

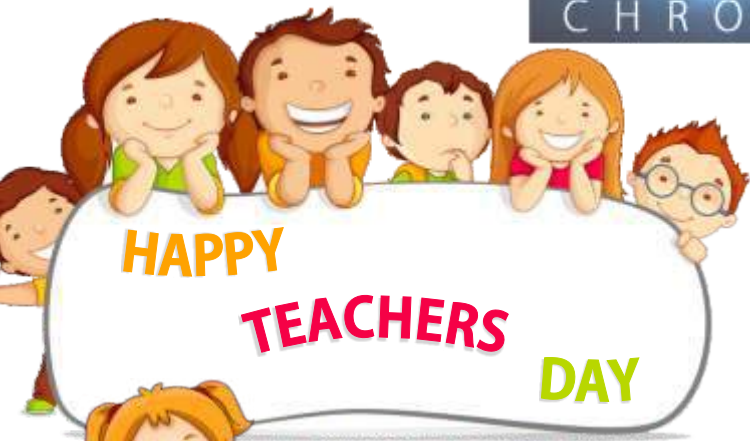
# VUCA

CHRONICLES

# BLACK HOLES

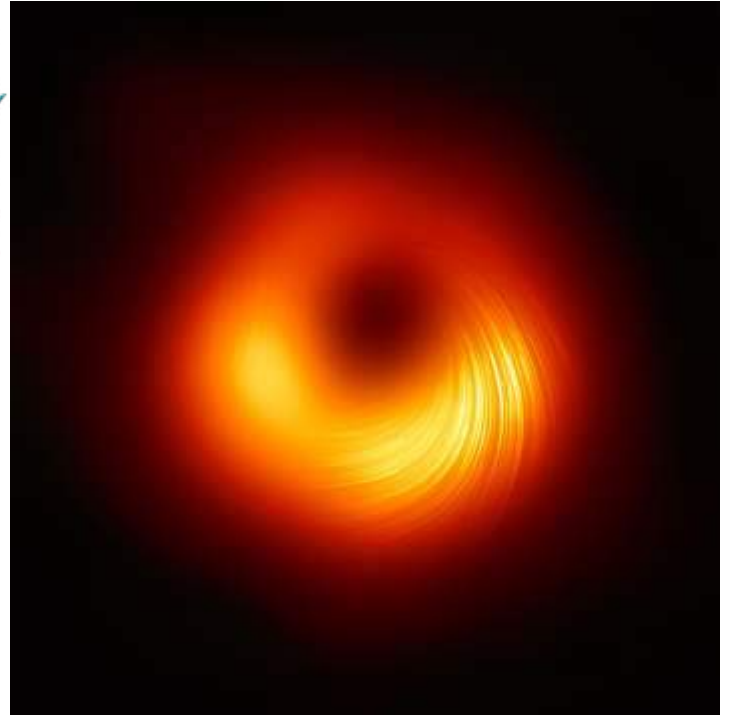
**Article by : Veer Thareja, G 6, SNS Noida**

**V**olatile **U**ncertain **C**omplex **A**mbiguous



## Black Holes

By Veer Thareja, Grade 6, SNS Noida



Have you ever wondered what it would be like to be trapped in a black hole and finally emerge from it to find you are a hundred years older!

A black hole is a region of spacetime where gravity is so strong that nothing, no particles or even light can escape from it. **Black holes** are formed when the centre of a very massive star collapses on itself.

There are 5 types of black holes:

**Stellar black hole** is a black hole formed by the gravitational



hypothetical tiny black holes, for which quantum mechanical effects play an important role.



**Ultra-massive black holes** which are at least **ten times the size of most supermassive black holes**, at 10 billion solar masses or more, appear to have a theoretical upper limit of around **50 billion solar masses**, as anything above this slows growth down to a crawl.

**collapse of a star.** They have masses ranging from about 5 to several tens of solar masses. The process is observed as a hypernova explosion or as a gamma ray burst.

