



# KNOW & BEL

NLIGHTENING THE NOBLES!

# Happy Independence Day













KNOW BEL

Enlightening the nobles!

# WELCOME!

To the 8th issue of KNOWBEL.

Here comes the latest edition of your favourite magazine, KNOWBEL. Dive into the world of fascinating articles, inspiring personalities, mind-blowing quizzes, adorable comics and a lot more. All it takes is the flip of a page. We firmly believe that everyone must have access to information and hence, strive to include the choicest of material for you to dwell upon. Besides, we provide a wonderful platform for you to showcase your amazing talent. You can send us your creative work at knowbel.science@gmail.com.

Moreover, don't forget to participate in the quizzes and contests we host because who knows, you may be the next star to be featured. Do share this with your friends and family. A candle loses nothing by lighting up another one.

Happy reading!

Stay home & Stay safe!

**SPECIAL THANKS TO** 

DR. APARNA DESHPANDE
Faculty Advisor

# **KNOWBEL**

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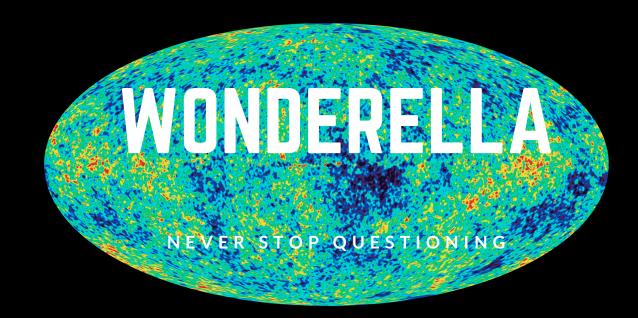
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Source: Wikimedia Commons

## **JUST HOW OLD IS THE UNIVERSE?**

A lot of evidence points to the fact that the universe, as we know it, has been in existence only for a finite amount of time, and tremendous effort has been made to determine the age of the universe. The current estimate, primarily based on Cosmic Microwave Background (CMB) radiation data from the Planck space telescope, is that the universe is roughly 13.8 billion years old.

New research based on data from the Atacama Space Telescope (ACT) in Chile corroborates the estimates made by Planck. It suggests that the universe may actually be slightly younger than previously guessed.

How exactly does one go about estimating the age of the universe? It has been observed that just like how points on an expanding balloon move farther away with time, the various galaxies in the universe are also continually moving away from each other. If the rate of expansion can be determined, one can, in principle, estimate the time at which the universe condensed into a tiny amount of space. Studying the CMB reveals a great deal about the state of the universe shortly after the Big Bang.

The similarity between observations of Planck and those of ACT are elaborated in a series of recently published papers. As one scientist on the team says, they are "restoring the 'baby photo' of the universe to its original condition, eliminating the wear and tear of time and space that distorted the image". These similarities strengthen our confidence in the accuracy of the current estimates of the age of the universe.

## **RIVETING READS IN THIS ISSUE:**

02 - ROCKETS AND GRAVITY SIMPLIFIED . . . !

03 - EARTHQUAKES IN GUJARAT, DELHI AND JAMMU KASHMIR...

04 - EPIDEMICS AND PANDEMICS

05 -WEIRD SPECIES SEEN
DURING THE RAINY SEASONS!



SOURCE - WWW.SCIENCEDAILY.COM

# 02 - A NEW ELEMENTARY PROOF OF THE PRIME NUMBER THEOREM

The primes (numbers which cannot be expressed as a product of factors) are a source of constant mystery and intrigue to mathematicians. They have been studied since the time of the ancient Greeks, and yet, they continue to hold secrets that elude us even today.

A useful construction in the study of prime numbers is the prime-counting function  $\pi(n)$ , which counts the exact number of primes less than a given number n. Understanding this function will provide mathematicians with some insight into the distribution of prime numbers. Since computing the exact values of  $\pi(n)$  at several points is not practical, mathematicians usually analyse simpler functions that take values close to those of  $\pi(n)$ . One such commonly studied function is  $n/\ln(n)$ , which takes in a number n and outputs the value of n divided by the natural logarithm of n.

It may seem very surprising and utterly non-intuitive that this strange-looking function approximates the prime counting function, and indeed, it took nearly 100 years and very sophisticated mathematics to prove this result. This approximate function captures two fundamental properties of the prime numbers - that there is an infinite number of them, and that they become sparser as one goes higher up the number line. Even though this theorem was proved back in 1896, mathematicians have been searching for different proofs of this statement (known as the "Prime Number Theorem") using diverse techniques. Some have managed to prove this profound theorem using elementary methods such as the properties of logarithms.

