గణిత చంద్రిక
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విషయ సూచిక

సంపాదకీయం

గణిత చంద్రిక పాఠక మహాశయులకు నమస్కారం. ఈ సంచికలో అనేక ఆసక్తికరమైన అంశాలను చేర్చడం జరిగినది. పాఠకులందరికీ ఇవి నచ్చుతాయని ఆశిస్తున్నాము. సంచిక వెలువరించడంలో జరిగిన జాప్యానికి క్షంతవ్యులము. ఈ సారి కూడా మన గణిత చంద్రిక ఆన్లైన్ విధానంలోనే ప్రచురించబడుచున్నది. పాఠకులు గమనించ ప్రార్థన. రెండు పేజీలకు మించని గణిత వ్యాసాలను ఎప్పటిలాగానే పాఠకుల నుంచి గణితచంద్రిక ఆహ్వానిస్తోంది. గణిత చంద్రికపై మీ అమూల్యమైన అభిప్రాయాలను సూచనలను తెలియజేయ ప్రార్థన.

శుభాభివందనములతో

భవదీయుడు

Dr. B.B. రామశర్మ

Chief Editor

Cover Story: C. S. Seshadri : A Pillar of Indian Mathematics

C. S. Seshadri, an eminent Indian mathematician, has made monumental contributions to algebraic geometry, leaving an indelible mark on the mathematical community in India and across the globe. As a distinguished professor at the prestigious **Indian Institute of Science (IISc), Bangalore**, Seshadri's work and influence extend beyond the realm of research, shaping the academic landscape of India and inspiring generations of mathematicians.

Early Life and Academic Background:

Born in 1938 in Tamil Nadu, Seshadri's early education in mathematics was exceptional. After completing his undergraduate studies at Loyola College, Chennai, he pursued graduate studies at the **University of Madras** and later obtained his Ph.D. from **Tata Institute of Fundamental Research (TIFR), Mumbai**, under the guidance of the renowned mathematician **M. S. Raghunathan**. His passion for geometry, specifically algebraic geometry, blossomed during his early academic years.

Contributions to Algebraic Geometry:

Seshadri's research was primarily centered around the field of **algebraic geometry**, which studies the solutions of systems of polynomial equations and their geometric properties. His most significant work includes the **Seshadri Constant**, a tool to study the geometry of vector bundles on algebraic curves. This concept has had a profound influence on the study of the geometry of moduli spaces and vector bundles, making him one of the leading figures in the field.

One of his major contributions is his work on **moduli spaces of vector bundles**, which are spaces parameterizing vector bundles over algebraic curves. His insights into the construction and classification of these spaces have paved the way for deep developments in the theory of stable vector bundles. Seshadri's work in algebraic geometry is often characterized by a blend of pure theoretical insight and practical application.

Influence and Legacy at IISc:

Seshadri joined IISc in the 1970s, where he not only continued his own research but also played a pivotal role in establishing the institution as a hub for mathematical research in India. His time at IISc was marked by his dedication to building a strong mathematical community. He mentored numerous Ph.D. students, many of whom have gone on to become influential mathematicians themselves. Under his guidance, the **Mathematics Department** at IISc became one of the premier centers for research in mathematics, especially in the field of algebraic geometry.

His commitment to Indian mathematics extended beyond academia. Seshadri was involved in organizing conferences and workshops that brought together mathematicians from around the world, fostering a global exchange of ideas. He was also instrumental in shaping the Indian Mathematical Society and contributed to the growth of mathematical culture in India.

Recognition and Awards:

Throughout his career, Seshadri received several prestigious awards and honors, including the **Shanti Swarup Bhatnagar Prize** in 1988, which is one of the highest honors in Indian science. He was also elected a Fellow of the **Indian Academy of Sciences** and the **Royal Society of London**, marking his international recognition.

Personal Philosophy:

Seshadri was known for his quiet demeanor and deep intellectual rigor. His approach to mathematics was not just about solving problems but about seeking beauty and elegance in mathematical structures. He often emphasized the importance of a solid foundational understanding and encouraged his students to approach mathematics with both creativity and discipline.

Passing and Legacy:

C. S. Seshadri passed away on **January 17, 2020**, but his contributions to mathematics, especially in the field of algebraic geometry, have cemented his legacy as one of India's greatest mathematical minds. His work continues to influence mathematical research worldwide, and his role at IISc has ensured that his legacy endures in the form of a vibrant and thriving mathematical community in India. Seshadri's impact as a mentor, researcher, and scholar continues to resonate, inspiring future generations of mathematicians to explore the vast and beautiful world of mathematics.

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Magic Square Construction

R.Shanmukha Priya, 12th Class,
Khammam

A **magic square** is a square grid of numbers where the sum of the numbers in each row, each column, and both diagonals is the same. This constant sum is called the **magic constant**. Magic squares have been studied for centuries and are used in various fields, from mathematics to art and architecture.

General Formula for the Magic Constant:

The **magic constant** S for an p×p magic square is given by the formula:

$$S = \frac{p\left(p^2+1\right)}{2}$$

For a 3 x 3 magic square, p = 3

$$S = \frac{3\left(3^2+1\right)}{2} = \frac{3(9+1)}{2} = \frac{30}{2} = 15$$

Thus, the sum of each row, column, and diagonal in a 3x3 magic square must be 15.

Steps to Form a 3x3 Magic Square:

- **Let**:
    - p = Order of the magic square (e.g., p=3).
    - q= A number such that the magic sum is p×q (e.g., q=5 for p=3).

- **Construct the magic square using the following pattern**:

$$\begin{bmatrix} q-1 & P^2 & q-p \\ p & q & 2q-p \\ p+q & 1 & q+1 \end{bmatrix}$$

Example:

Substituting p=3 and q=5:

$$\begin{bmatrix} 4 & 9 & 2 \\ 3 & 5 & 7 \\ 8 & 1 & 6 \end{bmatrix}$$

This arrangement satisfies the condition of a magic square, where the sum of each row, column, and diagonal is 15.

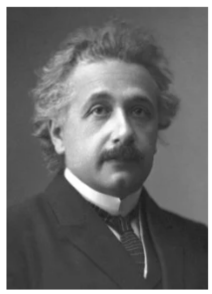
- The value of q should always be at the center of the square, with p positioned in its left cell.
- The cell above p is taken as q – 1, as shown in the formula above.

Key to MSET = 2023 Questions

Class	Questions														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
V	3	1	2	4	1	3	4	4	1	4	3	4	2	3	1
VI	2	4	3	4	3	3	2	3	4	3	1	4	3	1	1
VII	3	3	4	1	3	1	2	1	3	1	3	1	1	2	3
VIII	2	4	3	3	1	4	2	3	2	4	1	1	1	3	4
IX	4	4	4	2	2	3	3	1	4	2	4	2	1	2	2
X	4	3	4	2	1	3	1	1	3	3	3	1	1	3	2

Albert Einstein: The Man Behind the Theory of Relativity

P.Rohit, 12th Class, Khammam



Albert Einstein, one of the most renowned scientists of the 20th century, is celebrated for his groundbreaking contributions to physics, most notably his theory of relativity. Yet, beyond his scientific achievements, his life was filled with fascinating stories and intriguing facts.

