

# IBDP SPOTLIGHT



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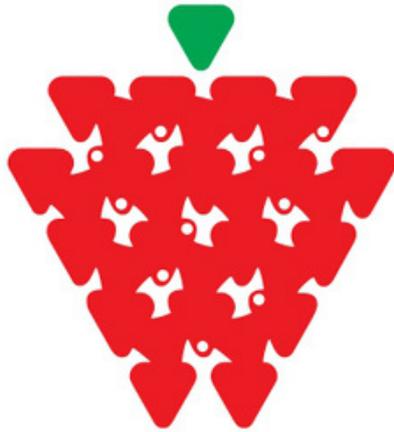
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Over the years, SFHS IB DP students have engaged in highly meaningful work as part of the Creativity, Activity, Service (CAS) program, Extended Essay, Theory of Knowledge (TOK) and Internal Assessments. In this issue, we are delighted to share with you some of the most interesting excerpts of our students' work.



**strawberry fields**  
HIGH SCHOOL

**CREATIVITY,  
ACTIVITY,  
SERVICE  
STUDENT  
REFLECTIONS**

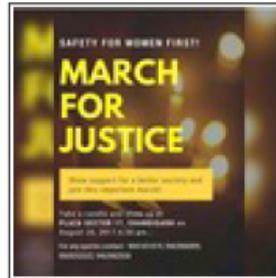
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# CAS STUDENT REFLECTIONS

**ISHGUN ARORA: IB DP 2017-19**

**Candle March to uplift the status of women**

**Aug 20, 2017 to Aug 21, 2017**



Recently, I had been hearing a lot about severe injustice against women. I had an urge to provide some help. Soon, an opportunity presented itself. I was approached by a student of Punjab University who invited me to take part in a Candle March to spread Awareness about rape, molestation and stalking women. We marched across the Sector 17 Marketplace in late evening with a candle in our hands to showcase our grief and lack of respect for the malfunctions in our society who commit such atrocious crimes .Posters helped us pictorially convey our message. Towards the end, I gave a short speech about injustice against women and the need to act bold and soon. This event brought me close to many women who have faced such atrocities. I offered my condolences to all. I realized how hard it is for a woman to have the courage to walk out of her home alone at night. Our society cannot even offer a sense of safety to its citizens. I gained values about respecting women and stepping up for them.

Through this activity, I learned how to inquire - 'why do we face these issues? Why can't we be on community and resolve our problems?' By developing a sense of inquiry, I learned how to be able to communicate with the society to obtain answers. Thereby, exhibiting the traits of a communicator. These kinds of activities play an important role in helping the participants 'create a better and more peaceful world through understanding and respect.'



**ISHGUN ARORA: IB DP 2017-19**

**Developed a machine that utilises waste heat to produce electricity**

**Apr 02, 2017 to Aug 10, 2017**

I learnt another aspect of entrepreneurship. We can contribute to the environment while making money. We have been approached by many successful entrepreneurs to fund out project. We intend to run it by the Environment and Forestry department of the Government in order to expand its reach. I have been working on the entire business plan and market research of the project. It is important to ensure that the customer is benefited by our machine. Only in the case will we be able to implement the machine and help transform cthe way factories operate.

Developing this machine required a careful understanding of various scientific concepts. I learned to patiently lend an ear to my teammates while developing this product. I was able to balance this work along with my studies very well too. Post completion of the project and appreciation from family and friends, I felt content. I had successfully done my bit in helping solve an issue of global significance.

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**TANISHIQA GUPTA: IB DP 2018-20**

**Amity Summer School - Filmmaking**  
**May 26, 2019 to Jun 07, 2019**



I am very happy that I got to go on a filmmaking course during my summer vacation. It was an enlightening experience. I had been trying to learn about the process of filmmaking for 2 years from YouTube and the Internet, and I had learnt a lot from it. But it is always better to be able to experience learning in person, which is why I wanted to go to a filmmaking related summer school course.

So, I learnt about camera angles and types of shots and cuts in filmmaking. I learnt about the types of filmmaking as well. Our project for the course was to make a short film of our own, and thus we made a short film too. It was a great experience, getting to see the process behind the scenes myself.

First off, we conceptualised the idea for our film by discussing. We wanted to target a social issue and thus, settled on the theme of objectification of women. So, our film is a satire comedy that mocks the objectification culture by exaggerating it. The next day we wrote our script and built our characters. We titled the film "mancherdise" as a pun combining men and merchandise, since our film is an infomercial for a website that sells men, as objects, thus, exaggerating objectification of people. I came up with the title as I thought it would be nice to have a clever title that intrigues the audience's interest.

We spent one day on shooting and then 3 days on editing. Overall, the course was 10 days long. We were taught the basics of cameras and shooting, story structure, characterisation, etc. on the days in between. This was an unforgettable experience and it made me feel more confident about pursuing a career in filmmaking as I realised my passion and potential for the medium through this little behind the scenes experience. I also learnt the importance of collaboration.

All in all, this experience has just further made me more passionate about filmmaking, and I am thankful that I got to be in it.



**KHUSHI ANSHUMAAN KAPOOR: IB DP 2017-19**

**Recording audio textbooks for the blind**  
**Jun 28, 2017 to Nov 28, 2018**

I've always admired the blind for their bravery to taken on the world. They live with their fear and get past it. It was this admiration for them that made me want to help them in any small way that I could. Hence, I joined an NGO 'Saksham' that provides audio textbooks and guides as resources to the blind.