**Intermediate-mass black hole** is a class of black hole with mass in the **range of  $10^2$ – $10^5$  solar masses**: significantly more than stellar black holes but less than the  $10^5$ – $10^9$  solar mass of supermassive blackholes.

**Supermassive black holes** have a **mass of millions to billions of times of the mass of the sun**. When you compare supermassive black holes to stars, the stars look like little ants.

**Miniature black holes**, also called **quantum mechanical black holes** or mini black holes, are





black hole would puncture our planet's surface like a hot knife through butter, but it would immediately begin to slow down because of its gravitational interaction with Earth.

The Unicorn is about three times the mass of our sun – tiny for a black hole. Very few black holes of this mass have been found in the universe. This black hole is 1,500 light years away from Earth, still inside the Milky Way galaxy; and until Tharindu Jayasinghe started analysing it, it was essentially hiding in plain sight.

Over 100 black holes have been hiding in the Milky Way all this time. A study, published in the Journal Nature on 28 July 2021 has discovered over 100 stellar-mass black holes hidden within a cluster of stars moving across the Milky Way.



Want to know more about the types of black holes?

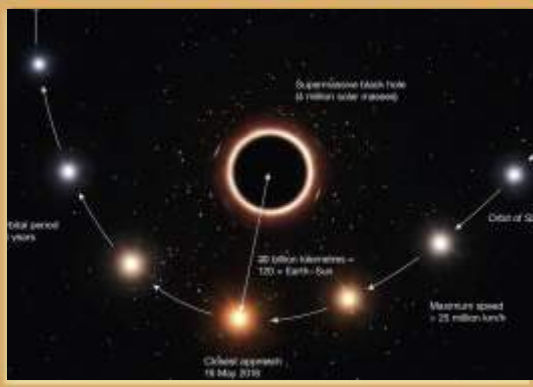
Watch this -

<https://www.youtube.com/watch?v=0FH9cgRhQ-k&t=641s>

### Are Black Holes close to us?

Scientists have discovered one of the smallest black holes on record and the closest one to Earth found to date. Very few black holes of this mass have been found in the universe. This black hole is 1,500 light years away from Earth and it is still inside the Milky Way galaxy.

What would happen if an asteroid-mass black hole were to hit Earth? In short, catastrophe! The





But what would happen if the Sun were suddenly replaced with a black hole of the same mass? Contrary to popular belief, **the Solar System would not be sucked in a solar-mass black hole as it would exert no more gravitational pull than our Sun.**

Black holes are the most powerful destructive forces in the universe. They can rip apart a star and scatter its ashes out of the galaxy at nearly the speed of light. But these engines of destruction can also pave the way for new stars to form, as a new study in Nature shows.

Why does time flow slowly around the black hole?

To a distant observer, **clocks near a black hole would appear to tick more slowly than those further away from the black hole.** Due to this effect, known as gravitational



### CAN WE CONTROL BLACKHOLES?

To make a black hole, one must concentrate mass or energy sufficiently enough that the escape velocity from the region in which it is concentrated exceeds the speed of light.

In such scenarios, black hole production could possibly be an important and observable effect at the Large Hadron Collider located at CERN

Can black holes be useful? No known black hole is. If anything, we benefit from their existence. The stellar explosions that produce black holes also spew elements such as carbon, nitrogen, and oxygen into space. The collisions of black holes and neutron stars help spread heavier elements, such as gold and platinum.



**February 22, 2021** Swift Helps Tie Neutrino to Star-shredding Black Hole

**February 11, 2021** Hubble Uncovers Concentration of Small Black Hole

**January 14, 2021** Galaxies Hit Single, Doubles, and a Triple (Growing Black Holes)

**December 17, 2020** On the Hunt for a Missing Giant Black Hole (Abell 2261)

**November 27, 2020** Galaxy Survives Black Holes Feast For Now (Cq4479)

**November 19, 2020** Hubble Catches Possible 'Shadow Play' of the Disk Around a Black Hole

time dilation, an object falling into a black hole appears to slow as it approaches the event horizon, taking an infinite time to reach it.