A new elementary proof of the Prime Number Theorem was published as recently as six months ago, by Florian K. Richter. New proofs of established theorems bring in different perspectives and allow mathematicians to examine familiar entities in a new light.



**IMAGE BY GERD ALTMANN FROM PIXABAY** 

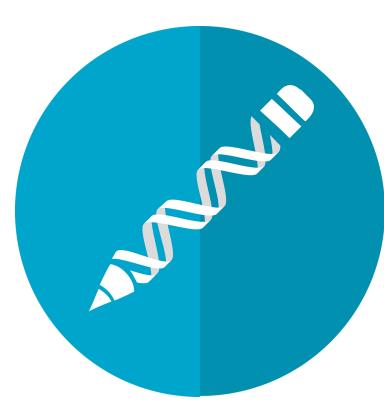


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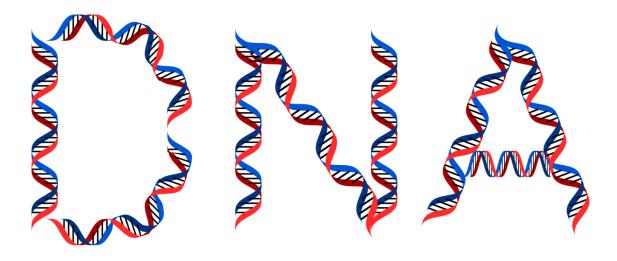
# 03 - GENE EDITING USING CRISPR

Several of our traits - from eye colour to height to complexion - are determined by heritable units known as genes. Genes are short segments of DNA (deoxyribonucleic acid) present in every cell of our body, which control these traits via a carefully regulated cell machinery. Changing these genes provides a means of altering the characteristics of an individual.

A new technique known as CRISPR harnesses bacterial defence machinery to edit genes precisely and efficiently. CRISPR is quite revolutionary compared to its predecessor gene-editing techniques, and it is expected to help biologists tremendously in performing gene editing efficiently. This technology has been recently used in clinical trials to treat beta-thalassemia and sickle cell anaemia - both blood-related diseases that require regular transfusions. Three people have been treated so far, and the clinical trials have been quite successful. Despite these successes, CRISPR has a long way to go before it becomes standardly for gene editing in humans.



**IMAGE BY MCMURRYJULIE FROM PIXABAY** 



**IMAGE BY GORDON JOHNSON FROM PIXABAY** 

# 04 - THE EARTH'S CHANGING MAGNETIC FIELD

The magnetic field of the Earth (which causes compass needles to align) is generated by liquid iron inside the Earth's core. The magnetic field is crucial because it protects the atmosphere and satellites from harmful radiation from the sun.

Surprisingly, the magnetic field of the Earth is not fixed and is known to vary over time. In fact, the magnetic field of the Earth can get reversed completely!

Scientists observed that a region of the Atlantic Ocean between South America and Africa is showing unusually weak magnetic fields. To investigate this, they set out to some islands in the area and collected samples of volcanic rocks. The grains of iron oxide in the volcanic rocks are magnetised during cooling, and their arrangement can provide valuable information about the direction and magnitude of the Earth's magnetic field at that region. They found that the iron oxide grains were not aligned in any specific direction, suggesting that the magnetic field in that region is prone to change. This may happen because the iron core in the corresponding region is turbulent and is continuously changing. This is an example of how one can determine what is happening in the Earth's by making observations on the surface.

Probing deeper into these mysteries will give us a better understanding of what happens in the depths of the Earth.



**IMAGE BY ANJA FROM PIXABAY** 



SOURCE - WWW.LIVESCIENCE.COM

# 05 - HOW SQUIRRELS GAIN INFORMATION FROM BIRD CHATTER

While one may believe that the chatter of birds is intelligible and useful only to other birds, recent studies show that this may not be the case. Other animals like squirrels often rely on the alarm cries of birds to detect the presence of predators. This is advantageous to the squirrels since they can spend less time worrying about the presence of predators and allocate more time to foraging.

