

The mentors *Digest*



DECEMBER 2023

ISSUE NO. 07





Our Founder and his Vision

Knowledge is the prime wealth among all wealths. In other words, knowledge is the best and important wealth among all wealths. Start your journey to find or explore the knowledge. Our founder and renowned scholar late Padmashri Dr Vellayani Arjunan's vision is to spread quality education to entire community and make it affordable.

Shri. Vellayani Arjunan was born on 10 February 1933 at Vellayani in the erstwhile Kingdom of Travancore. After receiving a Master of Arts degree in Malayalam, he went on to teach Malayalam Language and Literature at Sree Narayana College in Kollam. He later became the first Malayalam lecturer in Aligarh Muslim University, from which he gained his PhD degree in 1964. After leaving Aligarh Muslim University, he was appointed director of the State Institute of Encyclopaedic Publications in Kerala

He was honoured with the Padma Shri award by the nation in 2008. Dr Arjun, who was the first Professor of Malayalam at the Aligarh University and head of the Department of Modern Indian Languages. He supervised 20 research scholars and published more than 100 research papers and articles. He had authored 40 books in different genres including poetry, short story, essays and literary criticism, and his books were prescribed as textbooks in Kerala schools from 1959 onwards.



Degree	Topic	Awarding Institution
D.Litt.	Influence of Sree Narayana Guru on Malayalam Poetry.	Aligarh Muslim University
D.Litt.	A Comparative Study of the Mutual Relations and Uniformity of Hindi and Malayalam Languages.	Agra University
D.Litt.	The influence of Hindi Vocabularies on the South Indian Languages: A Linguistic study.	Jabalpur University
Ph.D.	A Comparative Linguistic Study of Common Vocables of Hindi and Malayalam Languages.	Aligarh Muslim University

Other degrees

Degree	Subject
B.A. Hons	Malayalam Language and Literature
M.A.	Malayalam Language and Literature
M.A.	Hindi Language and Literature
M.A.	Hindi Special
P.G. Diploma	Tamil, Telugu, Kannada



The mentors Digest



From the Editor's Desk.....

Dear Students & future leaders,



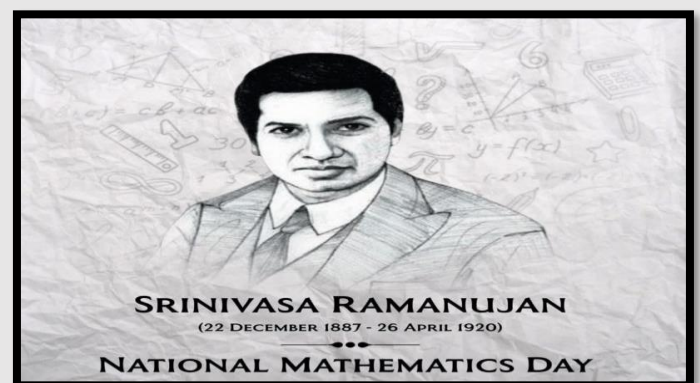
The world is getting hotter because of human activity, UN scientists say. Globally, the world has warmed already by just over 1°C with the UN warning it could be headed for more than 2°C . This would break pledges under the 2015 Paris deal where countries agreed to “pursue efforts” to limit warming to 1.5°C above pre-industrial levels. UN scientists have warned that if this threshold is breached, billions of people could be affected by heat and humidity that damages their health. COP28 will try to tackle this.

WHAT IS SPECIAL ABOUT THE MONTH OF DECEMBER ?

DECEMBER 22: NATIONAL MATHEMATICS DAY is celebrated in India on December 22nd to commemorate the birth anniversary of Srinivasa Ramanujan, a renowned Indian mathematician. The day is observed to recognize the importance of mathematics in various aspects of life, promoting its study and application. Educational institutions across the country organize various events and activities to engage students in mathematics, including workshops, seminars, and competitions. The day also serves to highlight the contributions of Indian mathematicians to the field of mathematics. Srinivasa Ramanujan was a self-taught mathematician who made significant contributions to number theory, infinite series, and continued fractions. His work has had a profound impact on various fields, including physics, engineering, and computer science. National Mathematics Day serves as an important reminder of the power and beauty of mathematics, encouraging students to explore its depths and discover its numerous applications.