Near a black hole, the slowing of time is extreme. From the viewpoint of an observer outside the black hole, time stops.

**For example, an object falling into the hole would appear frozen in time at the edge of the hole. No force in the universe can stop this fall, any more than we can stop the flow of time.** Our Sun is too small a star to end its life as a black hole.

### LATEST FACTS ABOUT BLACKHOLES-

**March 9, 2021** Gigantic Jet Spied From Black Hole in Early Universe (PJ352-15)





# VUCA CHRONICLES



## Center of the Milky Way

**October 14, 2020** The Recipe for Powerful Quasar Jets

**October 1, 2020** 'Echo Mapping' in Faraway Galaxies Could Measure Vast Cosmic Distances

**August 3, 2020** Black Hole Fails to Do Its Job (SpARCS1049)

**July 29, 2020** Hidden in Plain Sight: Monster Black Holes Found in Nearby Galaxies

**July 16, 2020** Runaway Star Might Explain Black Hole's Disappearing Act

**July 15, 2020** Cases of Black Hole Mistaken Identity

**June 19, 2020** Black Hole Bounty Captured in the

**June 2, 2020** Intense Flash from Milky Way's Black Hole Illuminated Gas Far Outside of Our Galaxy

**May 29, 2020** Black Hole Outburst Caught on Video (MAXIJ1820+070)

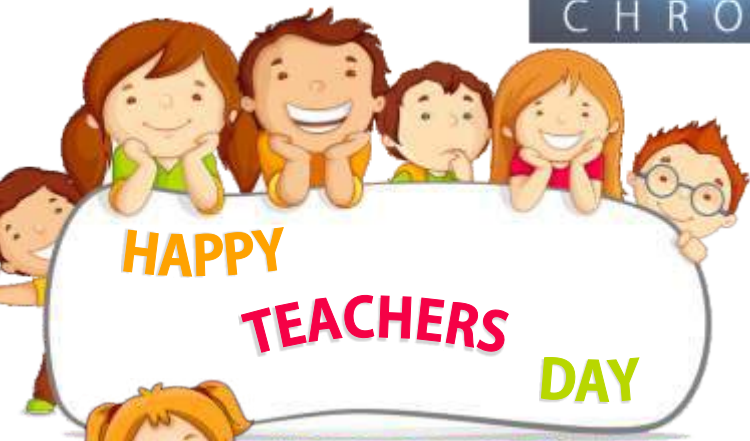
**May 14, 2020** Why Clouds Form Near Black Holes

**April 28, 2020** Spitzer Telescope Reveals the Precise Timing of a Black Hole Dance

**April 23, 2020** Star Survives Close Call with a Black Hole (GSN 069)



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## Space Tourism

By Armaan Srivatsan, Grade 8, SNS Gurugram



### Introduction

The universe is full of things unknown, and in order to discover the universe we need to experiment and/or explore. In man's endeavour to explore new horizons, "SPACE TOURISM" has become popular in the recent past. Some people think that this is value for money - spending just 6 minutes in space, seeing stars around yourself and paying hundreds of thousands of dollars for it!!!



Gross Domestic Product) and provided 284 million jobs in 2016-17. **Adventure tourism is easily one of the fastest growing segments of the tourism market.**

Thus, space tourism is a logical next step for this trend. According to a report by World Tourism, this will be a new way to boost economy in the future. It is sure to result in massive technological innovations as well as new fields of research.