Conversely, the regular bird-chatter in the absence of any predators may also be valuable to the squirrels, as recent research shows. When a recording of the call of a red-tailed hawk (a natural predator of squirrels) was played, the squirrels that were surrounded by ambient bird chatter went back to going about their regular activities sooner than those that were not. This has interesting implications - animals can use the chatter of other species around them to gain valuable information about their surroundings.



Amidst the ongoing pandemic, tremendous efforts are being made to develop a vaccine. So what does it take to develop a vaccine and get it into the market? The general stages of the development cycle of a vaccine are:

- Exploratory stage
- · Pre-clinical stage
- · Clinical development
- Regulatory review and approval
- Manufacturing Quality control

Clinical development is a three-phase process. During Phase I, small groups of people receive the trial vaccine. In Phase II, the clinical study is expanded, and the vaccine is given to people who have characteristics (such as age and physical health) similar to those for whom the new vaccine is intended. In Phase III, the vaccine is given to thousands of people and tested for efficacy and safety. Many vaccines undergo Phase IV formal, ongoing studies after the vaccine is approved and licensed.



STORAGE.NEEDPIX.COM



SOURCE - THE-SCIENTIST.COM



PHOTO CREDIT: JAMES GATHANYCONTENT PROVIDERS(S): CDC / PUBLIC DOMAIN



SOURCE - WWW.CDC.GOV

ARICLES BY ANAND

# 07 - COSMOS STUDY WILL BE DONE BY USING A STADIUM SIZED BALLOON -NASA ENGINEERS

The new and ambitious mission on which NASA engineers are working will be trailblazing!

**Mission:** 2.5-meter telescope high into the stratosphere on a football stadium-sized balloon.

The launch of the mission called ASTHROS (Astrophysics Stratospheric Telescopic for High Spectral Resolution Observation at Submillimeter–wavelengths), is tentatively planned for December 2023 from Antarctica. Ballon missions like ASTHROS are at higher risk than space missions but offer a fruitful reward at a modest cost.

## Aim of the Mission:

- 1. Astrophysics observation that has never been attempted before.
- 2. ASTHROS will carry an instrument to measure the motion and speed of gas around newly formed stars.
- 3. To pave the way for future space missions by testing new technologies.



**IMAGE CREDIT: NASA/JPL-CALTECH** 

## Intriguing facts about the ASTHROS:

For the first time, we could detect and map the presence of two specific types of nitrogen ions (atoms that have lost some electrons). This nitrogen can disclose places where winds from massive stars and supernova explosions have reshaped the gas clouds within these star-forming regions.

It will spend approximately three weeks drifting on air currents above the icy southern continent and achieve several firsts along the way. ASTHROS should reach an altitude of about 40 km (roughly four times higher than commercial airliners fly), which is still well below the boundary of space (100 km from earth surface ). This altitude will be sufficient to observe light wavelengths blocked by Earth's atmosphere.

# OBBLE THE

Get ready to guzzle down these interesting facts...



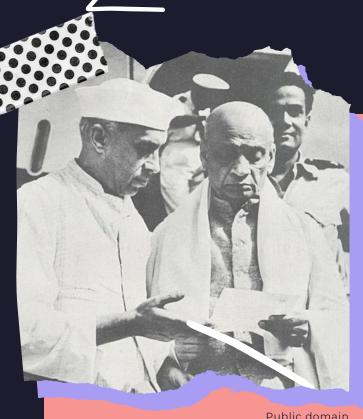
Cherishsantosh / CC BY-SA (https://creativecommons.org/licenses/by-sa/4.0)

# **OUR NATIONAL ANTHEM**

You will definitely be surprised to know that the Indian National Anthem, by Rabindranath Tagore, was first composed as a homage to George V! The Bengali version was written in 1911 but was adopted as our National Anthem only in 1950.

# **NEHRU WASN'T ELECTED AS OUR FIRS PRIME MINISTER:**

Yes! It was not Nehru, but Sardar Vallabhbhai Patel. Sardar Patel won the Prime Ministry elections fair and square. However, since Nehru didn't want to play second in command to anyone, and besides, Gandhi had a soft spot for Nehru, Sardar Patel was pulled down.







Unknown author (Ramnath Photographers, Delhi) / Public domain

# MULTI-LINGUAL FREEDOM FIGHTERS:

An Inspiration to one and all, Bhagat Singh was extremely fluent in several different languages like French, Swedish, English, Arabic, Hindi and Punjabi. Not just that, he was a voracious reader as well.

# **INDIA AND PAKISTAN**

The border between India and Pakistan was drawn by British lawyer Sir Cyrill Radcliffe.