COP28 is the 28th annual United Nations (UN) climate meeting where governments will discuss how to limit and prepare for future climate change. The summit is being held in Dubai, in the United Arab Emirates (UAE), from 30 November until 12 December 2023.

COP stands for “conference of the parties”, referring to the almost 200 countries that signed up to the UN’s original climate deal in 1992.





INDIA, US TO LAUNCH JOINT MICROWAVE SATELLITE FOR EARTH OBSERVATION

1. NISAR Satellite Launch: India and the US are gearing up for the joint launch of the NISAR satellite in the first quarter of the upcoming year, marking a significant collaboration in Earth observation.

2. NISAR's Objectives: The satellite, set to ride aboard India's GSLV, aims to observe and study various Earth aspects, including land ecosystems, solid earth deformations, polar dynamics, sea ice behaviors, and coastal ocean phenomena on a global scale using microwave remote sensing.

3. Integration and Testing: ISRO's S-band SAR and NASA's L-band SAR are seamlessly merging at JPL/NASA facilities. The integrated technology is currently undergoing rigorous testing at URSC in Bangalore, promising cutting-edge Earth observation capabilities.

4. Extended Collaboration: Beyond satellite launches, a Joint Working Group (JWG) on Human Spaceflight Cooperation is exploring space health, radiation studies, and debris shielding. The recent 8th meeting of the India-USA Joint Working Group on Civil Space Cooperation underlined their joint commitment to exploration.

5. Industry Partnerships: Discussions with major US players like Boeing, Blue Origin, and Voyager are underway, contemplating joint ventures with Indian commercial entities, envisioning a collaborative leap in space innovation.

6. Leveraging Resources: ISRO's interest in utilizing NASA's Hypervelocity Impact Test (HVIT) facility for Gaganyaan module testing demonstrates their commitment to mutual support and leveraging each other's strengths for advancement.

7. Thriving Space Startup Ecosystem: Dr. Jitendra Singh highlighted India's rapid space startup growth, from a few to over 150 within four years. This surge symbolizes the burgeoning potential and opportunities within the space industry.

Together, these points showcase a formidable partnership between India and the US, not just launching a satellite but shaping a future where collaboration in space exploration fuels innovation and pushes boundaries.





GOOGLE INTRODUCES AI CHATBOT BARD FOR TEENAGERS

1. Google's Expansion of Bard for Teenagers: Google is broadening access to Bard, its AI chatbot, tailored for teenagers, aiming to enhance educational experiences in a secure online environment.

2. Commitment to Safe Learning: Google emphasized creating a secure learning space for young users. Bard's accessibility will align with regional age regulations, ensuring content safety for its users.

3. Safety Measures: Bard is equipped with AI-driven content filtering to remove inappropriate material, prioritizing the well-being of its teenage users.

4. Enhanced Information Accuracy: Google introduced a 'double-check' response feature to improve Bard's reliability in delivering factual information, aiming to prevent the spread of misinformation, though it's not yet universally activated.

5. AI Literacy Resources: Google provides an AI literacy guide and an onboarding video, aiming to educate teenagers about AI technology and foster critical thinking regarding generative AI tools like Bard.

6. Math Learning Component: Bard facilitates math learning by allowing users to input or upload equations. It doesn't just give answers but offers step-by-step explanations, encouraging deeper comprehension of mathematical concepts.

7. Engagement with Experts: Before Bard's launch, Google consulted extensively with safety experts, students, and family organizations. This collaborative approach emphasizes responsible AI development and user well-being.

Bard
at Google 





Mathematics

BREAKTHROUGH IN THE STUDY OF KNOTS

What are Knots? Knots are mathematical objects that are formed by tying a piece of string or rope into a loop. They are often used as metaphors for complexity and difficulty, and they have been studied for centuries by mathematicians, physicists, and scientists.

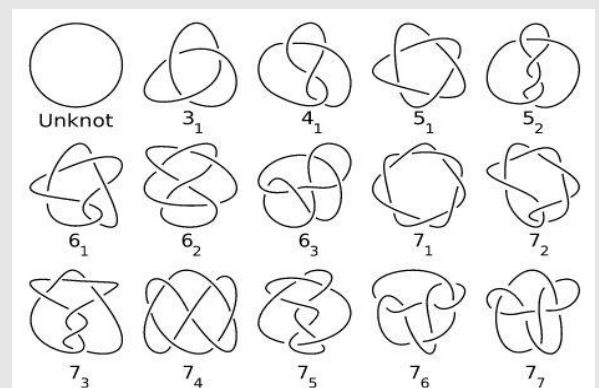
The Problem of Knot Classification: One of the central problems in knot theory is the problem of classification. This is the problem of determining whether or not two knots are equivalent. Two knots are said to be equivalent if they can be deformed into each other without cutting the string or rope.