I first met with the head of our group in June to learn how to operate the software 'Audacity' to record audiobooks. A surprisingly tedious affair, after spending two hours I had finally learnt the basics and common problems I could face while recording. There was a lot of editing to be done, as

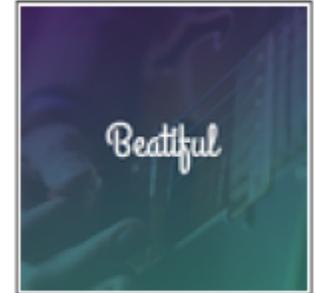
the final product had to have clarity. The prospect of hearing your own voice can be exciting, as I proved to myself when I kept recording for two hours after our session. Not the wisest decision, as I ended up with a parched mouth and a dry throat.

Later on, during our first workshop, Ms. Anu told us to keep our recordings from 10-15 minutes long, otherwise the students would find it difficult to look for a specific topic. It was then that I understood that my ambitious attempt would be of use to no one, and that I wished to help them more than I wished to please myself.

**Iha Jain IB DP 2018-20**

**Beautiful App**

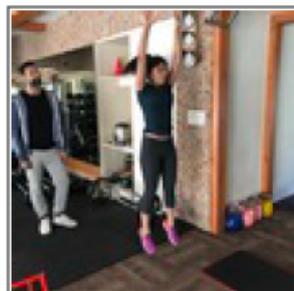
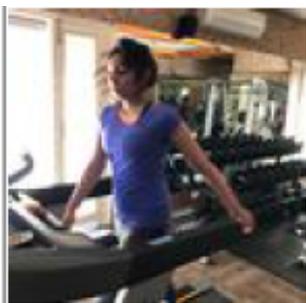
**May 19, 2017 to Aug 01, 2019**



The app named Beautiful is intended to be a double sided communication channel between music tutors and students. The idea is to connect underprivileged kids from the age of eight to fourteen with music tutors who are willing to give music lessons pro bono. The app details the lesson plans for beginner, intermediate and advanced guitar lessons that tutors can opt to tutor for and the students can attend.

This app is more an iteration 2 of something that I started in the year 2015 through 2016. I started with a class of 6 students from the nearby Indira colony and started classes on weekends at my father's office premises. My class by the end of 2016 had about 26 students. This year I invested in building the app to scale the concept and also make it self-sustaining.

It was truly an amazing feeling to be recognised and appreciated for something I feel so strongly about and something I spent so long working on. Me too, I feel proud to have actually converted a basic idea into something real, something that can be used and something that will make a difference to the world (even if it is in the smallest way possible).



**Iha Jain IB DP 2018-20**

**Physical training**

**Sep 03, 2017 to Aug 01, 2019**

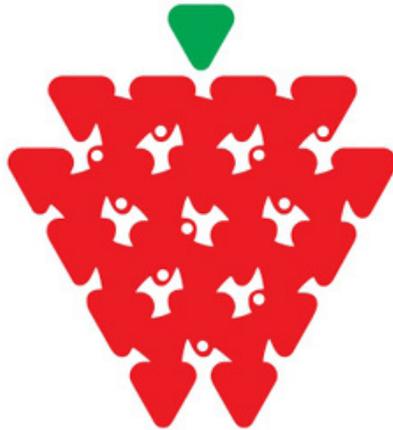
I started learning Karate this year. I really enjoy it because not only am I getting fitter but also am learning a means of self-defence. I believe that self-defence is an important skill for many reasons. The most important being: discipline.

The technique, not only teaches you how to be more self-aware, but also teaches you how to be more disciplined in general. This includes eating habits and daily exercise. I am working on integrating and achieving the level of concentration and discipline required to get better at this self-defence form.

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Finally getting exercise not only made me feel fitter and better, but also made me feel happy. I feel more positive, overall, when I exercise. It was extremely challenging to start with, since the hard part is to begin. Once, I got used to the exercise, it got easier. It definitely takes commitment and perseverance to continue going to the gym because a lot of times- one just wants to quit because the discipline that comes with it is harder. One always has to be in check of the number of calories and the type of calories consumed. I had to lay off junk food that I enjoy munching on when I am bored. It is truly a task to remain fit and healthy.



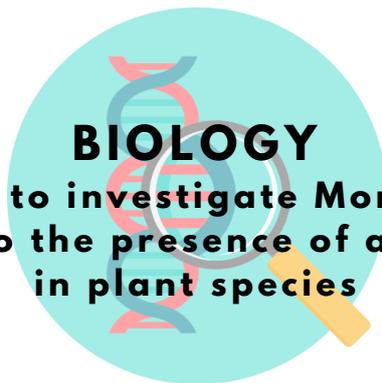


**strawberry fields**  
HIGH SCHOOL

**EXTENDED  
ESSAY  
EXCERPTS**

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## EE EXCERPTS



### Topic : A study to investigate Morphological and biochemical effects to the presence of a static magnetic field in plant species

**Research Question:** To what extent does the time taken for the appearance of plumule, the plumule length (measured up to 15 days) and the protein concentration vary in *Triticum aestivum* (Wheat) seeds grown in the presence of a strong magnetic field (strength 0.49 Tesla), a weak magnetic field (strength 0.33 Tesla) and in the absence of a magnetic field?

The limitations of the investigation do not significantly affect the accuracy of the data. More reliable data could be obtained by conducting a larger number of trials and using greater number and variety of plant samples ( Section 4.3, Table 22)

It can be concluded from the results that due to the positive effect of magnetic fields on *Triticum aestivum*, the time taken for the plumule to appear was the least in the presence of the 0.49 T magnetic field. On account of the same effect, the plumule length was the greatest for the wheat seeds grown in 0.49 T magnetic field. In accordance with the effect of magnetic fields on the growth of *triticum aestivum*, the protein concentration of the seeds grown in the absence of a magnetic field as the highest while it was much lower in the seeds growth in the 0.33 T and 0.49 T magnetic fields.