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## THE INDIAN FLAG



Image by Paul Brennan from Pixabay

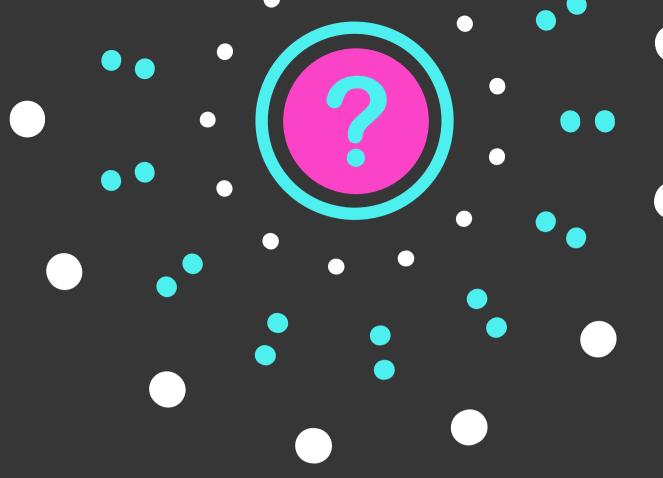
We all are of the notion that the Indian flag was first hoisted on August 15th, 1947. But that isn't true. Our National flag is said to be first hoisted on August 7, 1906, in Parsee Bagan Square (Green Park) in Calcutta. Our current national flag is the result of many iterations. The version you know today was made by Pingali Venkayya at Bezwada in 1921.

# TERMINOLOGY AND USAGE

The English term "patriot" is first known from the Elizabethan era, via Middle French, from Late Latin (6th century) patriota "countryman", ultimately from Greek πατριώτης (patriōtēs) "countryman", from πατρίς (patris), "fatherland". The abstract noun patriotism appeared in the early 18th century.



Image by Sambeet D from Pixabay



ISSUE NO. 8 | AUGUST 2020

# The Quizopedia

ARE YOU READY TO GET YOUR BRAIN BUSTED!

"Intelligence is the quickness in seeing things as they are."

- George Santayana

INDEPENDENCE DAY EDITION

# The Quizopedia

Is your mind slowly going stale, all with this never-ending quarantine and having nothing to do. Did you pride yourself on being the 'Know-it-all' in your class? Well, here's a chance to flex your grey cells and bring them back to tip-top shape.

KNOWBEL presents to you, the Quizopedia. I, Aditya, the quizmaster, have selected 15 of the most sizzling questions for you to crack. Note that 10 of these questions are related to the theme of this month's issue, while five are related to the previous month's issue.

Check out the instructions below: The QR code below will take you to a Google Form, which contains a quiz consisting of 15 questions. You must answer all the questions and try to get them correct. There is no negative marking. Don't even try cheating as it would not help you in any way to reach the answer! The names of the winners would be published in the upcoming issue, and the winner of the contest will get *prizes worth Rs. 250*. Apart from that, all participants would be sent E-certificates through email. Answers will officially be released via mail on 25/08/2020. The *competition begins* on *02/08/2020* at midnight.

The winners would be chosen based upon

- 1. Number of Correct Answers
- 2. Time of Submission

Deadline for submission: 20/8/2020 So what are you waiting for? Let's get quizzing!

## Quizopedia - 7 Winners:

- 1. Jasmine Shaikh
  (Pravara Institue of
  Medical Sciences Loni)
- 2. **Rohit Gupta**(Pravara Institue of
  Medical Sciences Loni)
- 3. **Karthikeya Raghu** (Symbiosis Secondary School)

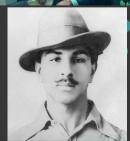


## LET'S BEGIN - HERE ARE THE QUESTIONS :

- 1) Even though the British Empire has collapsed, its ex-colonies (including India) are member states of an international organization whose head is the Queen of England. What is the name of this organization?
- a) The Queen's Estates
- b) The Commonwealth of Realms
- c) British Union
- 2) It is widely known that Tagore composed the national anthems of both India and Bangladesh. However, he supposedly played a role in the composition of one more nation's national anthem. Which country is it?
- a) South Africa
- b) Nepal
- c) Sri Lanka
- 3) Aamir Khan: Mangal Pandey:: \_\_\_\_: Bhagat Singh?
- a) Ajay Devgan
- b) Ranveer Singh
- c) Abhishek Bachchan
- 4) In her early childhood, she founded the Bal Charka Sangh to assist the Congress party during the Non-cooperation movement? Name her.
- a) Sarojini Naidu
- b) Indira Gandhi
- c) Kamala Nehru









