The mentors Digest

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The mentors Digest

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

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From the Editor's Desk.....

Dear Students & future leaders,

The state festival of Kerala (India), Onam, is celebrated with zeal. All through the ten days of the festival, the air is filled with excitement, while people are busy in welcoming their King Mahabali. Feasting, laying Pookkalam (floral carpet) on floor, singing songs and shopping are the highlights of the festival. Malayalees from the nook and corner of the country as well as abroad make it a point to visit their loved ones back home in Kerala, during the festive season

May all the students are blessed with the power to achieve all the goals in life. Wishing a very Happy Onam to all the students." "May the festival of Onam bring along lots of joy for you and bless you with a life full of happiness. Happy Onam to the students."

WHAT IS SPECIAL ABOUT THE MONTH OF SEPTEMBER ?

September 5 , Teacher's Day is a special occasion dedicated to honoring the contributions of educators in shaping the future of the nation. This day marks the birthday of Dr. Sarvepalli Radhakrishnan, a philosopher, scholar, and India's second President, who was also a great advocate for education.

On this day, students across the country express their gratitude and appreciation to their teachers for their guidance, wisdom, and relentless efforts in imparting knowledge. Schools and colleges often organize various events, performances, and ceremonies to showcase their respect and admiration for their teachers. It's a time to reflect on the importance of education and the profound impact teachers have on the lives of their students.

As we celebrate Teacher's Day, let's remember and acknowledge the invaluable role teachers play in shaping minds, nurturing talents, and building a brighter future for our society.

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CHANDRAYAAN-3

THE LANDING

India had made history as its Moon mission, Chandrayaan-3, became the first to land in the lunar south pole region. With this, India joined an elite club of countries to achieve a soft landing on the Moon, after the US, the former Soviet Union and China. The Vikram lander had successfully touched down as planned at 18:04 local time (12:34 GMT) on August 23,2023. Celebrations had broken out across the country, with Prime Minister Narendra Modi saying “India is now on the Moon”. One of the mission’s major goals was to hunt for water-based ice which could support human habitation on the Moon in future. The lander and the rover were carrying five scientific instruments which would help discover the physical characteristics of the surface of the Moon. Chandrayaan-3 worked to build on the success of the earlier Moon missions and ISRO officials said it would help make some “very substantial” scientific discovery. It came 15 years after Chandrayaan-1, which discovered the presence of water molecules on the lunar surface and established that the Moon had an atmosphere during daytime. Despite failing the soft landing, Chandrayaan-2 was not a complete write-off - its orbiter continued to circle the Moon even then and helped the Vikram lander send images and data to Earth for analysis. India was not the only country with an eye on the Moon - there was a growing global interest in it, with many other missions headed to the lunar surface in the near future.