Apart from impacting the economy positively, this will also ensure more & more growth in employment. **Another space maverick and businessman, Sir Richard Branson has already set-up and launched his own plans & planes for space tourism in the form of Virgin Galactic, that completed its maiden flight carrying the second Indian woman astronaut into space on 11th of July.**



## Historical Perspective

From the year 1969 when Neil Armstrong & Buzz Aldrin took their first steps on the moon and returned with samples of moon rock as declared by Buzz Aldrin, in the General Declaration after landing back from the moon], **the human race has come a long way in space exploration.**

He posted this Declaration on social media on the 29th of July, when Jeff Bezos had returned to earth after the successful mission of the New Shepard's maiden flight into space which carried a paid space tourist (Oliver Daemen) for the first time ever!!!

## Space Tourism – the Boon

Tourism generated \$7.2 trillion (9.8% of global





## Conclusion

Considering all these points, I still don't think there is a right or wrong argument for this. **Although, in my personal opinion, instead of going into space for fun and adventure, we should first focus on learning a lot more about what is happening on earth and why!**



## Space Tourism – the Bane

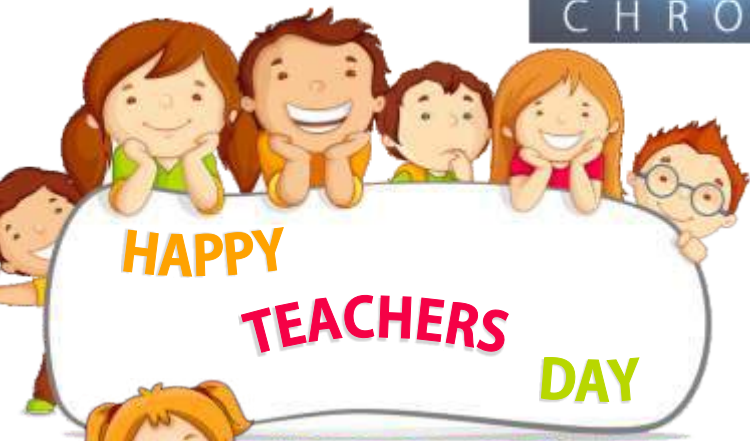
With every bright side, comes a dark side.

- The space tourism industry has already had 3 failures including the death of a pilot in just the last 2 years.

- The exhaust from rocket emissions gets accumulated in the stratosphere and cannot be easily dispersed. This will cause exponentially more climate change, contributing to overall global warming.

The space debris which is definitely going to increase, can potentially harm a lot of the already existing infrastructure in space – like communication satellites, low earth orbit spacecraft, the International Space Station etc.





## Skyscraper Day

By Samarth Kalra, Grade 6, SNS Noida



A skyscraper is a tall building of an approximate height of above 200 meters with multiple floors. We celebrate Skyscraper Day on 3rd September to appreciate the work of engineers.

From the top of skyscrapers, the cars below look like insects. 'The home insurance building built in 1885 & located in the corner of Adams & LaSalle Streets in Chicago, Illinois, went down in history as the world's first modern skyscraper.

New York is also known as the city of skyscrapers as there are many skyscrapers like the Empire State Building, One57, and 56 Leonard, etc. Now the question that arrives in our mind is - 'are the skyscrapers safe?'

The answer to the above question is that high rise buildings are



**Palais Royale with a height of 320 meters.** A short list of skyscrapers according to their heights are as following: Burj Khalifa, Shanghai Tower, Makkah Royal Clock Tower, Ping An Finance Centre, Lotte World Tower, One World Trade Center, Guangzhou CTF Finance Centre, Tianjin CTF Finance Centre.