- 5) Maulana Hasrat Mohani (1875-1951) was a freedom fighter and a noted Urdu poet. He coined something in 1921 which has a great part in the independence movement. What is it?
- a) Ae Mere Watan Ke Logo
- b) Inquilaab Zindabaad
- c) Saare Jahaan Se Accha
- 6) In India whose official standard was this?
- a) The Chief Justice of India
- b) The Governor General of India
- c) The President of India
- 7) Founded in 1889, \_\_\_\_ is one of the oldest football clubs in Asia. The club is notable for being the first all-Indian side to win a major championship over the British side in 1911. Fill in the blank.
- a) East Bengal FC
- b) Mohun Bagan FC
- c) Mohammedan SC
- 8) As per the Mahabharata, this city was referred as 'Goparashtra' meaning the 'place of cowherds.' Which city (whose current name is derived from Goparashtra) are we talking about?
- a) Goa
- b) Gwalior
- c) Dwarka
- 9) \_\_\_\_ were revolutionaries who were associated with the association of W.C. Rand. Their lives have been immortalized by this statue located in Pune (refer pic). Fill in the blank.
- a) Bhagat Singh and Sukhdev
- b) Greece, Noah
- c) Khudiram Bose and Prafulla Chakki
- 10) He was the Nawab of Bengal from 1757-60 and then again from 1763-65. A controversial figure, he is universally blamed for welcoming the British to annex India. You must have read his name in your history textbooks. Who is he?
- a) Spherical
- b) Mir Qasim
- c) Mir Jafar
- 11) What is the full form of LASER?
- a) Light Amplification for Stimulated Emission of Radiation
- b) Light Absorbing System for Enhanced Resonance
- c) Light Absorbing Semi-conductor Equilibrated Remote
- 12) South Africa was banned from international cricket for 21 years from 1970 to 1991 (after Mandela was released from prison). Why were they banned?
- a) Lack of stadiums
- b) Apartheid
- c) No fully functioning team



By India Post, Government of India GODL-India



By Prez001 - Own work, CC BY-SA 3.0







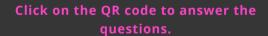
By Sureshkhole - Own work, CC BY-SA 4.0





- 13) Consider a hypothetical planet whose mass is half as that of Earth but radius is twice that of Earth. What would be the escape velocity of the planet?
  - a) Same as that of Earth
- b) Higher than that of Earth as the radius has increased
  - c) Lower than that of Earth as the mass has decreased
  - 14) Richter: Earthquakes :: \_\_\_\_\_ : Wind Speed?
  - a) Mohs
  - b) Beaufort
  - c) Sorensen

- 15) Owing to the efforts of Mandela, South Africa post 1994 was called?
- a) The Millenial Country
- b) The Republic of 1000 Races
- c) The Rainbow Nation















# <D/CODE>

# THERE IS ONLY ONE TRUTH! BRING OUT THE SHERLOCK IN YOU.

Are you rooting to challenge your brain in this seemingly endless lockdown? Well, we have just the right thing for you. KNOWBEL presents a revamped version of your favourite D-code. Gear up to send your neurons on a marathon.

To begin, scan the QR code or visit the link mentioned below. There are six documents, one leading to another with a clue to open it. You have to submit the final answer, a code given in the final document, at the submission link. Remember, don't give up midway because the solution is staring at you in the face.

Conquistadors will be *honoured* with fantastic *prizes* worth *Rs.250* and *certificates*. Besides, you will get a chance to be featured in our next issue.

The answers will be sent to you by 25/8/2020. The enthralling competition begins on 02/08/2020. Hints would be given out after 5 days from the start of the competition on the official KNOWBEL website

here:



The final winners will be chosen on the following basis:

- 1) Your answers (obviously!)
- 2) Logic
- 3) Preference for early-bird submissions

Deadline for entering your answers is 25/8/2020.

Now, are you ready to EODCD?



Click on **START** to begin.