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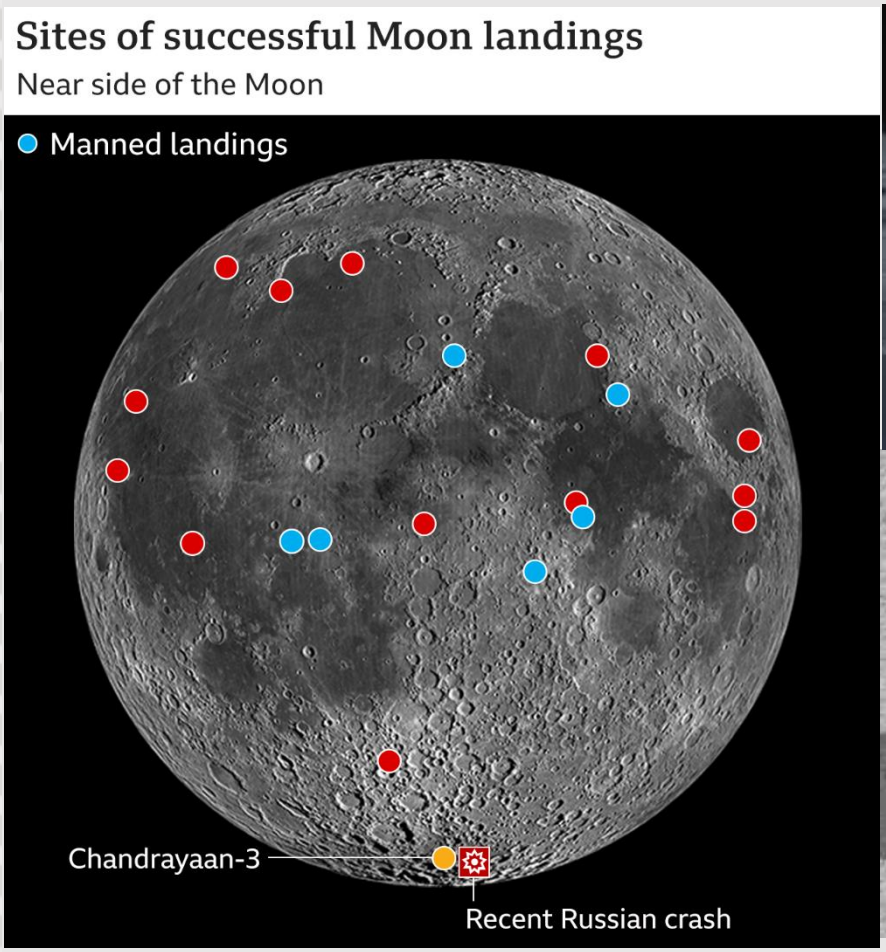
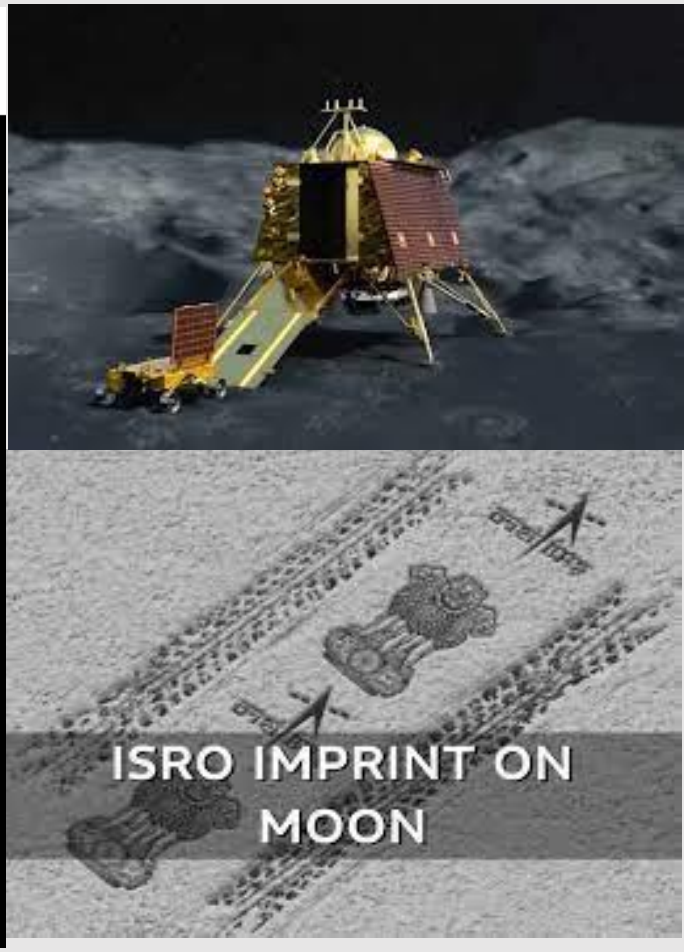
CHANDRAYAAN-3





WHATS NEXT?