The positive effect of magnetic fields on growth and development of *Triticum aestivum* can be applied to increase its yield and productivity. The relationship between the magnetic field strength and plant growth can be studied in the detail by cultivating plant species in a broader range of magnetic field strengths. The scope of such studies can be extended to staple crops such as *Oryza sativa* which could greatly benefit the field of agriculture.



विषय: खेल किस प्रकार हमारे सामाजिक जीवन का हिस्सा है।

शोध प्रश्न: लुप्त होते खेल किस प्रकार हमारी सामाजिक सोच की परिवर्तनशील शैली के मूल्यों का आंकलन करते हैं ?

#### परिचय

मैं हमेशा एक खेल उत्साही रहा हूँ और खेल में भाग लेने से मुझे महसूस हुआ कि मेरे चरित्र लक्षण, स्वास्थ्य और मेरे व्यक्तित्व का विकास हुआ है, इसलिए यह इस विषय को चुनने के प्रमुख कारणों में से एक रहा है। खेलों के बारे में बात करते हुए, इसमें सभी प्रतियोगी शारीरिक खेल या गतिविधियाँ शामिल हैं जिनका उद्देश्य शारीरिक गतिविधियों और विभिन्न व्यायामों के माध्यम से हमारे शारीरिक, मानसिक और सामाजिक कौशल में सुधार करना है। ऐसे सैकड़ों खेल हैं जिन्हें हम जानते हैं कि उनमें से कुछ रेसिंग, एथलेटिक्स, क्रिकेट, टेनिस, बास्केटबॉल, फुटबॉल आदि हैं। खेल शारीरिक फिटनेस और हमारे मानसिक स्वास्थ्य दोनों के लिए आवश्यक हैं। खेल सहनशक्ति को बढ़ाने में मदद करते हैं और हमें अपना काम करने के लिए अधिक ताकत देते हैं। खेलने के बाद हम थोड़ा थका हुआ हो जाते हैं और अपना काम दुगुनी ऊर्जा के साथ करने लगते हैं। खेल खेलते समय हम जाति, लिंग और धर्म के आधार पर भेदभाव नहीं करते हैं। खेल न केवल हमें शारीरिक और मानसिक रूप से फिट रखने में मदद करता है बल्कि विभिन्न प्रकार के लोगों के बीच सांस्कृतिक अंतर को भी समाप्त करता है। किसी ने ठीक ही कहा है - "वसुदेव कटुंबकम" अर्थात् सारी पृथ्वी हमारा परिवार है। खेल खेलते समय हमें भी कुछ ऐसा ही महसूस होता है।

## निष्कर्ष

अपने विस्तृत निबंध के माध्यम से, मैंने खेलों के महत्व को देखा और कैसे खेल न केवल शारीरिक क्रियाओं को प्रभावित करते हैं बल्कि किसी व्यक्ति के मानसिक और सामाजिक तथ्यों को भी प्रभावित करते हैं। अपने निबंध में, मैंने उन तरीकों पर ध्यान केंद्रित किया, जिनमें भारत के पारंपरिक खेल हमारी सामाजिक सोच को प्रभावित करते हैं और कैसे ये खेल हमें हमारे नैतिक मूल्यों और जड़ों से जोड़ते हैं। हमने देखा कि तकनीकी प्रगति के कारण लोगों के पास पारंपरिक खेल खेलने के लिए अधिक समय नहीं है, लेकिन वे अभी भी नए खेल खेलना जारी रखते हैं। हमें अपने पारंपरिक भारतीय खेलों को पुनर्जीवित करने की आवश्यकता है क्योंकि ये खेल हमें प्राचीन भारत में खेलों की उत्पत्ति के कारण हमारी पारंपरिक भारतीय जड़ों के साथ प्रदान करते हैं। नई पीढ़ी में आगे बढ़ने से हम उन नैतिक मूल्यों को भूल रहे हैं जो हमारे बुजुर्गों ने हमें सिखाया है। प्रौद्योगिकी ने हमारे विकास में एक भूमिका निभाई है लेकिन इसने हमें हमारी भारतीय पारंपरिक नैतिकता और मूल्य प्रणालियों से अलग कर दिया है। पारंपरिक खेलों को बढ़ावा देने से हम अपने आप को उस अखंडता और अनुशासन को बनाए रखेंगे जो हमें बचपन से दिया जाता है। अंत में, मैं यह कहकर निष्कर्ष निकालना चाहूंगा कि हमें अपने नैतिक मूल्यों और परंपरा को बनाए रखने की आवश्यकता है और कबड्डी जैसे पारंपरिक खेल खेलने से हमें अपनी परंपरा को पुनर्जीवित करने की आवश्यकता है क्योंकि ये हमारी भारतीय पारंपरिक जड़ों से जुड़े रहने में हमारी मदद करते हैं। मेरा भी मानना है कि हम चाहे कितने ही बड़े क्यों न हो जाएँ जब तक अपने मूल से नहीं जुड़ेंगे तब तक हम सही मायने में उत्पत्ति नहीं कर पाएंगे।

# PSYCHOLOGY

## Topic: Treatment of Major Depressive Disorder using Psychotherapy

### Research Question: To what extent is Cognitive Behavioral Therapy effective in treatment of Major Depressive Disorder in adolescents?