START



D-code - 7 Winners:

- 1. Chinmay Kale
  (Symbiosis Secondary
  School)
- 2. **Parth Khose**(DAV Public School)



# **KNOWBEL**



Amidst all the mayhem surrounding the pandemic, KNOWBEL wishes to sneak in some lighthearted moments into your routine. We present to you a new comic section in our monthly magazine to cheer you up. Comics are a fantastic, creative way of conveying your thoughts while keeping a reader entertained. If you are a budding creator, you are always welcome to share your work with us for a feature in the upcoming issue. Happy Reading!!!







# INSPIRON

## **MAJOR DHYAN CHAND**

ONE OF THE GREATEST HOCKEY PLAYERS OF ALL TIME.

## INSPIRON



In India, the 29th of August is celebrated as 'National Sports Day' commemorating the birth anniversary of Major Dhyan Chand. For the uninitiated, Chand was one of the greatest hockey players the sport has ever seen. His extraordinary command over the game and phenomenal goal-scoring moves brought the nation three Olympic gold medals. It doesn't come as a surprise that he was nicknamed 'The Wizard' and 'The Magician'. In 1956, he was honoured by the Government of India with the Padma Bhushan, the third-highest civilian award. His autobiography, aptly titled 'Goal!', was published in 1952.

## 01. A TRYST WITH DESTINY

Dhyan Chand was born in Allahabad, Uttar Pradesh. His father, Sameshwar Dutt Singh, was employed in the British Indian Army, and as a result, he attended school for just six years owing to his father's transferable job. He graduated from Victoria College, Gwalior in 1932. Although his father and brothers played hockey, young Chand did not show an inclination for the sport until later on in his life. Even so, he did acknowledge his interest in wrestling. On the 29th of August 1922 (his 17th birthday), Chand enlisted in the British Indian Army as a sepoy. From 1922 to 1926, Chand played army hockey tournaments and regimental games. He was recognized and was ultimately selected for the Indian Army team which was to tour New Zealand then. In Hindi, the word 'Chand' literally means the moon. Dhyan Chand used to practice a lot during the night after his duty hours. Since there were no floodlights at that time, he used to wait for the moon to come out so that the visibility in the field improved. It was because of this habit that his fellow players fondly called him 'Chand' and the name had stuck ever since.

Illustration by Ritu

# WITHIN THESE PAGES:

- 01 A TRYST WITH
- 02 PROWESS PARAMOUNT
- 03 GAME AND GLORY
- 04 A SPLENDID LEGACY
- 05 AN ETERNAL LEGACY
- 06 A JEWEL IN THE CROWN OF HISTORY



66

Do not try to strike your opponent's goal post. Aim to attack their minds. You will score the goal automatically

99

# **02. PROWESS PARAMOUNT**

Chand's knowledge of every minute detail of the game was unmatched. In one incident, he found himself unable to score a single goal in a match. He got into an argument with the match referee about the measurement of the goal post. To everybody's amazement, he was right! The goal post was found to be in contravention of the official minimum width prescribed under international rules. With a mere four minutes to go, the star responded with three smashing goals to lead his team to a spectacular victory. He seemed to tactfully dart his opponents in the blink of an eye! According to several widespread reports, German dictator Adolf Hitler offered Dhyan Chand German citizenship and a position in the German Military, after Chand's impressive show at the Berlin Olympics. During the conversation, Hitler said, "Why don't you join the German hockey team? India will never be able to give you enough opportunities to grow." To this, Chand calmly replied, "Sir, it is not the responsibility of my country to make me grow. It is my responsibility to make my country grow."

## **03. GAME AND GLORY**

Chand's abilities were so astounding that on one occasion, the authorities in the Netherlands broke his hockey stick to check whether it had a magnet fixed inside it! During the Summer Olympics in 1932, India beat USA 24-1 and Japan 11-1. Chand scored 12 goals while his brother Roop Singh netted 13 out of the 35 goals India scored. This led to them being dubbed the 'hockey twins'.

INSPIRON



Illustration by Ritu

In 1935, the Australian cricketer, Don Bradman, met Dhyan Chand and after watching him play, Bradman remarked, "He scores goals like runs in cricket". He was idolized by people all over the world and to honour Chand, the residents of Vienna set up a statue with four hands and four hockey sticks, depicting his outstanding mastery in the game.

# 04. A SPLENDID LEGACY

In 1948, Chand decided to step away from 'serious hockey' gradually, and his final match was for the 'Rest of India' team against Bengal. The match concluded with a goal. He retired from the Army in 1956 at the age of 51, with the rank of Major. The Government of India has issued a commemorative postage stamp and a First Day Cover in his honour. Chand remains the only Indian hockey player to have a stamp in his honour. Further, the 'Dhyan Chand Award', conferred on the National Sports Day, is the highest award for Lifetime Achievement in the category of sports in India. The award is handed out every year to athletes who have not only contributed to a specific game but also worked for its betterment after retiring.