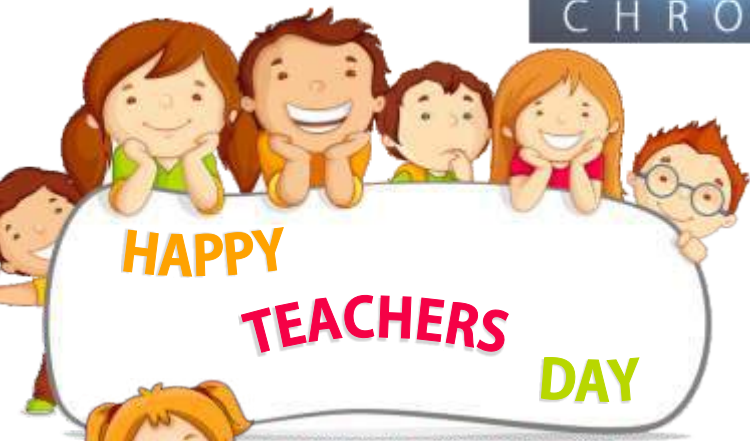


safe because at the time of construction they wisely take care of the materials, design & the latest technology so that it doesn't fall.

**The most famous skyscraper is Eiffel Tower which is located in France and is known to be the second-highest structure in the world.** It is also a historical monument. Every year, millions of people visit it.

**Burj Khalifa, which is known as, 'the world's highest skyscraper' is located in Dubai/United Arab Emirates.** The Burj Khalifa has 163 floors and is 828 meters long.

Even India is not behind in the skyscraper race. **There are currently more than 200 skyscrapers.** Most of them are located in Delhi, Mumbai, Kolkata, etc. **In Mumbai, the tallest skyscraper is**

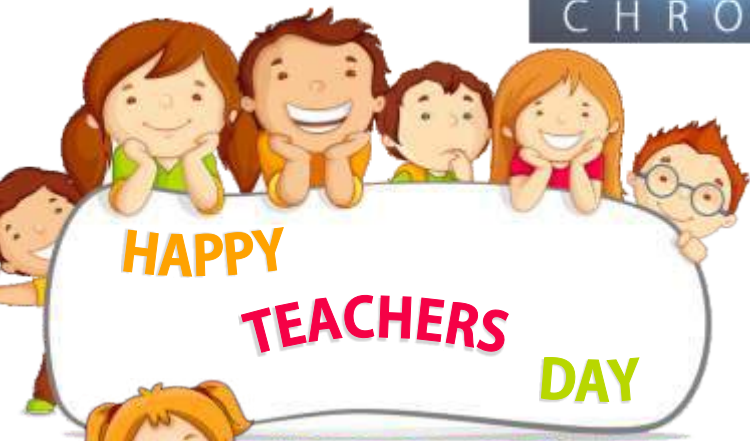


## Forest

By Ananya Bhola, Grade 7, SNS Gurugram



Deep in the forest  
Some people do stay,  
Deep in the forest  
Protecting it each day.  
Deep in the forest  
They save our biodiversity,  
Deep in the forest  
With all sincerity.  
Deep in the forest  
Where dangers do lurk,  
Deep in the forest  
With bravery they work.  
Deep in the forest  
Some people do stay,  
Deep in the forest  
Protecting it each day.



## National Nutrition Week

By Shriparna Sanvi, Grade 6, SNS Noida



*-"The first wealth is health." Emerson*

The purpose behind celebrating is to spread awareness about good nutrition, and health. Initiatives have been taken up by the government focusing on nutrition, good food, healthy body, mind, and lifestyle.

Nutrition is the science or practice of consuming and utilizing foods. A balanced diet is important for good health and well-being.



People should include a healthy diet in their daily routine like whole grains, fruits, vegetables, fat-free milk, etc. full of nutrition which not only helps in growth but also makes the immune system strong.

"Good nutrition will prevent 95 percent of all diseases." - Linus Pauling

Nutrition is the science or practice of consuming and utilising foods. Food provides our body with energy, protein, essential fats, vitamins, and minerals to live, grow, and function properly.

Therefore, a balanced diet is important for good health and well-being. It is said that an unhealthy diet increases the risk of many diet-related diseases.