#### Introduction

Major Depressive Disorder (MDD) is a complex disorder that is demonstrated by chronic and intense feelings of sadness that last for over a period of two weeks. Its symptoms include depressed mood, diminished interest in daily activities, insomnia or hypersomnia, significant weight change, fatigue, feelings of worthlessness and recurrent suicidal thoughts. The World Health Organization labeled Major Depressive Disorder as a leading cause of disability all over the world (Ferrari et al, 2013) with a lifetime prevalence rate of 1-16.9% (Kessler and Bromet, 2013). Depression is common amongst the youth, affecting 8-20% adolescents (Kessler et al, 2007; Thapar et al, 2012) at any given time owing to the fact that adolescence can be defined as a period of vulnerability. Although its symptoms vary cross-culturally, Major Depressive disorder affects the daily functioning of the suffering individual as well as their family and can be categorized as a severe disorder.

#### Conclusion

After taking into account all the evidence on the efficacy of Cognitive Behavioral Therapy, it becomes evident that CBT is an empirically supported and researched treatment approach that is effective in treatment of major depressive disorder in adolescents.

CBT is a technique that deals with the maladaptive automatic thoughts, cognitive distortions and underlying irrational beliefs that a person possesses in order to be diagnosed with Major Depressive Disorder. It breaks down the seemingly intimidating actions to simpler tasks for the patient in order to combat the existing beliefs and lead the patient to the realization of his own irrationality. Since it is an active and temporary treatment, it motivates the patients to be responsible for their own health conditions. Research by Brent et al (1997) suggests that CBT is superior to various other therapies to treat MDD in adolescents since it is directly focused on the etiology of depression. However, research by March et al (2006) and Brent et al (2008) argues that a combination treatment of CBT along with medication is the better approach for adolescents. A possible reason for this could be that the biological treatment often results in a quick and short-term correction of the symptoms that depression presents. This short-term treatment motivates the patient to become more active as

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compared to the amount of activity they performed pretreatment, as medications tend to restore the hormonal imbalance caused by depression. The maladaptive thoughts and thinking patterns can then be targeted by CBT and a visible change in behavioral patterns can be observed along with long-term wellness of the patient in most cases. Although this treatment is superior to others, research by Rosselló et al (1999) suggests that it is still not well known as to which psychotherapy is more effective for adolescents between CBT and IPT. Therefore, more research in this subject is required to reach any conclusion. However, there is a lot of support for CBT otherwise, which suggests that is an effective treatment approach.

To conclude, CBT having a lot of empirical evidence seems to be an effective approach for improving condition of adolescents with MDD for the time being. However, the best treatment approach for Major Depressive Disorder in adolescents is a combination treatment consisting of a medication along with Cognitive Behavioral Therapy.

## **WORLD STUDIES**

**Theme: World Studies, Environmental and Economic Sustainability**  
**Subject: Environmental Systems and Societies and Economics**

**Research Question: How far does agricultural crop residue burning in Patiala, Punjab impact environmental and economic sustainability?**

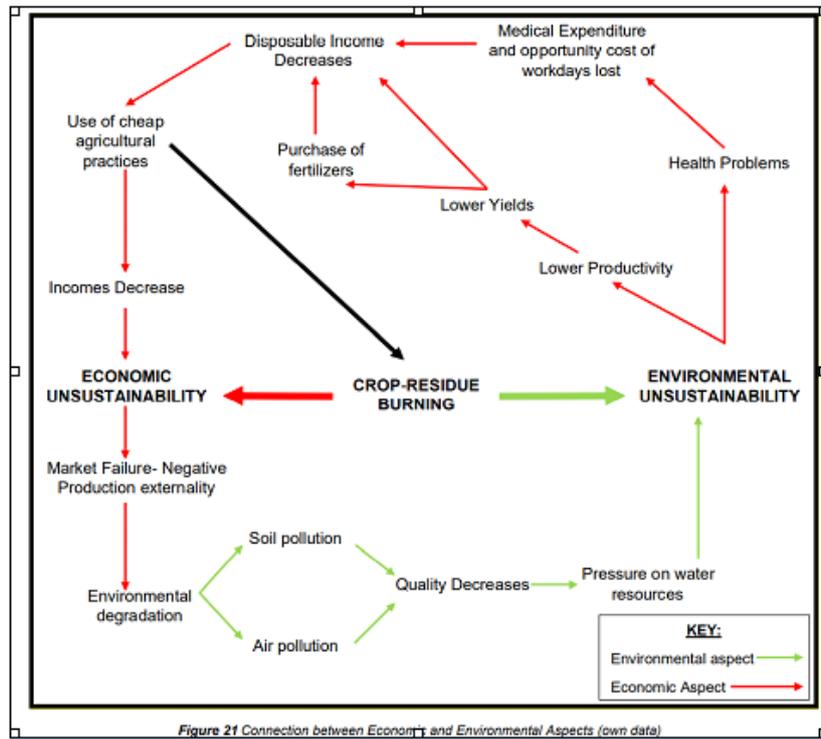
### **INTRODUCTION**

Since long, agriculture has formed a major part of the terrestrial food production systems. Approximately occupying 37 percent of global land area, 1 agriculture is responsible for sustaining almost 7631.1 million people, 2 thus, being instrumental in ensuring the overall well-being of humans. Similarly, agriculture played a significant role in shaping the economy of nations when the agricultural Green Revolution commenced an unprecedented economic growth in them. Economic Growth is increase in total real output produced by an economy (real GDP) over time. Therefore, agricultural development is considered to be directly linked to the economic advancement of nations, because increasing crop productivity leads to greater food production, enabling the sustenance of larger populations. 5 Hence, agricultural progress has been linked with expanding the carrying capacity globally. Carrying capacity is an area's ability to support growth of a population within the limits of its resource and tolerance of environmental degradation.