# **05. Behind the Scenes**

Apart from playing hockey, Chand also loved to fish. Cooking was his other favourite pastime. He enjoyed making mutton, fish dishes, and halwa dripping with ghee. Billiards was his indoor leisure activity. What's more, Chand also played cricket exceptionally well and was a talented batsman (hockey had strengthened his wrists). Besides, he used to play carrom and



The team
needs only
those players
who first play
for India, then
for their
teammates and
only then, if
they have any
life left, for
themselves.

99

loved photography. Chand admitted that he was not particularly good when it came to socializing. While at home or during play, he kept to himself. He thought that it would be better if he kept quiet and just did his duties.

# **06.** A JEWEL IN THE CROWN OF HISTORY

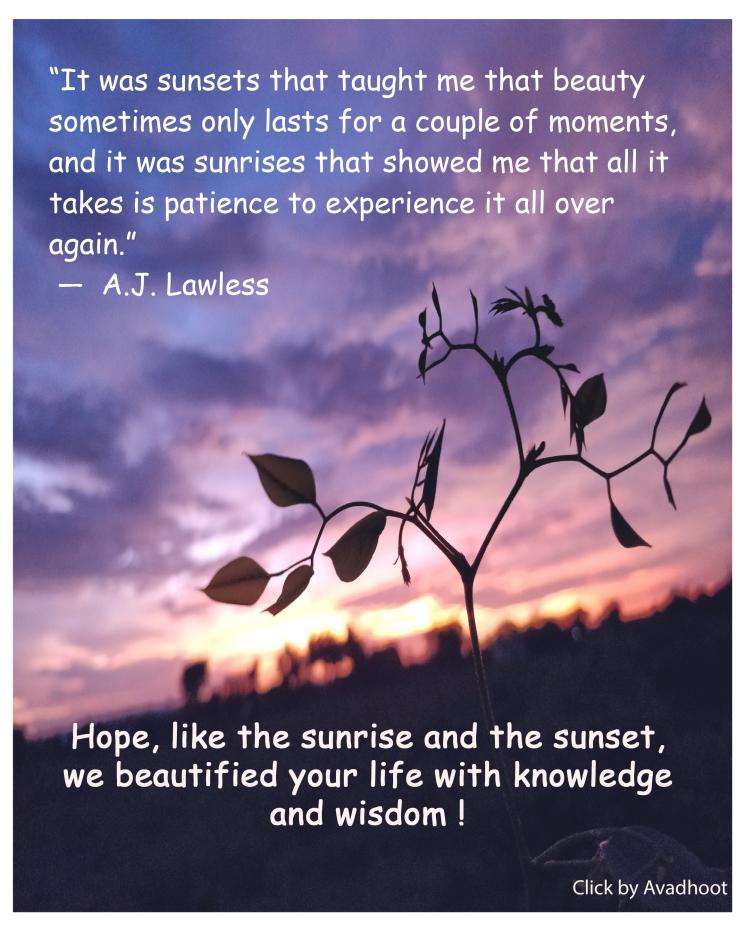
Dhyan Chand spent his final days in his hometown Jhansi in Uttar Pradesh. It is heartbreaking to know that he was short of money and that he was ignored by many during his last days. During a tournament in Ahmedabad, he was rudely turned away by the authorities who failed to recognize this legendary player. Chand was diagnosed with liver cancer and was admitted to a general ward at the AIIMS in New Delhi. The venerated luminary breathed his last on the 3rd of December, 1979, at the AIIMS. Keshav Dutt, the Olympic gold Medalist, said "His real talent lay above his shoulders. His was easily the hockey brain of the century. He could see a field the way a chess player sees the board. He knew where his teammates were, and more importantly, where his opponents were without looking. It was almost psychic. He treated everybody as pieces on a board meant for his use. He'd know from his movement how the defense was forming, and where the gaps were. In other words, he was the only one imponderable while everybody else (opposition included) fell in predictable patterns around him."

What counts
in life is not the
mere fact that we have
lived. It is what difference
we have made to the lives
of others that will
determine the significance
of the life we lead.





Illustration by Ritu



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