Traditional Methods for Knot Classification: Traditional methods for knot classification are based on visual inspection. However, these methods can be very difficult and time-consuming, especially for complex knots.

The Breakthrough: Knot Floer Homology The new method developed by the Berkeley mathematicians is based on a mathematical concept called "Floer homology." Floer homology is a powerful tool that has been used to solve many problems in mathematics and physics. By applying Floer homology to knots, the Berkeley mathematicians have developed a new way to classify knots. This method is much more powerful than traditional methods, and it can be used to classify knots that were previously considered impossible to classify.

Implications of the Breakthrough: The knot theory breakthrough's impact spans physics, biology, materials science, fluid dynamics, and cryptography. It has potential applications in studying DNA structure, devising innovative approaches to manipulate biological molecules, and could pave the way for discoveries and advancements in these diverse fields.

Conclusion: The breakthrough in the study of knots is a significant advance in our understanding of these complex mathematical objects. The new method for classifying knots could have far-reaching implications for a wide range of fields.





CONCEPT MAP

CHAPTER OF THE MONTH:

PERMUTATIONS AND COMBINATIONS

Class XI

Properties

- ${}^n P_n = n! = n(n-1)(n-2) \dots 3 \cdot 2 \cdot 1 = {}^n P_{n-1}$
- ${}^n P_1 = n$
- ${}^n P_0 = \frac{n!}{(n-0)!} = 1$
- ${}^n P_r = n \cdot {}^{n-1} P_{r-1} = n(n-1) \dots {}^{n-2} P_{r-2} = n(n-1)(n-2) \dots {}^{n-3} P_{r-3}$ and so on
- ${}^{n-1} P_r + r \cdot {}^{n-1} P_{r-1} = {}^n P_r$
- $\frac{{}^n P_r}{{}^n P_{r-1}} = n - r + 1$

Circular Permutations

(i) Arrangement of n different things taken all at a time in form of circle is

- $(n-1)!$, if sense matter.
- $1/2(n-1)!$, if sense doesn't matter

(ii) Number of circular permutations of n dissimilar things taken r at a time

$$= \frac{{}^n P_r}{r} \text{ if clockwise and anticlockwise}$$

orders are considered as different.

$$= \frac{{}^n P_r}{2r} \text{ if clockwise and anticlockwise}$$

order is considered as same.

Factorial Notation

Product of first n natural numbers is denoted by $n!$

$$\text{i.e., } n! = n(n-1)(n-2) \dots 3 \cdot 2 \cdot 1$$

Fundamental Principle of Counting

In an operation A can be performed in m different ways and another operation B can be performed in n different ways, then

- Both the operations can be performed in $m \times n$ ways.
- Either of the two operations can be performed in $(m+n)$ ways.

Permutations

Arranging r objects out of n different things

- When repetition is not allowed $= {}^n P_r = \frac{n!}{(n-r)!}$, where $0 \leq r \leq n$
- When repetition is allowed $= n^r$

Restricted Permutations

The number of ways in which r objects can be arranged from n dissimilar objects if k particular objects are

- Always included (or never excluded) $= {}^{n-k} C_{r-k} r! = {}^r P_k {}^{n-k} P_{r-k}$
- Always excluded (never included) $= {}^{n-k} C_r r! = {}^{n-k} P_r$

Distributions into Groups

Distribution of n distinct things into r groups G_1, G_2, \dots, G_r containing P_1, P_2, \dots, P_r elements respectively.