All this has made agriculture an integral part of every nation's economy, making economic development dependent on agriculture. However, this implies that an agricultural backlash can influence the economy destructively. The possibility of this problem intensifies as many agricultural management systems are adopted without considering their potential repercussions. One of the prime fallback of agricultural systems includes huge quantities of residues being generated as a by product of crop harvest cycle (In 2018, all agricultural crops cumulatively produced more than 375 million tonnes of residues). The disposal of crop residue poses a major challenge to the farmers, who tend to adopt practices that are not sustainable, both environmentally and economically. Sustainability refers to avoiding depleting natural resources in order to maintain an ecological balance. One such unsustainable practice is the agricultural crop-residue burning (CRB).

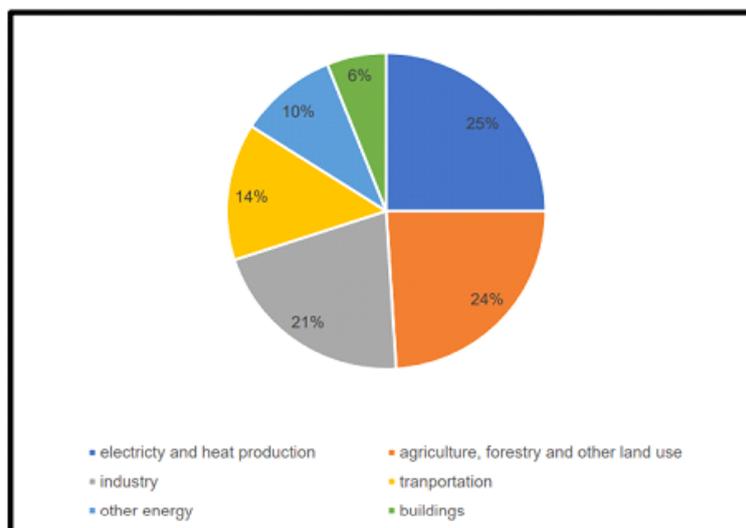
### **CONCLUSION:**

Economic and environmental analysis of CRB from this study shows its unsustainable nature because it is meeting the demands of the present but reducing the ability of the future generations to meet their needs. Figure 22 summarizes this by showing that CRB produces a continuous cycle with one problem leading to another due to positive feedbacks. Moreover, Figure 22 illustrates that the continued CRB loop will only break when either the economic or environmental factors are irreversibly tarnished.



As CRB is prevalent globally and increasing yearly, the potential for depleting these resources is imminent. The reason behind this is the growing global food demand which has put immense pressure on agricultural production leading to the adoption of regressive agricultural management systems like CRB.

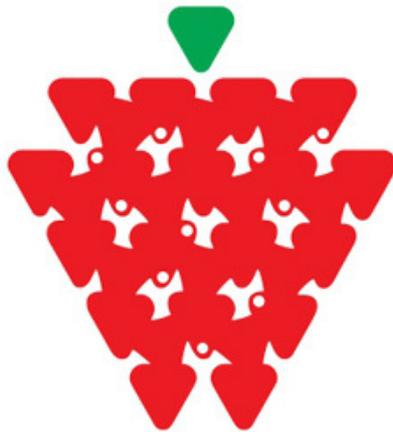
As agricultural is already a major greenhouse gases emitter (Figure 23) which includes CRB, the only way to prevent its grave outcomes is by breaking the positive feedback loop. If that is not done, while the population is snowballing, the CC will reduce due to which this population cannot be sustained by existing systems because limits to growth exist. Limits to growth indicate that the population is dangerously overshooting its capacity, and is heading towards unsustainability.



**Figure 22 Distribution of global greenhouse gases emissions by economic sector (Adapted from- "Global Greenhouse Gas Emissions Data." EPA, Environmental Protection Agency, 13 Sept. 2019, [www.epa.gov/ghgemissions/global-greenhouse-gas-emissions-data](http://www.epa.gov/ghgemissions/global-greenhouse-gas-emissions-data) )**

One way to prevent this can be shifting from the exploited terrestrial food production systems that are limited, to aquatic production systems that have greater resource capacity and using which appropriately can lead to sustainability.

Therefore, it can be said that crop residue burning is environmentally and economically unsustainable and hence, curbing it is imperative for ensuring future prosperity.



**strawberry fields**  
HIGH SCHOOL

**THEORY  
OF  
KNOWLEDGE  
EXCERPTS**

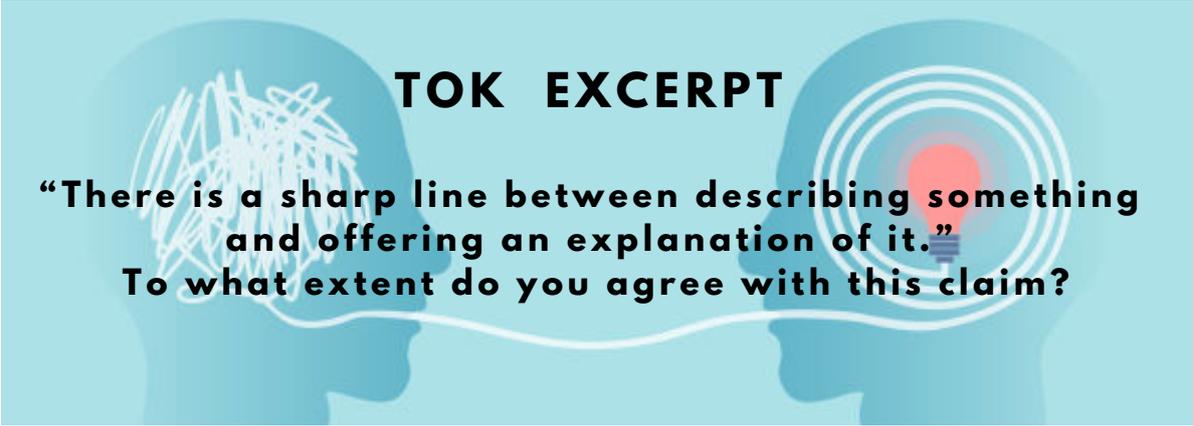
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As an aspiring visual artist, I am constantly learning about artists of various nationalities, genders, socio-economic statuses, and exploring the effect of such factors on the credibility of their work. Similarly, as a student of history, I am also studying the effect of said factors on knowledge production and reception, and the extent to which the knowledge of certain historians is accepted. Thus, I chose this PT, as going through it led to the immediate brainstorming of various KQ's- Do personal circumstances always influence knowledge acceptance? Can the influence of such circumstances ever be beneficial to the acceptance of knowledge? Should personal circumstances affect knowledge acceptance?