The 26kg rover called Pragyaan (the Sanskrit word for wisdom) was carried to the Moon in the Vikram lander's belly. After the dust raised by last evening's landing had settled, panels on one side of Vikram opened to deploy a ramp to enable Pragyaan to slide down to the lunar surface. Pragyaan is carrying two scientific instruments which will try to find out what minerals are present on the lunar surface and study the chemical composition of the soil. The Indian Space Research Organization (ISRO) has said that the rover will move at a speed of 1cm per second. The lander is also carrying several scientific instruments which will help find out what goes on the Moon's surface and above and below it. One of the major goals of Chandrayaan-3 is to hunt for water - scientists say the huge craters in the south pole region which are permanently in shadow hold ice which could support human habitation on the Moon in future.

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PRAGGNANANDHAA: INDIA CHESS PRODIGY'S 'REMARKABLE' IMPACT ON THE SPORT

R Praggnanandhaa, an Indian chess prodigy, recently concluded his remarkable journey in the FIDE World Cup 2023, emerging as the runner-up after a tie-breaker against Magnus Carlsen. His achievements have been hailed as transformative for Indian chess, reflecting a generational shift in the country's chess landscape. India's burgeoning chess prowess extends beyond Praggnanandhaa, with 21 Indian players among the top 100 junior players worldwide. This shift owes much to increased access to chess through smartphones and affordable internet, enabling youngsters to refine their skills via apps and online tournaments. Furthermore, basic chess coaching has become more accessible, a stark contrast to the limited opportunities available only a couple of decades ago. Praggnanandhaa's journey exemplifies the changing landscape of Indian chess, underpinned by accessible training and unrelenting determination. His achievements signal a brighter future for India's chess legacy. With his inspirational journey, India's influence in the chess world is set to soar.

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Mathematics

AFTER 65 YEARS, SUPERCOMPUTERS FINALLY SOLVE THIS UNSOLVABLE MATH PROBLEM

For decades, a math puzzle has stumped the smartest mathematicians in the world. $x^3+y^3+z^3=k$, with k being all the numbers from one to 100, is a Diophantine equation that's sometimes known as "summing of three cubes."

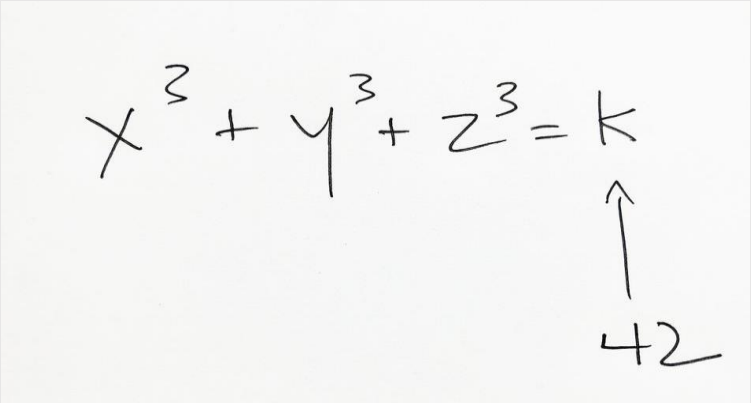
When there are two or more unknowns, as is the case here, only the integers are studied. The trick is finding integers that work for all equations, or the numbers for x, y, and z that will all equal k. Over the years, scientists have solved for nearly every integer between 0 and 100. The last two that remained were 33 and 42.

Earlier this year, Andrew Booker of the University of Bristol spent weeks with a supercomputer to finally arrive at a solution for 33. But 42, which by coincidence is a well-known number in pop culture, proved to be much more difficult.

So Booker turned to MIT math professor Andrew Sutherland, and Sutherland in turn enlisted the help of Charity Engine, which utilizes idle, unused computing power from over 500,000 home PCs to create a crowdsourced and environmentally conscious supercomputer.

The answers took over a million hours to compute. Without further ado, they are:

X = -80538738812075974,
Y = 80435758145817515,
And
Z = 12602123297335631.



