, but it is complicated to dissect the information into what's really being said and where the equation applies. It's hard to find a way to make an explanation and observation of an equation into my own thoughts. I found it best to slowly review each concept I was having a hard time analyzing. Then I would see how it was discovered and how it applied to things in my everyday life. This helped me to gain a better understanding of the equation.

This project helped me to progress in my SLCC learning outcomes. I was able to learn how to communicate better by taking my research and finding a way to explain it in my own way and add my own thoughts on it. I also had to find a way to take the information from my project and organize it in

order to present in my reflective writing essay. This project also helped me to develop my quantitative literacy learning. I had to review physics concepts and analyze equations to find out how they apply to different situations in everyday life. This project encouraged me to think critically to analyze and solve equations and to apply thermal expansion to everyday situations. I had to analyze and evaluate different concepts in order to thoroughly understand what situations these concepts would be applied. This project also helped me to realize that physics is used in many different fields of learning. The fields of astronomy, mathematics, science, biology all have aspects of physics involved in them. This project helped me to develop my computer skills by researching and reviewing several online resources to determine the most reliable sources of information. It was also a review of how to cite the information I found online.

This project helped me to connect the information I was learning with my other general education courses. In physics, there are mathematical equations. Analyzing the equations gave me a different understanding of the math used on these equations. I felt like I learned a different way to view math and physics equations. I also feel like some of the concepts I learned in physics helped me in my biology course. Both physics and biology involve understanding scientific methods and the testing of hypothesis. Both classes involve observations and theories. It is interesting to see how many subjects that involve some concepts of physics.

For my process in completing this assignment I had to do a lot of research. I wasn't familiar with Fermi's paradox or the stars in the constellation Cygnus the Swan, so I really had to read and learn about these topics. Then I had to review all that I had learned and clearly organize it. I had to find out what information I had learned that was relevant to the information I needed for this project. I decided to write a rough draft and then review it. After reviewing it, I wrote my final draft of my project and got it ready for submission.

This project impacted my understanding of the world. I had no idea how many things in our lives involve physics. It made me really consider thermodynamics and how it affects the efficiency of my vehicle's engine. I had no idea that so much of my fuel is completely wasted. Although it is not possible for an engine to run at 100% efficiency, it would be great for vehicles to run at a higher efficiency than they are now. I hate to think of how much money is spent on fuel when only a small amount is being used for work. Also, just because a great scientist comes up with what seems like a logical conclusion, such as Aristotle's conclusion on objects falling at speeds proportional to the size, doesn't necessarily mean it's the truth. Without scientific evidence and several tests it can only be a conclusion. Scientists will always figure out new information and we should be open to the new information.