These perspectives lead me to the question of whether personal circumstances should or should not influence how knowledge is accepted. In the field of History, the main focus is how knowledge is remembered or recorded, and hence the influence of personal circumstances could be more detrimentalistic as opposed to an aspect such as the arts. The effect of personal circumstances is very often grounds for potential historian bias in historical investigations, and could, unintentionally, morph knowledge, hindering further future knowledge production. Chinese historian Jung Chang, had lived through the wrath of the CCP and Mao Zedong, including all purges, mass murders, economic crises, etc. These personal experiences of her, which can said to be her personal circumstance of nationality and era of birth, leads to the cognitive bias in her recall of the period, as she has very often been criticised for extolling Mao as a monster, and hence claim her knowledge is biased. While this furthers the discussion of why personal circumstances should influence how knowledge is accepted, as historical studies requires investigative analysis of potential biases which could lead to the distortion of knowledge, hence making such knowledge invalid and unreliable. While the circumstance of nationality is almost always seen as a potential source of bias, over generalization should be avoided as the same does not hold true in every scenario. Taking the case of revisionist American cold war historian William Appleman William, who in keeping with the revisionist school of thought, opposed the orthodox views that Stalin and the USSR caused the cold war, instead arguing that the causation was due to the USA and their economic interests across the globe. In keeping with my previous findings, these examples are able to present how the same circumstance (here, nationality) produce varying results in both areas of the arts and history.

Hence, I have inferred that personal circumstances are not an absolute permanent deterrence to the acceptance of knowledge, and this influence is more incidental than universal, more based on chance than strictly formulaic, and is not always applicable, and even when it is, can produce varying effects- sometimes proving to be even beneficial. The areas of History and the Arts, due to their differing natures, have varying effects these personal circumstances can create on knowledge acceptance, and to different degrees of seriousness.



## TOK EXCERPT

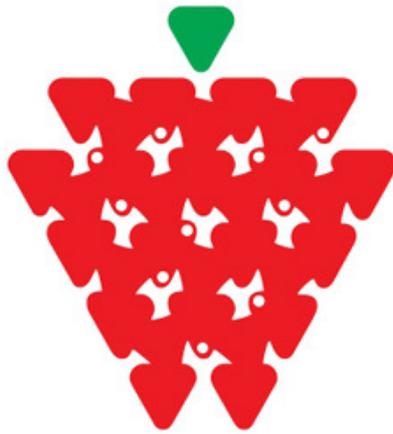
**“There is a sharp line between describing something and offering an explanation of it.”  
To what extent do you agree with this claim?**

<https://www.istockphoto.com/illustrations/explaining?phrase=explaining&sort=mostpopular>

Description refers to a detailed account thereby answering the who, what, where, and when questions. Explanation refers to making something, perhaps an idea or a theory, understandable to someone thereby answering the how and why questions. But explanation sometimes involves description and could be considered a detailed account with reasons. At first glance, a sharp line suggests that there is a definitive way to distinguish one thing from another. However, on further inspection, I discovered that the phrase sharp line is subject to a diverse array of interpretations. Many knowledge questions arise from the title, which I will reference as and when relevant throughout this essay. In this essay, I strive to explore the title by focusing on two areas of knowledge - Natural Sciences and the Arts. I believe that the sharp line exists in the Natural Sciences but not so much in the Arts.

Similarly, the dividing line between description and explanation pales in the case of visual arts. For example - Vicky Roy's photography portfolio of "Street Dreams", on the surface, is just a collection of what, where, and when events. The pictures portray the life of impoverished children who are rag-picking, selling balloons, cleaning shoes, and begging on the streets. Finding an explanation, however, for the inspiration behind the project would entail studying about Vicky Roy's own life story including time spent rag-picking and living on the streets. His photography exhibition is, in essence, a description of the daily struggles of street children. It is only when a critic searches for answers to questions such as "why the shots were taken the way they were" and "how the title "Street Dreams" relates to the bigger idea of street children wishing to do something meaningful in their lives" that an explanation takes shape. Therefore, the sharp line does not necessarily exist, rather is forced into works of art by critics.

Whether or not there is a sharp line between describing and explaining something is determined, to a certain degree, by the subjective nature of the phrase sharp line and how it is interpreted. The true purpose of the Natural Sciences is to aid in our understanding of natural phenomena by describing as well as explaining using solid evidence. Thus, there is typically a precise line between description and explanation but when there is not, it is acceptable to continue the quest for answers. On the contrary, the description comprises the explanation in the discipline of the Arts. A clear-cut split between the two only arises upon further investigation of the intricate elements and broader implications of the artwork. An extension to the title could look at the circumstances in the Natural Sciences and the Arts that require a sharp line to exist and those that do not. Furthermore, we need to be cognizant of the demands of the situation and use all the context we have to determine the right approach which can either be just the description or just the explanation or a perfect blend of the two.