Early Life and Education:

- **Born in Ulm, Germany (1879)**, Einstein exhibited an early fascination with mathematics and science. However, his formal education was not always smooth. Despite later becoming a revolutionary scientist, Einstein struggled with early schooling, often clashing with the rigid discipline and structure of the education system.
- At age 16, Einstein wrote his first scientific paper, **"The Investigation of the State of the Ether in Magnetic Fields,"** laying the foundation for his future work.

Scientific Breakthroughs:

- **Special Theory of Relativity (1905):** Einstein's year of miracles, 1905, produced the famous equation E=mc2E = mc^2, which showed the relationship between energy and mass. This equation is now one of the most well-known equations in the world.
- **General Theory of Relativity (1915):** Expanding on his special theory, Einstein's general relativity fundamentally altered our understanding of gravity. It described gravity as the warping of space-time by mass, which was confirmed by the bending of light observed during a solar eclipse in 1919.

Anecdotes and Personal Life:

- **A Rebel in School:** Despite his later academic success, Einstein was considered a "slow learner" by his teachers. He often rejected traditional school methods, believing that curiosity and independent thinking were more important.
- **Patent Office Work:** Before achieving fame, Einstein worked at the **Swiss Patent Office** in Bern, Switzerland. This job provided him with a stable income, while giving him time to think and develop his scientific theories.
- **A Love for Music:** Einstein was an accomplished violinist and had a lifelong love for music. He often spoke of how music helped him in his thinking process, stating that if he weren't a physicist, he would have been a musician.

- **The Famous Hair:** Einstein's wild, unruly hair became his iconic trademark. However, Einstein was not particularly fond of his appearance and once joked that "if I had been born with a better haircut, I would have been more successful."

Philosophical Views:

- Einstein's profound thoughts extended beyond physics into philosophy and social issues. He was an outspoken pacifist and advocate for civil rights. During his time in the United States, he spoke against the oppression of African Americans and was a strong supporter of the civil rights movement.

Fun Facts:

- Einstein was offered the **presidency of Israel** in 1952, a position he declined, stating he lacked the necessary experience and inclination for political office.
- He was famously absent-minded. One of the well-known stories is that he once forgot his own address and had to ask a stranger for directions to his house.
- He famously said, "Imagination is more important than knowledge," reflecting his belief that creativity and curiosity were essential to scientific discovery.

Legacy:

Albert Einstein passed away in **1955**, but his theories, insights, and philosophical views continue to shape the world of science, mathematics, and even culture. His legacy remains not just as a scientist, but as a symbol of intellectual curiosity and the power of imagination.

Twin Prime Numbers: A Fascinating Pair of Primes

V.Ashish, 11th Class, Khammam

In the vast and intricate world of number theory, prime numbers hold a special place due to their fundamental role in the structure of numbers. Primes are numbers greater than 1 that have no positive divisors other than 1 and themselves. Among the various types of prime numbers, **twin primes** are an especially intriguing pair, sparking curiosity and extensive research in mathematics.

Definition of Twin Primes:

A **twin prime** is a pair of prime numbers that differ by exactly two. In other words, if p and p + 2 are both prime, then the pair (p,p+2) is a set of twin primes. For example, the first few twin primes are:

- (3, 5)
- (5, 7)
- (11, 13)
- (17, 19)
- (29, 31)

These pairs are often considered "neighbors" in the world of primes because they are the closest prime numbers to each other.

Importance in Mathematics:

The study of twin primes lies at the intersection of prime number theory and number theory in general. Prime numbers themselves are the building blocks of all natural numbers, and twin primes, as close neighbors, hold special significance in the study of prime distribution.

The **twin prime conjecture**, proposed by mathematician **Alphonse de Polignac** in 1846, posits that there are infinitely many twin primes. This conjecture remains unproven to this day, despite the efforts of mathematicians for over a century. While no definitive proof exists, significant progress has been made in understanding the distribution of twin primes.

Progress in Twin Prime Research:

In 2013, a major breakthrough in prime number research brought new hope to the twin prime conjecture. The mathematician **Yitang Zhang** made a landmark discovery by proving that there is a finite gap, no larger than 70 million, between any two prime numbers. Although this doesn't directly prove the twin prime conjecture, it was a significant step in understanding how prime numbers are distributed and suggested that smaller gaps, possibly even two, exist between primes. This led to further efforts, including the **Polymath Project**, which aims to reduce the gap between primes to the smallest possible value.

Applications of Twin Primes:

While twin primes are primarily studied for their theoretical significance, they also have applications in cryptography, which relies heavily on the properties of prime numbers. Algorithms that depend on large prime numbers, such as

RSA encryption, form the backbone of modern digital security. Understanding the patterns and distributions of primes can help improve these algorithms and provide insights into number-theoretic cryptography.

The Mystery of Twin Primes:

Despite significant advances in number theory, the full behavior and distribution of twin primes remain elusive. Twin primes seem to appear less frequently as numbers grow larger, but they continue to appear at increasingly larger intervals, suggesting that they may still exist infinitely. However, the exact manner in which twin primes occur within the set of all primes is still one of the great unsolved problems in mathematics.

Conclusion:

Twin prime numbers represent an exciting and mysterious area of research in mathematics. While the twin prime conjecture remains unproven, the study of these special pairs continues to inspire mathematicians. The discovery of even small breakthroughs, like Yitang Zhang's work, hints at the deep and fascinating structure underlying the primes. Twin primes are a perfect example of how even the simplest number theory problems can challenge the brightest minds and fuel discoveries that shape our understanding of the mathematical world.