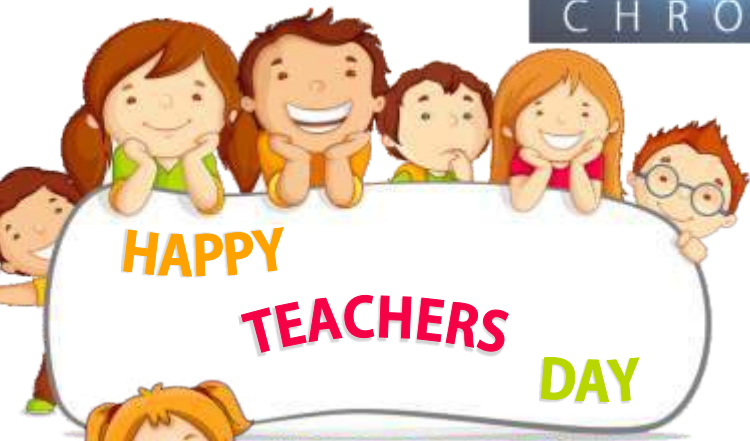
Good Nutrition is necessary because

- With a poor diet, well-being is reduced.
- Helps to manage a healthy weight.
- Maintains the immune system.
- Provides energy.
- Delays the effect of Ageing.
- Reduces the risk of chronic diseases.
- Healthy eating also affects your mood positively.
- A healthy diet increases life span.
- Also, a healthy diet increases focus.

"The only way to keep your health is to eat what you don't want, drink what you don't like, and do what you'd rather not." - Mark Twain

"Exercise is king, nutrition is Queen, put them together and you've got a kingdom." – Jack Lalanne





## Viala or Vera

By Anveshika Singh, Grade 8, SNS Gurugram



Twigs creaked; every sound needed an explanation to convince me. I cursed myself for listening to Gretel and enter Gibbet Wood. I wouldn't be surprised if I ended up at home with half a leg or a fractured arm. It wasn't the way the forest looked which terrified me but Viala, the lady who guarded the forest.

She was said to be very beautiful indeed but anyone who looked in her eye became a Vera, a human without life. I used my Aunt Laura's trick to think positive. Unfortunately she had never come across Viala. It was getting dark as the bag on my back weighed

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But this time what I saw was unforeseen. I could see myself sleep unconscious and weary.

I was soul-less. But then, who was I? I gazed at the pond as I saw a beautiful woman with blue eyes and tanned skin stare back. I am Viala, I thought. Since my disappearance no one has crossed this forest, and you must ask what is Viala's story, my story? Well that folks is a tale that no one knows and no one should either.

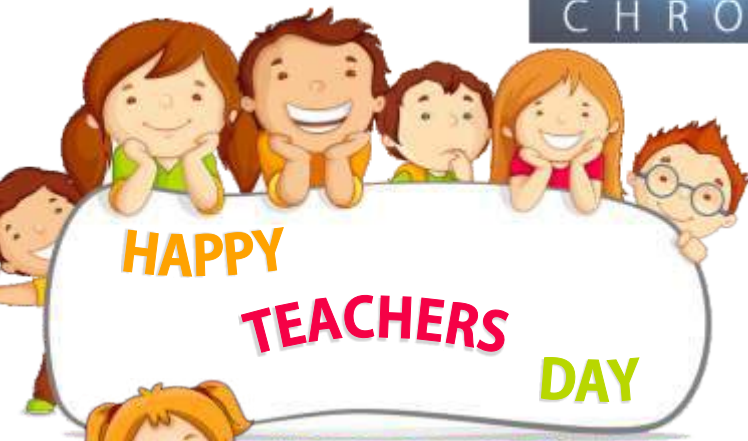
heavier than ever. I kept my bag on a rock and took out my tent. I set it out, took out the things I needed to make fire and cooked some food on it. After a hearty meal I got in my tent and set out my bed. I was reading my book when I heard music.

I looked at the time; it was way past mid night. I waited in my tent. The music grew louder. I read my book and fell asleep. When I woke up, there was the prettiest woman I had ever seen. With pearl white teeth, light tanned skin and, getting a little peek of her eyes, they were blue.