**strawberry fields**  
HIGH SCHOOL

**INTERNAL  
ASSESSMENT**

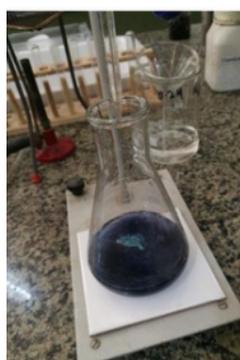
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# INTERNAL ASSESSMENT CHEMISTRY

## Chemistry Experiments in Action:



Measure the amount of copper in coins



Measurement of enzyme activity



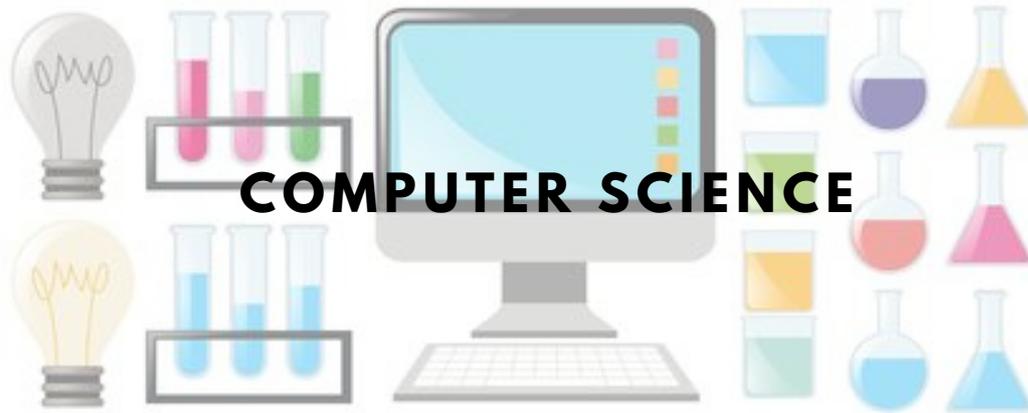
Plotting pH curves for a given acid using vernier



The effect of age on the tensile strength of human hair



The effect of acid rain on seed germination and growth



### **An Innovative App for Instant advice to Diabetics**

#### **About app:**

GlucoDoc is a mobile based platform that enables patients who suffer from diabetes to get instantaneous feedback on abnormal blood sugar levels from their treating doctor. It replaces the need for traditional hospital visits and facilitates faster communication that can be the turning point in case of emergencies. The app also lets patients securely save their active medications and blood sugar reports. The app is currently launched in India on the google play store

(link - [https://play.google.com/store/apps/details?](https://play.google.com/store/apps/details?id=com.csia.glucodoc)

[id=com.csia.glucodoc](https://play.google.com/store/apps/details?id=com.csia.glucodoc)

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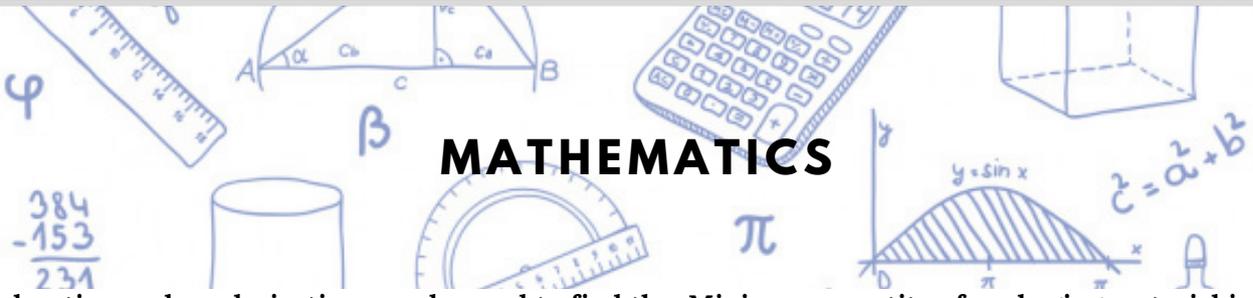
**An Innovative App for Instant advice to Diabetics  
ADAVYA BHUTANI'20**

#### **Inspiration:**

Patients need careful and frequent monitoring of blood sugar levels and almost always require immediate change to medications and diet to prevent any complications. When I realized that a lot of people were stressed out and taking inappropriate doses because of not being able to connect with the doctor right away, I decided to work on an application that could potentially bridge this gap and be more convenient to use.

#### **Experience:**

As I went from one stage of the software development lifecycle to another, I realized the intricacies involved in bringing an idea to fruition. I learned about product-market fit, iterative design and user testing, considered pivotal in developing real-world solutions. I saw the benefits of failing fast and correcting mistakes early on in the development process. For example - the first working version of the app did not account for different screen sizes on android phones and caused my app to crash for all but one size. I quickly pushed a patch in version 2 before working on new features thereby avoiding unnecessary overhead and maintenance problems later on.