* * *

Sequence and Progressions questions for competitions

M.Yeswanth
B.Tech, 2nd Year, IIT Hyderabad

1. **If the sum of the first 20 terms of an arithmetic progression is 210, what is the 20th term?**
(a) 19 (b) 20 (c) 21 (d) 22

2. **The sum of the first n terms of an arithmetic progression is given by (S_n = 3n^2 + 5n). What is the common difference?**
(a) 3 (b) 5 (c) 6 (d) 7

3. **If the 7th term of a geometric progression is 128 and the 10th term is 1024, what is the common ratio?**
(a) 2 (b) 3 (c) 4 (d) 5

4. **The sum of an infinite geometric series is 8 and the first term is 4. What is the common ratio?**
(a) 1/2 (b) 1/3 (c) 1/4 (d) 1/5

5. **If the sum of the first 10 terms of an arithmetic progression is 155 and the first term is 5, what is the common difference?**
(a) 2 (b) 3 (c) 4 (d) 5

6. **In an arithmetic progression, the 5th term is 20 and the 10th term is 35. What is the first term?**
(a) 5 (b) 10 (c) 15 (d) 20

7. **The sum of the first n terms of a geometric progression is given by (S_n = 81(1 - (1/3)^n)). What is the first term?**
(a) 81 (b) 27 (c) 9 (d) 3

8. **If the 4th term of an arithmetic progression is 15 and the 9th term is 30, what is the sum of the first 10 terms?**

(a) 225 (b) 230 (c) 235 (d) 240

9. **The sum of the first n terms of an arithmetic progression is given by (S_n = n(2n + 1)). What is the nth term?**

(a) 4n - 1 (b) 4n + 1 (c) 2n - 1 (d) 2n + 1

10. **If the 6th term of a geometric progression is 64 and the 3rd term is 8, what is the first term?**

(a) 1 (b) 2 (c) 4 (d) 8

11. **The sum of the first 15 terms of an arithmetic progression is 120 and the first term is 2. What is the 15th term?**

(a) 14 (b) 16 (c) 18 (d) 20

12. **If the sum of the first n terms of a geometric progression is given by (S_n = 5(1 - (1/2)^n)), what is the common ratio?**

(a) 1/2 (b) 1/3 (c) 1/4 (d) 1/5

13. **In an arithmetic progression, the 8th term is 24 and the 12th term is 36. What is the common difference?**

(a) 2 (b) 3 (c) 4 (d) 5

14. **The sum of the first n terms of an arithmetic progression is given by (S_n = 4n^2 + 2n). What is the first term?**

(a) 2 (b) 4 (c) 6 (d) 8

15. **If the 5th term of a geometric progression is 243 and the 2nd term is 9, what is the common ratio?**

(a) 3 (b) 4 (c) 5 (d) 6

16. **The sum of an infinite geometric series is 10 and the first term is 5. What is the common ratio?**

(a) 1/2 (b) 1/3 (c) 1/4 (d) 1/5

17. **If the sum of the first 12 terms of an arithmetic progression is 156 and the first term is 3, what is the common difference?**

(a) 2 (b) 3 (c) 4 (d) 5

18. **In an arithmetic progression, the 3rd term is 12 and the 7th term is 24. What is the first term?**

(a) 3 (b) 6 (c) 9 (d) 12

19. **The sum of the first n terms of a geometric progression is given by (S_n = 16(1 - (1/4)^n)). What is the first term?**

(a) 16 (b) 8 (c) 4 (d) 2

20. **If the 10th term of an arithmetic progression is 50 and the 5th term is 25, what is the sum of the first 15 terms?**

(a) 375 (b) 400 (c) 425 (d) 450

ANSWERS

1. (a) 19	2. (c) 6	3. (a) 2	4. (a) 1/2
5. (b) 3	6. (a) 5	7. (a) 81	8. (a) 225
9. (d) 2n+1	10. (a) 1	11. (c) 18	12. (a) 1/2
13. (b) 3	14. (a) 2	15. (a) 3	16. (a) 1/2
17. (a) 2	18. (a) 3	19. (a) 16	20. (a) 375

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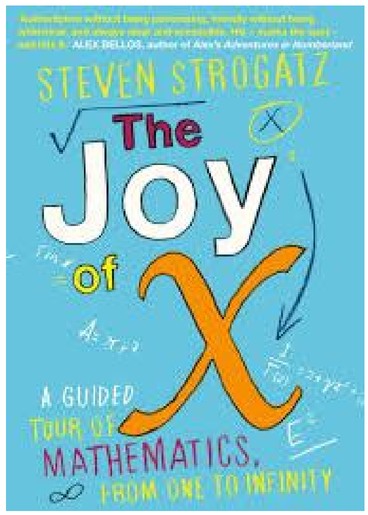
గణితాన్ని ఆస్వాదించే వారికోసం - "The Joy of X" పుస్తక పరిచయం

V. Bruhathsena, 12th Class, Khammam



పుస్తక వివరాలు :

- ✳ పేరు : The Joy of X : A Guided Tour of Mathematics from One to infinity
- ✳ రచయిత : Steven H. Strogatz
- ✳ ప్రచురణకర్త : Atlantic Books
- ✳ ప్రచురణ తేదీ : 6 మార్చి 2014
- ✳ **ISBN - 13 :** 978 - 1848878457
- ✳ పేజీలు : 336
- ✳ ధర : Rs. 300 (Paperback)
- ✳ భాష : English

పుస్తక పరిచయం :

గణితశాస్త్రాన్ని ఎప్పుడైనా విపరీతంగా ఆస్వాదించిన అనుభవం మీకు ఉందా? లేదా, గణితం కేవలం సంక్లిష్ట సమీకరణాలు, సిద్ధాంతాలతో నిండిన గజిబిజి అంశమని అనుకుంటున్నారా? The Joy of X పుస్తకం ఈ రెండూ తప్పని నిరూపించడానికి అద్భుతమైన మార్గదర్శి.

రచయిత Steven H. Strogatz గణితశాస్త్రాన్ని ఒక కథలా అద్భుతంగా వివరిస్తారు. చిన్న సంఖ్యల నుండి అశేషానికి, గణిత ఆవిర్భావం నుండి ఆధునిక కంప్యూటింగ్ వరకూ, ఇందులో గణితశాస్త్రం యొక్క అందం మరియు అనువర్తనాలను సులభంగా అర్థమయ్యే భాషలో వివరించారు.

పుస్తక సారాంశం :

ఈ పుస్తకం గణితశాస్త్రాన్ని కొత్తకోణంలో చూపిస్తుంది. ముఖ్యంగా, పాఠకులలో గణితంపై భయాన్ని తొలగించి, దాన్ని ఒక అందమైన కళగా చూస్తే ఎలా ఉంటుందో వివరిస్తుంది.

ఈ పుస్తకంలోని కొన్ని ముఖ్యమైన అంశాలు :

* **సంఖ్యల మర్మాలు :** చిన్న సంఖ్యల నుండి ప్రారంభించి వాటి ప్రాముఖ్యతను వివరించడం.
* ఆకారాల మరియు మాధ్యమాల వెనుక గణితం : వృత్తాలు, సమాంతర రేఖలు మరియు డిజిటల్ ప్రపంచంలో వాటి ప్రాముఖ్యత.
* ప్రొబబిలిటీ మరియు లాజిక్ : కేవలం గణిత కోణంలో కాకుండా, మన దైనందిన జీవితంలో దీని ప్రాముఖ్యత.
* కల్కులస్ సౌందర్యం : భౌతికశాస్త్రం మరియు ఇంజనీరింగ్‌లో దాని వినియోగం.

ఎందుకు చదవాలి?