- Groups are distinct: $\frac{n!}{P_1! P_2! \dots P_r!} r!$
- Groups are identical: $\frac{n!}{P_1! P_2! \dots P_r!}$

De-arrangements

Any change in the existing order of things is called De-arrangement. If m things are arranged in a row, the number of ways in which they can be dearranged so that none of them occupies its original place (no one of them occupies the place assigned to it)

$$= m! \left[1 - \frac{1}{1!} - \frac{1}{1!} + \frac{1}{2!} - \frac{1}{3!} + \dots + (-1)^m \frac{1}{m!} \right]$$

$$= m! \sum_{r=0}^m (-1)^r \frac{1}{r!}, \text{ we denote it by } D(m)$$

$$= {}^m P_m - {}^m P_{m-1} + {}^m P_{m-2} - \dots + (-1)^m {}^m P_0$$

Properties

- ${}^n P_r = {}^n C_r r!, 0 \leq r \leq n$
- For $0 \leq r \leq n, {}^n C_r = {}^n C_{n-r}$
- For $1 \leq r \leq n, {}^n C_r + {}^n C_{r-1} = {}^{n+1} C_r$
- ${}^n C_a = {}^n C_b \Rightarrow a = b \text{ or } n = a + b$
- ${}^n C_0 + {}^n C_1 + \dots + {}^n C_n = 2^n$

Restricted Combinations

The number of ways in which r objects can be selected from n dissimilar objects if k particular objects are

- Always included $= {}^{n-k} C_{r-k} = {}^{n-k} C_{n-r}$
- never included (Always excluded) $= {}^{n-k} C_r$

PERMUTATIONS AND COMBINATIONS

Combinations

- Selecting r objects out of n different things given by

$${}^n C_r = \frac{n!}{r!(n-r)!}, 0 \leq r \leq n$$



Science & Technology

NEW ALZHEIMER'S DRUG SLOWS DISEASE BY A THIRD

•**Donanemab's Impact:** Eli Lilly's donanemab, like lecanemab, offers promise in slowing Alzheimer's progression by targeting brain amyloid deposition—the hallmark of the disease.

•**Trial Findings:** Donanemab's trial showcased a notable 29-35% reduction in the pace of Alzheimer's advancement among participants in the early stages of the disease. This intervention allowed individuals to maintain some daily activities. However, the emergence of brain swelling as a side effect resulted in fatalities in a few cases, dampening the otherwise positive outcomes observed.

•**Shifting Treatment Approaches:** There's growing anticipation among experts regarding a significant shift in Alzheimer's treatment methodologies. The focus is shifting from merely providing palliative care to actively modifying the course of the disease.



•**Constraints and Challenges:** While the results are promising, these drugs, donanemab and lecanemab, appear to be effective primarily in the initial stages of Alzheimer's. This necessitates a pressing need for improved diagnostic tools to identify patients who could benefit most from these treatments. Furthermore, there's a notable challenge regarding the high costs associated with these interventions, posing potential limitations on widespread accessibility and affordability.