After a second or two I quite regretted that, feeling damp and unaided. I understood. I am Vera, lifeless, alone, I thought. I looked back into her eyes, struggling to elevate my head. Something kept me from looking, but I still did.



Volatile Uncertain Complex Ambiguous



## Childhood

By Maya Chatterjee, Grade 8, SNS Gurugram

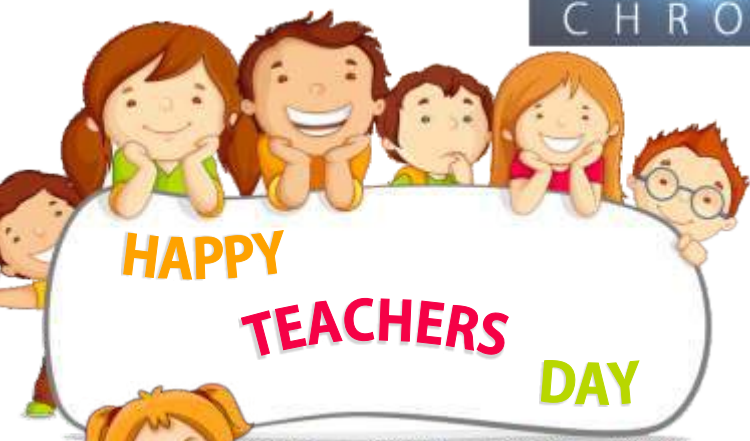


As my childhood slips away with the flow of water, the only sight I make out being my bare powerless hands.

Skin peels off and their hearts bruised with neglect, the only balm being the one I miss.

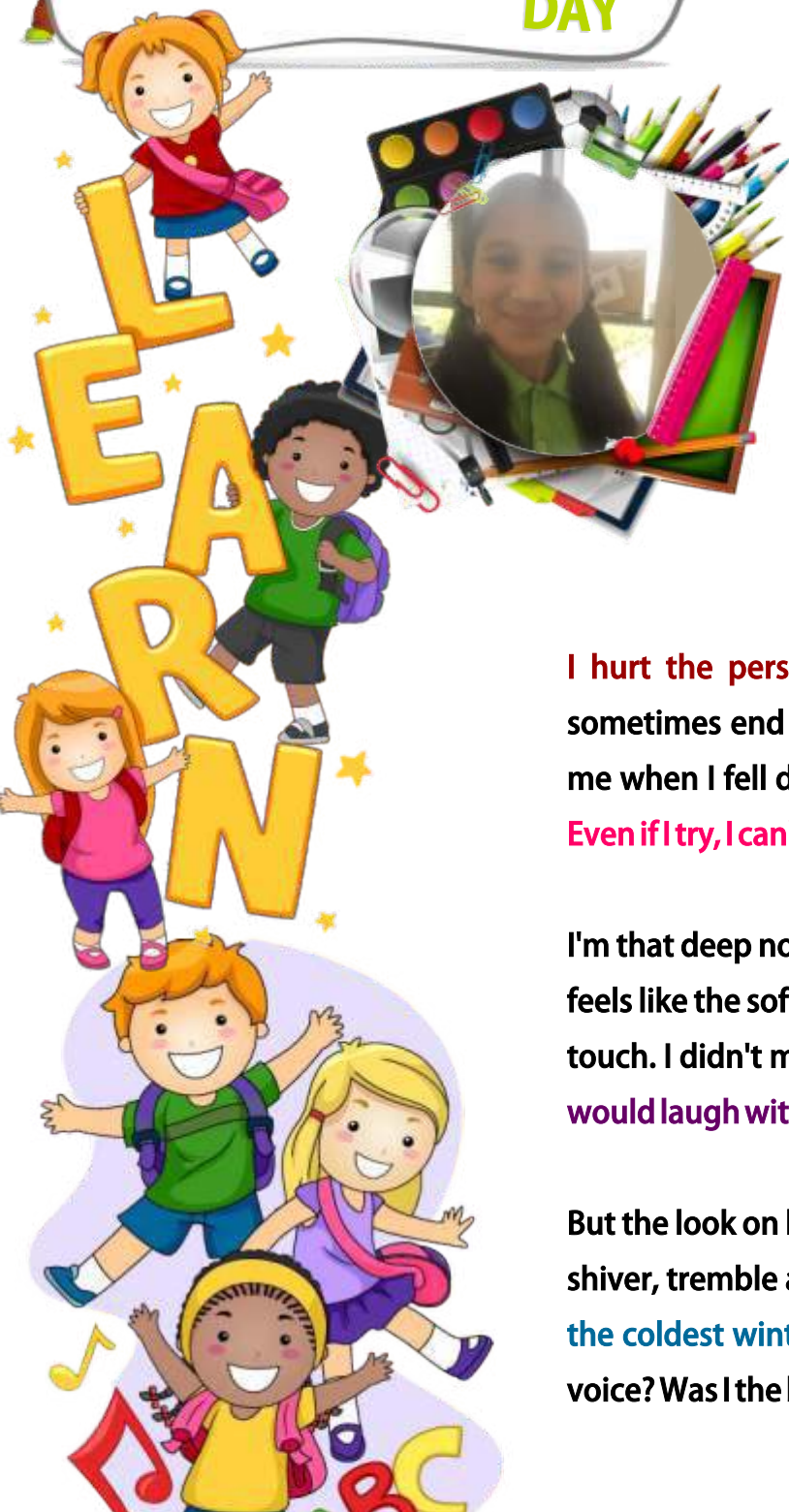
I contain the torture of watching, thinking, analyzing. But the ounce of hope I have kept, kept stored with rationing, sweat and tears, bounds to stretch my lips into a painful smile of memories.