* గణితశాస్త్రాన్ని ఒక కథగా ఆసక్తికరంగా చదవాలనుకునే వారికి
* గణితం అంటే భయం అనుకునేవారికి దాన్ని సులభంగా అర్థమయ్యేలా పరిచయం చేయడానికి.
* IIT, JEE ఇతర పోటీ పరీక్షలకు సిద్ధమవుతున్న వారికి, గణితంలోని ఆలోచనాత్మక భావనలను సులభంగా అర్థం చేసుకునేందుకు
* గణితశాస్త్రం ఎలా ప్రపంచాన్ని మార్చిందో అర్థం చేసుకోవాలనుకునే ప్రతి ఒక్కరికీ

ధర & ఎక్కడ కొనాలి ?

ఈ పుస్తకం Amazon, Flipkart మరియు ఇతర ప్రముఖ ఆన్‌లైన్ విక్రయ కేంద్రాల్లో అందుబాటులో ఉంది.

ముగింపు :

"The Joy of X" ఈ పుస్తకం గణితశాస్త్రాన్ని ప్రేమించే ప్రతి ఒక్కరూ తప్పక చదవాల్సిన అద్భుత గ్రంథం. గణితంపై కొత్తగా అవగాహన కలిగించడమే కాకుండా, దానిపై ఆసక్తిని పెంచుతుంది. ఇది మీ గణిత యాత్రను మరింత ఆనందదాయకంగా మారుస్తుంది

దృఢ సంకల్పం, పవిత్ర ఆశయం తప్పక సత్ఫలితాలను ఇస్తాయి. వీటిని ఆయుధాలుగా గ్రహించిన వారు అన్ని విఘ్నాలను ప్రతిఘటించి నిలువలుగుతారు.

- స్వామి వివేకానంద

The Abel Prize: Honoring Excellence in Mathematics

V.Sathwik, II B.tech, IIT Kharagpur

Introduction

The **Abel Prize** is one of the most prestigious awards in mathematics, often regarded as the equivalent of the **Nobel Prize** for the field. Established by the **Norwegian government** in **2001** and first awarded in **2003**, the Abel Prize recognizes outstanding contributions to mathematical sciences. It is awarded annually by the **Norwegian Academy of Science and Letters** based on recommendations from an international **Abel Committee** of prominent mathematicians.

History and Significance

The prize is named after **Niels Henrik Abel (1802–1829)**, a Norwegian mathematician known for his groundbreaking work in algebra and analysis. Abel made significant contributions to the study of **elliptic functions and group theory**, despite his short life. The establishment of the Abel Prize was meant to honor his legacy and recognize mathematicians whose research has had a lasting impact on the field.

Unlike the **Fields Medal**, which is awarded to mathematicians under the age of **40**, the Abel Prize does not have an age limit, making it a lifetime achievement award for mathematicians who have made fundamental advances in the subject. The prize comes with a **monetary award** (approximately **7.5 million Norwegian kroner**, or about **$700,000 USD** in recent years) and is presented by the **King of Norway** at a formal ceremony in Oslo.

Notable Abel Prize Winners

Over the years, the Abel Prize has been awarded to some of the greatest mathematical minds. Some notable laureates include:

- **Jean-Pierre Serre (2003)** – Recognized for his work in topology, algebra, and number theory.
- **John G. Thompson & Jacques Tits (2008)** – Awarded for their profound contributions to group theory.
- **Andrew Wiles (2016)** – Honored for proving **Fermat's Last Theorem**, one of the most famous problems in mathematics.
- **Karen Uhlenbeck (2019)** – The first woman to win the Abel Prize, recognized for her contributions to geometric analysis.
- **Masaki Kashiwara (2025)** – Recognized for his foundational work in **algebraic analysis** and **representation theory**.

Recent Developments and Impact

The **Abel Prize** has played a crucial role in highlighting the significance of mathematics in modern science and technology. Many Abel Prize laureates have made contributions that extend beyond pure mathematics into fields such as **physics, computer science, economics, and engineering**. The recognition helps inspire younger generations to pursue mathematical research and appreciate its real-world applications.

Conclusion

The Abel Prize remains a symbol of excellence in mathematics, celebrating individuals who have dedicated their lives to advancing human knowledge. By recognizing their contributions, the prize not only honors their achievements but also reinforces the importance of mathematics in shaping the future. As mathematics continues to evolve, the Abel Prize will continue to highlight and reward the pioneers who push the boundaries of what is possible.

శూన్యం (Zero)యొక్క చరిత్ర

M. Yashwanth, II B.Tech,
IIT Hyderabad

గణితంలో "శూన్యం" (Zero) ఒక విశేషమైన సంశోధన. ప్రాచీన భారతీయులు శూన్యాన్ని కనుగొని, గణితశాస్త్రానికి అద్భుతమైన మార్గదర్శకత్వం అందించారు. శూన్యం వాడుక ఆధ్యాత్మిక, తత్వశాస్త్ర పరమైన భావనల నుండి ఆవిర్భవించి, గణితపరమైన విలువను పొందింది.

శూన్యానికి మూలాలు :

శూన్యానికి ఆధారాలు 5వ శతాబ్దంలో భారతీయ గణిత శాస్త్రవేత్త "ఆర్యభట" రచనల్లో కనిపిస్తాయి. అనంతరం బ్రహ్మగుప్త (7వ శతాబ్దం) తన బ్రహ్మస్పుట సిద్ధాంతం గ్రంథంలో శూన్యానికి నిశ్చితమైన నియమాలను ప్రవేశపెట్టాడు. ఆయన శూన్యంపై చేసిన స్పష్టీకరణలు, తదనంతరం గణితాన్ని విప్లవాత్మకంగా మార్చాయి.

ప్రపంచానికి భారతదేశపు కానుక :

శూన్యాన్ని ప్రపంచానికి పరిచయం చేసిన గొప్ప కీర్తి భారతదేశానికి చెందుతుంది. అరబ్బీ గణితశాస్త్రవేత్తలు భారతీయ సంఖ్యాపద్ధతిని స్వీకరించి, దానిని యూరప్‌కు పరిచయం చేశారు. దీంతో 13వ శతాబ్దంలో ఫిబొనాక్సి లెక్కలలో శూన్యం ఉపయోగించబడింది.

శూన్యం లేకుండా గణితం ?

ఈ నేటి గణిత గణనలు, కంప్యూటర్ సాంకేతికత, భౌతికశాస్త్రం మొదలైనవన్నీ శూన్యం లేకుండా అసంభవం. శూన్యాన్ని కనుగొనడం గణిత చరిత్రలో గొప్ప మైలురాయి.

ముగింపు :

శూన్యం కేవలం ఓ సంఖ్య మాత్రమే కాదు; ఇది తత్వశాస్త్రం నుండి గణితానికి వచ్చిన ఒక అద్భుత ప్రగతి. భారతీయుల సృజనాత్మకత ప్రపంచానికి అందించిన గొప్ప బహుమతి.