# MATHEMATICS

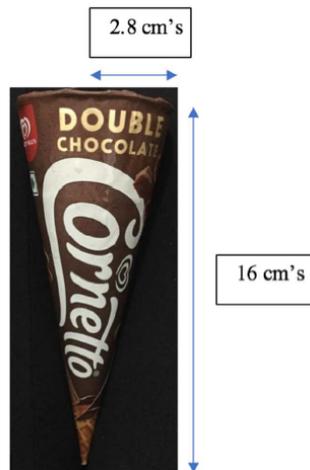
Exploration on how derivatives can be used to find the Minimum quantity of packaging material in various products :

Now, differentiating the equation with respect to r, for S. Also, V is a constant:

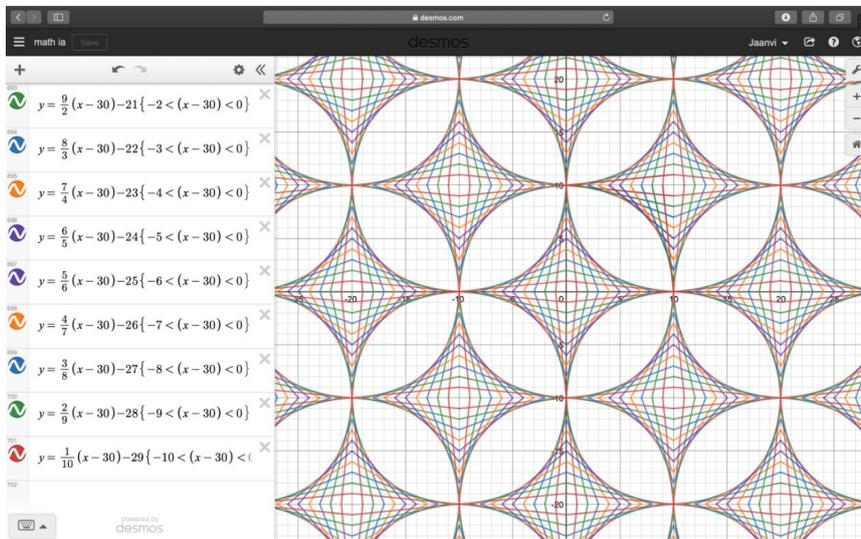
$$\frac{dS}{dr} = \frac{1}{2} \left( \pi^2 r^4 + \frac{9V^2}{r^2} \right)^{-\frac{1}{2}} \left( 4\pi^2 r^3 - \frac{18V^2}{r^3} \right) + 2\pi r$$

When the first derivative equals 0, the surface area will reach a maxima or minima, as solved below:

$$0 = \frac{4\pi^2 r^4 - \frac{18V^2}{r^2} + 4\pi r \sqrt{\pi^2 r^6 + 9V^2}}{2\sqrt{\pi^2 r^6 + 9V^2}}$$



Exploration on generating a beautiful pattern using concept of straight lines, reflections and transformations :



### Exploration on finding the volume of egg using functions modelling and Calculus :

$$Volume = \pi \int_b^a [K(x)]^2 dx$$

As limits are required in definite integral, I inserted the values for all functions  $[f(x)-u(x)]$  in the formula to find out volumes for each function that I graphed to find out overall volume of the piece wise function.

To find out the volume, the points were also supposed to be rotated by 360 degrees. Thus,

Volume of  $f(x)=$

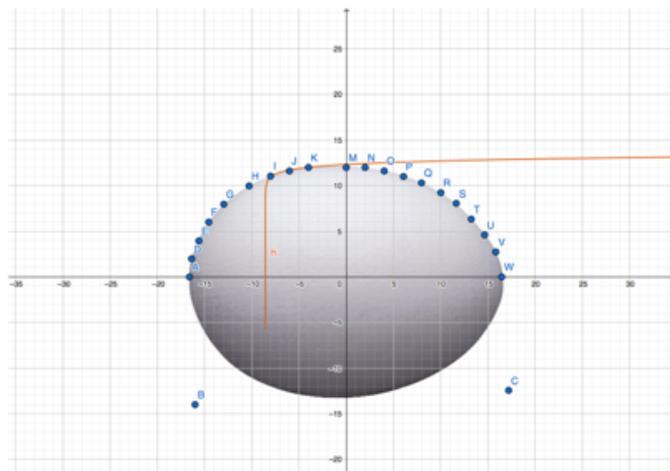
$$\pi \int_{-16.97}^{-3.29} (-0.2167x^2 - 4.39x - 12.09)^2 dx$$

Using the GDC:

Volume of function  $f(x)= 2359.02$  cubic units

## 2) Modeling a logarithmic function

To graph some of the data points I had missed, I graphed a natural



General form of logarithmic function:

$$I(x) = (\ln \sqrt{(ax + b)}) + c$$

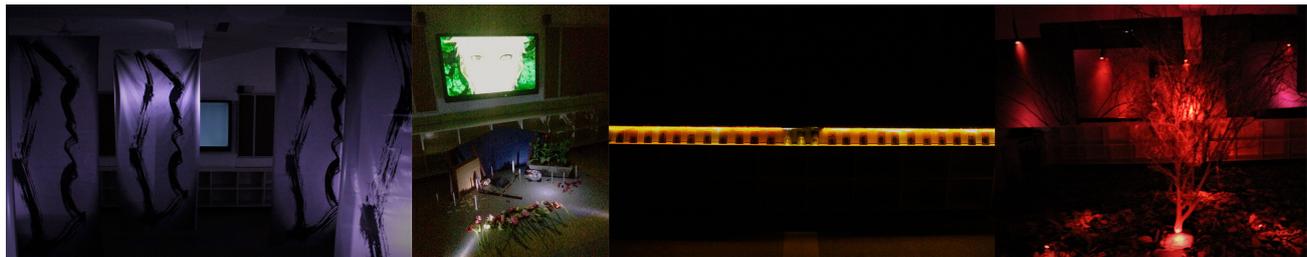
Corresponding data points:

$(-8.01, 11.05)$ ,  $(-6.01, 11.6)$ ,  $(-4, 12)$

# VISUAL ART



The IA showcased here is that of Parumveer Walia, a graduate of the 2020 cohort and the photo-stitch showcases his final exhibition which bagged a Grade 6 in Visual Art. Furthermore, his IA has also been selected to be featured as part of the In Thinking site. Internal Assessment in Visual Art is the Exhibition of a student where they display what they have learned over two years.



**Final Exhibition by Parumveer Walia'20**