Introducing **WORD OF THE MONTH:**

Martinet: Someone who demands exact conformity to rules and forms

**word
of the
month**

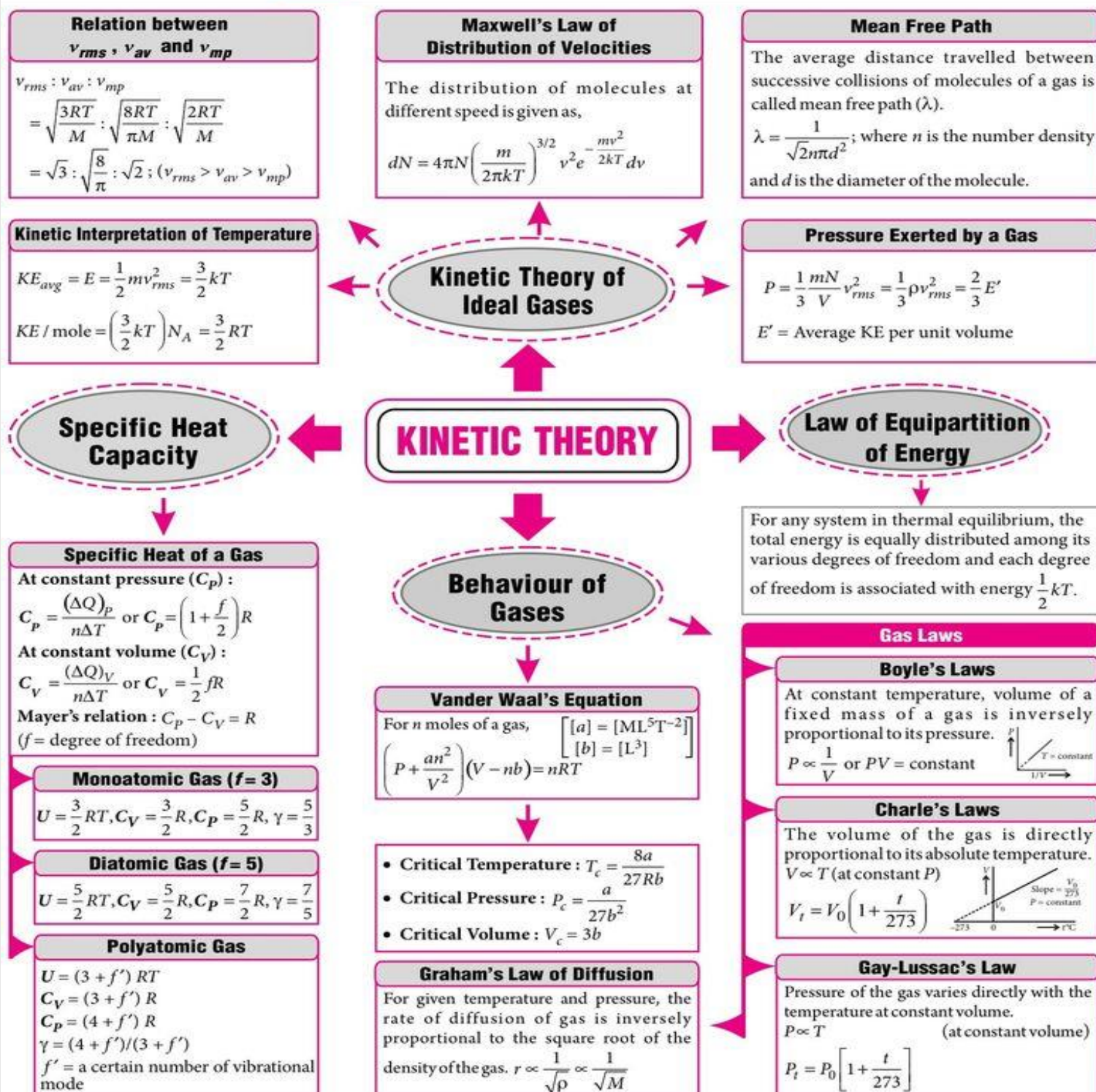


BRAIN MAP

CHAPTER OF THE MONTH:

KINETIC THEORY

Class XI





TWIST YOUR MIND

(Answers will be given in the January 2024 digest)

RIDDLES

1. What question can you never answer yes to?
2. Rachel goes to the supermarket and buys 10 tomatoes. Unfortunately, on the way back home, all but 9 get ruined. How many tomatoes are left in a good condition?

PUZZLES

1. Which number should replace the question mark to form accurate equations, knowing that three numbers are shown per row (i.e. two of the numbers form a two-digit number)?

3	2	1	0
1	9	2	0
0	8	1	?
7	5	2	4

Bright Spots: Positive Events from November 2023

In November 2023, there were many major positive events around the world, including:

- **ADC Cancer Treatment:** Promising clinical trials for Antibody-Drug Conjugates (ADCs) show effectiveness against cancers with fewer side effects.
- **New Climate Agreement:** COP27 agreement focuses on reducing greenhouse gases, phasing out coal, and supporting developing nations.
- **Increased Life Expectancy:** Global average life expectancy reaches 73 years, up from 64 years in 1990, attributed to better healthcare, nutrition, and sanitation.

These events are a sign of progress and hope in the world, and they remind us that there is still good to be found.

NOVEMBER ANSWERS

RIDDLES: 1. Temperature 2. You are, because you are a primate, too.

PUZZLE: 1. 6210001000 2. It is the digits 0 to 9 in alphabetical order. Note: it can also be exactly divided by all of the digits 1-9 except 7

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JUNE 2023



JULY 2023



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ABOUT US

Affordable Quality education

By understanding the need of aspiring students, India's renowned Academic experts in the field of school education- Mr. Jayasankar Prasad (Son of Late Padmasree Dr Vellayani Arjunan and former Director Vivekananda group of schools) and Ms. Chitra Jayasankar (Educational advisor, Tagore Educational trust) are there to bridge the gap of ensuring quality education for the students. We have formulated an online platform for providing significantly exceeding educational experience through online tuitions (classes 8-12), IAS bridge programs and finishing school for fresh engineers and other professionals. We will ensure excellent learning experience to students and 100% satisfaction level to parents.

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