INTERESTING APPLICATIONS OF PYTHAGORAS' THEOREM

Y.Nehanth, Class 11, Vijayawada

Pythagoras' theorem is one of the most fundamental theorems in mathematics, stating that in a **right-angled triangle**, the square of the **hypotenuse** is equal to the sum of the squares of the other two sides. Mathematically, it is given by:

$$C^2 = a^2 + b^2$$

where **c** is the hypotenuse, **a** and **b** are the two perpendicular sides of the triangle.

Although this theorem is primarily used in geometry, it has a wide range of real-world applications across various fields such as physics, engineering, architecture, navigation, and even computer graphics. Below are some interesting applications of Pythagoras' theorem.

1. Engineering and Architecture

Application:

Engineers and architects frequently use Pythagoras' theorem to ensure the stability and accuracy of structures. It helps in designing buildings, bridges, and ramps by determining the correct slope and angles.

Example:

A wheelchair ramp needs to be constructed outside a hospital entrance. If the vertical height of the entrance is **3 meters** and the ramp must extend **4 meters** horizontally, the length of the ramp can be calculated using Pythagoras' theorem:

$C^2 = 3^2 + 4^2 = 9 + 16 = 25$ implies $C = 25^{1/2} = 5$ meters

Thus, the ramp should be **5 meters long** to maintain a safe and comfortable incline.

2. Navigation and GPS Systems

Application:

Pythagoras' theorem is widely used in **navigation** to calculate the shortest distance between two points, especially in aviation and maritime travel.

Example:

A pilot needs to fly from **City A** to **City B**, which are **300 km east** and **400 km north** from each other. The direct flight path (hypotenuse) can be calculated as:

$$c^2 = 300^2 + 400^2 = 90000 + 160000 = 250000$$

$$c = \sqrt{250000} = 500 \text{ km}$$

Thus, the shortest route for the plane is **500 km**, following a straight-line path.

3. Computer Graphics and Game Development

Application:

In computer graphics and game development, Pythagoras' theorem helps in calculating distances between objects in a 2D or 3D space. This is essential for **collision detection**, **animation**, and **rendering realistic movements** in video games.

Example:

In a **2D shooting game**, a player's position is at (2,3), and an enemy is at (7,9). The distance between them is calculated as:

$$C^2 = (7-2)^2 + (9-3)^2 = 5^2 + 6^2 = 25 + 36 = 61$$

$$C = \sqrt{61} = 7.81 \text{ units}$$

The game engine uses this distance to determine if the player is within attack range.

4. Astronomy and Space Exploration

Application:

Astronomers use Pythagoras' theorem to calculate distances between celestial bodies when measuring distances indirectly using triangulation.

Example:

To determine the distance to a satellite orbiting Earth, scientists measure two known distances and use Pythagoras' theorem to find the third unknown side.

5. Medicine and Imaging Technologies

Application:

In **CT scans, MRIs, and X-rays**, medical imaging systems use Pythagoras' theorem to reconstruct cross-sectional images of the human body.

Example:

A radiologist uses a **CT scan** to calculate the depth of an internal organ based on two known points. This helps in diagnosing diseases and planning surgeries with high precision.

Conclusion

Pythagoras' theorem is more than just a mathematical formula; it is a powerful tool that finds applications in **engineering, physics, astronomy, computer science, and medicine**. Its ability to calculate distances and relationships between points makes it essential in solving real-world problems, making it one of the most useful theorems in mathematics.

When you pray for peace,
peace is greater than God to you;
When you pray for knowledge,
knowledge is greater than God to you
- Sri Sri Ravi Sankar

FAMOUS BOOKS THAT INSPIRED MATHEMATICIAN RAMANUJAN

P.Ruthwika, 12th class, Khammam

Srinivasa Ramanujan, the self-taught mathematical genius from India, drew inspiration from a select few mathematical texts that profoundly influenced his development. Among these, two books stand out for their significant impact.

1. A Synopsis of Elementary Results in Pure and Applied Mathematics by G. S. Carr

At the age of 16, Ramanujan encountered this compendium, often referred to simply as "Carr's Synopsis." Authored by George Shoobridge Carr in 1886, the book aimed to summarize the state of basic mathematics known at the time. It contained a collection of approximately 5,000 theorems presented with minimal proofs. Originally designed to assist students preparing for the Cambridge Mathematical Tripos examination, the book provided concise statements of results across various mathematical topics. Ramanujan immersed himself in this work, meticulously studying each theorem and attempting to derive proofs independently. This rigorous engagement not only deepened his understanding but also sparked his creativity, leading him to develop original ideas and theorems. Carr's Synopsis thus played a crucial role in awakening and nurturing Ramanujan's mathematical genius.

2. Advanced Trigonometry by S. L. Loney

Prior to encountering Carr's work, Ramanujan delved into "Advanced Trigonometry" by Sidney Luxton Loney. This book offered a comprehensive treatment of trigonometric functions, identities, and applications. By the age of 12, Ramanujan had mastered its content, demonstrating an exceptional grasp of complex trigonometric concepts. His early exposure to Loney's work laid a solid foundation in trigonometry, which later influenced his explorations in mathematical analysis and number theory.

These texts were more than mere academic resources for Ramanujan; they were catalysts that ignited his passion and guided his self-education in mathematics. Lacking formal training and access to contemporary mathematical research, Ramanujan relied heavily on these books to build his knowledge base. His approach was not limited to passive learning; he actively engaged with the material, often extending the ideas presented and venturing into uncharted territories of mathematics.

The influence of these works is evident in Ramanujan's own publications and notebooks, where he recorded numerous original results, many without proofs, mirroring the style of Carr's Synopsis. His profound insights and novel discoveries eventually garnered the attention of prominent mathematicians, leading to his collaboration with G. H. Hardy at Cambridge University. Hardy recognized the depth of Ramanujan's findings, many of which were groundbreaking and ahead of their time.

In summary, the mathematical texts by G. S. Carr and S. L. Loney were instrumental in shaping Srinivasa Ramanujan's journey. They provided the foundational knowledge and inspiration that propelled him to become one of the most remarkable mathematicians in history. His story underscores the profound impact that well-crafted educational resources can have on nurturing innate talent and curiosity.

ON THE RESEARCH ABOUT LARGEST PRIME NUMBER

J.Nageswara Rao, Lecturer, Vijayawada

The quest to discover ever-larger prime numbers has long captivated mathematicians and enthusiasts alike. Prime numbers—integers greater than 1 that have no divisors other than 1 and themselves—are fundamental to number theory and have significant applications in fields such as cryptography. As of October 2024, the largest known prime number is 2^136,279,841 – 1, a Mersenne prime with an astounding 41,024,320 digits.

Understanding Mersenne Primes

Mersenne primes are a special class of prime numbers that can be expressed in the form 2^p – 1, where p is also a prime number. They are named after the French monk Marin Mersenne, who extensively studied these numbers in the early 17th century. The allure of Mersenne primes lies in their unique properties and the relative efficiency of testing their primality compared to other large numbers. Historically, many of the largest known primes have been Mersenne primes.