But not memories of color, yet of me, just me, so with a forceful smile, I get over the grief of losing my childhood.



## Hurt

By Gia Ganesh, Grade 7, SNS Gurugram



I hurt the person who was dear to me. The one who would sometimes end up being the only person who would encourage me when I fell down. I didn't hurt her physically but emotionally. Even if I try, I can't fix things. There's nothing I can do about it.

I'm that deep now. I don't want to sink nor drown but some how it feels like the softest feather in the world is lifting me up just with a touch. I didn't mean to be rude or negative or salty. I thought she would laugh with me when I made the joke.

But the look on her face said otherwise. Her aura made me scared, shiver, tremble all at the same time. This distinct emotion felt like the coldest winter night I ever felt. Did I talk back? Did I raise my voice? Was I the bad guy? I made her cry. I didn't mean to...but I did.



better. I do! To start a new book, a fresh chapter but somehow...**Just somehow, I always end up in the same position? How? Could someone please tell me why?**

I just wanted to be someone, to prove that I'm worth. But I think I overdid it. There's nothing I can do now. **I'm still trying to figure out what life actually is but for now I'll keep trying.** Even if its for no reason at all, I will NOT give up. Ever. I would in the future try to absorb that pain and move on. After all, I'm still learning.

I was hurt emotionally majorly today. Although I was not the only person, but I still somehow was. **I want to encourage my tears and put all of them away once done. Then, and ONLY then...I can come out to reach for the sun once again.**



From this day on, I still feel guilty not all for what I did, but for what I could have done better. Why couldn't I have just shut my mouth or said this or that?

**Even a sigh could have been enough instead of showing such a nasty attitude and arrogance towards one of my own.** Not only they, but I was too shocked. I wish... I just wish I could turn back time.

Just a little. Just 5 seconds so that I could stop myself from blurting out those words. Then those thoughts came one by one entering my brain and killing me from inside slowly. **Why did it feel like a rushing train passing by?**

How stupid it felt, how dumb. I always try to

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SEPTEMBER 2021