Discovery of the Current Largest Prime

The current record-holding prime, 2^136,279,841 – 1, was discovered on October 12, 2024, by Luke Durant, a 36-year-old researcher and former NVIDIA employee based in San Jose, California. Durant's achievement was part of the Great Internet Mersenne Prime Search (GIMPS), a collaborative project that leverages the computing power of volunteers worldwide to search for large prime numbers. This particular prime, known as M136279841, surpasses the previous record-holder by over 16 million digits.

Computational Effort and Innovation

Durant's approach to discovering this massive prime was notable for its use of Graphics Processing Units (GPUs) rather than traditional Central Processing Units (CPUs). GPUs, typically employed for rendering graphics and parallel processing tasks, offer significant advantages in handling the intensive computations required for prime searching. Durant orchestrated a network of thousands of GPUs across 24 data centers in 17 countries, effectively creating a cloud-based supercomputer dedicated to this task. This marked the first time a Mersenne prime was discovered using GPUs, highlighting a shift in computational strategies within the prime-searching community.

Verification and Recognition

Upon the initial discovery, rigorous verification processes were undertaken to confirm the primality of

2^136,279,841 – 1. Multiple independent tests using different hardware and software configurations corroborated the finding, ensuring its validity. The GIMPS project officially announced the discovery on October 21, 2024, recognizing Durant's contribution and awarding him a $3,000 research discovery prize, which he generously donated to the Alabama School of Math and Science's mathematics department.

Significance and Future Prospects

While large prime numbers like M136279841 currently have limited direct applications, their discovery is a testament to human curiosity and the pursuit of mathematical knowledge. The methods and technologies developed in the search for large primes often have broader implications, particularly in computational mathematics and cryptography. The collaborative nature of projects like GIMPS exemplifies the power of distributed computing and collective effort in tackling complex problems. As computational capabilities continue to advance, the search for even larger primes will persist, pushing the boundaries of mathematics and computer science.

In summary, the discovery of the largest known prime number, 2^136,279,841 – 1, represents a significant milestone in mathematical research. It underscores the evolving landscape of computational methods and the enduring fascination with prime numbers that has spanned centuries.

GH Hardy's Role in moulding Ramanujan's Mathematical Career

Ch.Raghu Kumar, Lecturer, Hyderabad

G.H. Hardy played a pivotal role in shaping the mathematical career of Srinivasa Ramanujan. A renowned British mathematician, Godfrey Harold Hardy was instrumental not only in recognizing Ramanujan's genius but also in bringing him to the international stage and guiding his work through the formal frameworks of modern mathematics.

In 1913, Hardy received a letter from Ramanujan, then a largely unknown clerk in Madras (now Chennai), filled with mathematical theorems, identities, and equations—many of which were unfamiliar and astonishing even to Hardy. Despite the unorthodox presentation and lack of formal proofs, Hardy recognized the profound originality and depth in Ramanujan's work. Along with his colleague J.E. Littlewood, Hardy began examining the results and quickly concluded that Ramanujan was a mathematician of extraordinary brilliance.

Hardy arranged for Ramanujan to travel to England and join him at the University of Cambridge in 1914. This marked the beginning of a unique and deeply impactful collaboration. Hardy's role in Ramanujan's life extended beyond logistics; he provided rigorous training in formal mathematical proofs, helped Ramanujan publish his work in prestigious journals, and introduced him to the broader mathematical community in Europe.

Under Hardy's mentorship, Ramanujan flourished. The collaboration led to important contributions in number theory, infinite series, continued fractions, and modular forms. Ramanujan's work on partition functions and mock theta functions are still foundational today. Hardy also ensured that Ramanujan was elected a Fellow of the Royal Society and a Fellow of Trinity College, rare honors for someone of Ramanujan's background.

Hardy himself later described his collaboration with Ramanujan as the most important event of his life. In his essay *A Mathematician's Apology*, Hardy wrote of Ramanujan: "The limitations of his knowledge were as startling as its profundity. Here was a man who could work out modular equations and theorems... but who had never heard of a doubly periodic function." This quote encapsulates the contrast between Ramanujan's raw intuitive brilliance and the structured formalism Hardy represented.

Hardy was also sensitive to Ramanujan's cultural background and health. Ramanujan, being a strict vegetarian and unaccustomed to the British climate, suffered physically and emotionally during his stay in England. Hardy tried to ease his discomfort and shield him from the prejudices of the time. Unfortunately, Ramanujan's health deteriorated, and he returned to India in 1919, passing away a year later in 1920 at the young age of 32.

In essence, Hardy was not just a mentor or collaborator—he was a bridge between Ramanujan's intuitive genius and the formal mathematical world. Without Hardy's support, Ramanujan's work might never have reached the global stage. The Hardy-Ramanujan partnership stands as one of the most inspiring in the history of mathematics, a testament to how mentorship, mutual respect, and recognition of talent can change the course of scientific history.

Silence is totality of mind.
In it the 'other' disappears.
Be qiet for a while.

Sri Sri Ravi Sankar

Some Problems from MSET- 2023

CLASS - V

1. Eratosthenes belongs to

1) Italy 2) India 3) Greek 4) Germany

2. In finding prime factorisation of 105 through division method, value of P,Q,R (in the same order)

P	105
5	35
7	Q
	R

1) 3,7,1
2) 1,3,7
3) 1,7,3
4) 7,3,1

3. Jagan purchased a car for Rs.3,56,250 and sold it with a profit of Rs.25,000/- to Ravi. After one year Ravi sold it with a loss of Rs.13,000/- to Krishna. Krishna purchased the car for Rs..................

1) 4,94,250 2) 3,68,250 3) 3,44,250 4) 3,94,250

4. 110110110 is divisible by

1) 2 2) 3 3) 5 4) All the three

5. Length and breadth of a rectangle are 55cms, 25cms. The perimeter of this rectangle is equal to perimeter of a square. Then side of the square is ....cm

1) 40 2) 45 3) 35 4) 50

6. Chandana counted 32 wheels of some buses and cars. If bus have 6 wheels and car have 4 wheels, number of buses and cars he counted (in the same order)

1) 4, 2 2) 2, 5 3) 1 and 2 4) None of them

7. Read the two statements. Note the truth statement
A) Product of any two primes is a prime
B) Sum of any two primes is a prime

1) A 2) B 3) Both A and B 4) Neither A nor B

8. **L.C.M of two numbers is 48: H.C.F =8 and one number is 16, the other number is**

1) 6 2) 3 3) 32 4) 24

9. **A worker earned Rs.16275 in the month of July by working all the days. The amount he earn in the month of Febeuary (if it is a leap year) at the same rate : Rs.______**

1) 15225 2) 14700 3) 15750 4) 15550

10. **9Q57 - P94S = 59R8 Values of P,Q,R,S in the same order**

1) 8,9,0,3 2) 9,0,3,8 3) 3,8,9,0 4) 3,8,0,9

11. **The difference between the greatest and smallest five digit numbers formed by 1, 5, 7 if repeating is allowed.**

1) 66558 2) 64554 3) 66594 4) 66394

12. **When all the primes below 100 are multiplied, the digit in units place of the product is ....**

1) 1 2) 4 3) 6 4) 0

13. **Seventh set of coprimes from the begining:**

1) 71, 73 2) 59, 61 3) 41, 43 4) 51, 53

14. **When 15 $\times$ 17 + 7 is divided by 6, remainder is**

1) 0 2) 1 3) 4 4) 2

15. **Next number in the series 1,3,6,11,18,.....**

1) 29 2) 27 3) 24 4) 30

CLASS - VI

1. **The largest perfect negative integer is ....**

1) -10 2) -1 3) -9 4) 0

2. **If $\frac{1}{2}+\frac{1}{x}=2$ then x = ...**

1) 2 / 5 2) 5 / 2 3) 3 / 2 4) 2 / 3

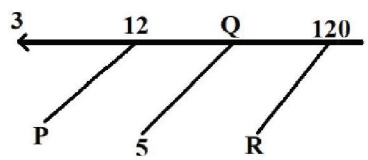
3. **Next number in the series 0, 6, 24, 60, 120, ...is**

1) 240 2) 180 3) 210 4) 310

4. **In a code language CAT $\rightarrow$24 , BOX $\rightarrow$ 41 then ZIP $\rightarrow$**

1) 49 2) 53 3) 47 4) 51

5. **In the factor tree (Shown in the figure) values of P, Q, R in the same order**



1) 2,4,60
2) 4,2,60
3) 4,60,2
4) 60,2,4

6. **The truth statement in the following.**

A) All primes are odd

B) All composite numbers are even

1) A 2) B

3) Neither A nor B 4) A and B

7. **A, B, C, D are four places on one road in the same order. Distance AC = 6 Kms, BD = 9 Kms and BC = $\frac{1}{4}$ AD. Distance BC = ...Km**

1) 2 2) 3 3) 4 4) 1

8. **Next two numbers in the series 1,2,6,15,31, ... , ...**

1) 45,62 2) 55,91 3) 56, 92 4) 45, 56

9. **The smallest number having four different prime factors.**

1) 100 2) 190 3) 205 4) 210

10. **The largest number that will divide 381, 436 and 542 leaving remainders 7, 11, 15 respectively.**

1) 34 2) 51 3) 17 4) 6

11. **The product of any natural number and the smallest prime is ....number**

1) an even 2) an odd 3) a prime 4) None

12. **Which of the following pairs of integers have 9 as a difference**

1) 19, 10 2) -19, -10 3) 19, -10 4) 1 and 2

13. **The teacher taught 3 / 5 of the book. Vivek revised 1 / 5 more on his own. How much does he still have to revise.**

1) 2 / 5 2) 4 / 5 3) 1 / 5 4) 2 / 3

14. **Perimeter of a square and rectangle are equal. Side of the square is 6 cm. Then number of possible measurements of rectangle satisfying the given condition:**

1) 5 2) 4 3) 6 4) 3

15. **In the given number 97404531, the digits which have same place value and face value**

1) 0, 1 2) 0, 5 3) 2, 3 4) 2, 1

CLASS - VII

1. **If x = 7, y = -3 and z = 4 then the value of $3x + 5y + 2z^2$ *is* ___________**

1) 36' 2) 35 3) 38 4) 30

2. **If an angle is 5 times its compliment, Then its measure is______**

1) 30° 2) 15° 3) 75° 4) 90°

3. **Range of data 18,32,40,80,5,-40 is _____**

1) 80 2) 40 3) 50 4) 120

4. **Mean of biggest 3 digit number and smallest 3 digit number is______**

1) 549.5 2) 559.5 3) 549 4) 5000

5. **The median of 6, 11, 13, 8, 10, 9, 20, 18 is _______**

1) 10 2) 10.8 3) 10.5 4) 9.5

6. **If $\frac{X}{3}+\frac{X}{9}$ = 4 then x=_______**

1) 9 2) 10 3) 3 4) 6

7. **No. of minutes for $2\frac{3}{4}$ hours =_________minutes**

1) 105 2) 165 3) 150 4) 100

8. **If 2A=3B=4C then C:B:A =_________**

1) 3:4:6 2) 4:3:6 3) 6:3:4 4) None

9. **Pythogoras belongs to _______ century.**

1) 4th 2) 5th 3) 6th 4) 2nd

10. **Set up equation for the following ....one tenth of double the number minus $\frac{1}{2}$ gives 32 is______**

1) $\frac{2X}{10}-\frac{1}{5}=32$ 2) $\frac{X}{10}-\frac{1}{5}=32$

3) $\frac{2X}{5}-\frac{1}{5}=32$ 4) None

11. **"Between any two rational numbers there is an infinite set of rational numbers". This property is called _______ property**

1) Closure 2) Associative

3) Density 4) Commulative

12. **Next num ber in the squence 1, 2, 6, 15, 31, 56........**

1) 92 2) 82 3) 72 4) 70

13. **If 'CASE' is coded as '5231', 'CHAIR' is coded as '58206' and 'TEACH' is coded as '71258', What does '586037' stand for______**

1) CHRIST 2) STREET

3) CHEESE 4) CHASTE

14. **If A + A + A = BA then what is A?**

1) 3 2) 5 3) 2 4) 7

15. **What is the another name for cuboid ?**

1) Rectangle 2) Cube

3) Rectangular parallelepiped 4) QJFHS

CLASS - VIII

1. How many sides does a regular polygon have if each of its interior angles is 165 ?

1) 12 2) 24 3) 36 4) 18

2. HCF of $\frac{9}{10},\frac{12}{25},\frac{18}{35},\frac{21}{40}$ is ________

1) $\frac{3}{5}$ 2) $\frac{252}{5}$ 3) $\frac{63}{700}$ 4) $\frac{3}{1400}$

3. When a die is thrown, The probability of an event of getting a prime number greater than 2 is _____

1) $\frac{1}{2}$ 2) $\frac{4}{6}$ 3) $\frac{1}{3}$ 4) 2

4. How many non-square numbers lie between two squares$(2023)^2$ and $(2024)^2$

1) 2023 2) 2024 3) 4046 4) 4048

5. We can express the square of any odd number as the sum of two consecutive ______ integers

1) positive 2) prime 3) odd 4) even

6. General form of the pythogoren triplet is _______

1) 2m, m+1, m-1 2) $2m^2$, $m^2 + 1$, $m^2 – 1$

3) m^2 , $m^2 + 1$, $m^2 –1$ 4) 2m, $m^2 – 1$, $m^2 + 1$

7. The smallest square number which is divisible by each of numbers 6,9,15 is ....

1) 90 2) 900 3) 180 4) 450

8. What is the least number that can be multiplied to 69120 to make it a perfect cube?

1) 2 2) 3 3) 25 4) 5

9. $\sqrt[3]{4913}+\sqrt[3]{12167}-\sqrt[3]{32768}=$ __________

1) 2 2) 8 3) 16 4) 38

10. The ratio of the number of boys to the number of girls in a school of 640 students is 5 : 3. If 30 more girls admitted, then how many more boys should be admitted so that the ratio of boys : girls becomes 14 : 9.

1) 30 2) 25 3) 15 4) 20

11. A cell was bought at a price of 20,000 rupees. Every year the value of the cell was depreciated by 20%. The value of cell after 4 years Rs________.

1) 8192 2) 12,000 3) 12,800 4) 8000

12. The difference between 31% of a number and 13% of the same number is 576. what is 17%of that number.

1) 544 2) 546 3) 540 4) 530

13. The digits from 1 to 8 which does not appear in the decimal fraction of $\frac{22}{7}$ **are.....**

1) 3,6 2) 7,3 3) 3,5 4) 8,6

14. How much $66\frac{2}{3}\%$ **of 312 rupees exceeds 200 rupees?**

1) 96 2) 4 3) 8 4) 104

15. $\sqrt{729}+\sqrt{72.9}+\sqrt{7.29}=$ _________

1) 40.5 2) 45.6 3) 33.5 4) 38.23

CLASS - IX

1. **Number of real numbers between $\sqrt{2}$ *and* $\sqrt{5}$ will be..**

1) 1 2) 2 3) 0 4) Infinite

2. **Number of straight lines that can be made pass through (0,0) and (2023,2024)is**

1) 2023 2) 2024 3) 0 4) 1

3. **Which of the following is a perfect square (a,b,c > 0)**

1) $a^2b^3c^2$ 2) a^6b^4c

3) $(abc)^3(abc)^{56}$ 4) $\sqrt{abc}\,(abc)^{\frac{3}{2}}$

4. **Father of Geometry is ....**

1) Pythagorous 2) Euclid

3) Newton 4) Descartes

5. **No of integer pairs (x,y) satisfying the equation x+y+xy = 0 will be**

1) 0 2) 2 3) 5 4) Infinite

6. **Number of 5 digit numbers which are multiples of 13 is ......**

1) 7692 2) 9691 3) 6923 4) 7876

7. **Which of the following is equal to x^3 ?**

1)4090 2)-5050 3)-8000 4)5010

8. **Sum of the first 200 odd natural numbers is ....**

1) 4×10^4 2) 2×10^5 3) 8×10^3 4) 5×10^6

9. **The value of $\sqrt{10+\sqrt{25+\sqrt{108+\sqrt{154+\sqrt{225}}}}}$ is :**

1) 5 2) 2 3) 3 4) 4

10. **Number of volumes in the book " The Elements" written by Euclid....**

1) 23 2) 13 3) 14 4) 24

11. **In a code language SHIP - SEA = 27 ; BOX – TAB = 18 then BUS – CAR = ...**

1) 16 2) 24 3) 18 4) 20

12. **The Ratio in which the point (1,3) divide the line segment joining the points (–1,7) and (4,–3) is .....**

1) 2 : 5 2) 2 : 3 3) 3 : 5 4) 4 : 3

13. **A rectangle of dimensions l, b (l>b) satisfying $x^2 - 7x + 12 = 0$ is inscribed in a circle of area ________**

1) 6.25π 2) 3.75π 3) 1.25π 4) 5π

14. $\left(7+4\sqrt{3}\right)^2\left(3+2\sqrt{2}\right)^2\left(7-4\sqrt{3}\right)^2\left(3-2\sqrt{2}\right)^2 = ...$

1) 0 2) 1

3) $\left(26-24\sqrt{6}\right)$ 4) $10-6\sqrt{6}$

15. **The coordinates of a point A, Where AB is the diameter of the circle whose center is (2, –3) & B is (1, 4).**

1) (3, 5) 2) (3, -10)

3) (5, 10) 4) (–3, –10)

CLASS - X

1. The graph of y = 4x is a line

1) parallel to x - axis 2) parallel to y - axis

3) perpendicular to y-axis 4) passing through origin

2. The probability that a leap year has 52 sundays ?

1) $\frac{3}{7}$ 2) $\frac{8}{7}$ 3) $\frac{5}{7}$ 4) None

3. If $x^2 = 1 - y^2$, then average of y^2 , x^2 , $x^2 (3 - 4x^2)^2$, $y^2 (4y^2 - 3)^2$ is ____

1) 0.8 2) 25 3) 0 4) 0.5

4. Two sides of a triangle are 3 and 5 and third side is also an integer. Number of such triangles will be____

1) 2 2) 5 3) 11 4) 0

5. The length of the rectangle is less than twice its breadth by 1cm. The length of its diagonal is 17cm. Its length and breadth are ____,____.

1) 15cm, 8cm 2) 13cm, 4cm

3) 10cm, 6cm 4) 8cm, 9cm

6. If A = {1,3,4} and B = {x/x$\in$R and $x^2 - 7x + 12 = 0$} then which of the following is true

1) A = B 2) $A \subset B$

3) $B \subset A$ 4) A is equivalent to B

7. The point which lies on the perpendicular bisector of the line segment joining the points A(2,5) and B(-2,-5) is :

1) (0,0) 2) (0,2) 3) (-2,0) 4) (2,0)

8. **Who is famously known as Father of Statistics ?**

1) R.A .FISHER 2) P.C.ROY 3) C.R.RAO 4) B.V.RAO

9. **From first 500 natural numbers all multiples of 5 and all multiples of 6 are removed. The number of remaining numbers is__**

1) 278 2) 167 3) 333 4) 222

10. **Number of Circles touching all the 3 sides of the triangle formed by x=2 , y=3 and x + y = 10 is ___**

1) 1 2) 2 3) 4 4) 0

11. **Natural numbers are divided in to groups as follows. {1}, {2,3}, {4,5,6}, {7,8,9,10} .etc.,Then first number in 101th group will be _____**

1) 7875 2) 5661 3) 5051 4)3750

12. **A triangle has vertices (0,0) , (4,0) and (0,3). Then length of its longest median is _______**

1) $\frac{\sqrt{73}}{2}$ 2) $\sqrt{13}$ 3) $\sqrt{5}$ 4) $\sqrt{103}$

13. **Which of the following is a non leap year?**

1) 2022 2) 2024 3) 2076 4) 2032

14. **The father age is six times his son's age. After Four years the age of the father will be four times his son's age. The present ages of the son and father are respectively**

1) 4 & 24 2) 5 & 30 3) 6 & 36 4) 3 & 24

15. **In a college 20 professors teach mathematics or physics. If 12 teach maths and 4 teach both physics and maths, how many teach only physics**

1) 10 2) 8 3) 12 4) 15