Well, *obviously*.

"I feel relieved," Booker says of breaking the 65-year old puzzle first set down at Cambridge in a press statement. "In this game it's impossible to be sure that you'll find something. It's a bit like trying to predict earthquakes, in that we have only rough probabilities to go by. So, we might find what we're looking for with a few months of searching, or it might be that the solution isn't found for another century."

VEDIC MATH TRICK OF THE MONTH

Multiply Any Two-digit Number By 11

Use this Vedic Math trick to complete multiplication in just 2 seconds. So, let's see how you can reduce your calculation using this Vedic Trick.

For Example:

32 x 11

32 * 11 = 3 (3+2) 2 = 352

So, the answer is: 32 * 11 =352

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CHAPTER OF THE MONTH: STRAIGHT LINES

STRAIGHT LINES

$ax + by + c = 0$, is the general equation of a straight line, where a, b, c are real numbers and a or b can be zero, but not both at the same time. Slope of the line $= m = \tan\theta = -a/b$.

Different Forms of Equation of Straight Line

Slope-intercept form : $y = mx + c$, where m is the slope and c is an intercept on y-axis.

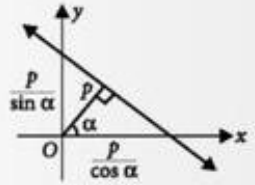
Point-slope form : $\frac{(y-y_1)}{(x-x_1)} = m$, where m is the slope and (x_1, y_1) be given point on the line.

Two point form : $\frac{y-y_1}{x-x_1} = \frac{y_2-y_1}{x_2-x_1}$, where (x_1, y_1) and (x_2, y_2) are two given points on the line.

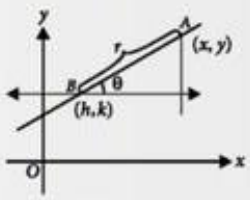
Intercept form : $\frac{x}{a} + \frac{y}{b} = 1$, where a and b represents intercepts on x and y axes respectively by the line.

Determinant form : $\begin{vmatrix} x & y & 1 \\ x_1 & y_1 & 1 \\ x_2 & y_2 & 1 \end{vmatrix} = 0$, where (x_1, y_1) and (x_2, y_2) are any two points on the line.

Perpendicular form (or) Normal form :
$x\cos\alpha + y\sin\alpha = p$



Parametric form : $\frac{x-h}{\cos\theta} = \frac{y-k}{\sin\theta} = r$ where r is the distance between A and B and $x = h + r\cos\theta, y = k + r\sin\theta$



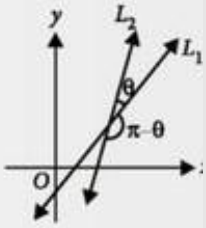
Angle Bisectors

et $a_1x + b_1y + c_1 = 0$, $a_2x + b_2y + c_2 = 0$ be two lines then quation of angle bisectors is given by

$$\frac{a_1x+b_1y+c_1}{\sqrt{a_1^2+b_1^2}} = \pm\frac{a_2x+b_2y+c_2}{\sqrt{a_2^2+b_2^2}}$$

Angle between Two Lines

For $L_1 : a_1x + b_1y + c_1 = 0$ and $L_2 : a_2x + b_2y + c_2 = 0$, acute angle (θ) between two lines L_1 and L_2 is given by $\tan\theta = \left|\frac{m_1-m_2}{1+m_1m_2}\right|$, where m_1 = slope of L_1, m_2 = slope of L_2.



- L_1 and L_2 are perpendicular iff $m_1m_2 = -1$.
- L_1 and L_2 are parallel iff $m_1 = m_2$.

Perpendicular Distance

- Distance of a point (x_1, y_1) from line $ax + by + c = 0$ is given by $\left|\frac{ax_1+by_1+c}{\sqrt{a^2+b^2}}\right|$.
- Distance between two parallel lines $ax + by + c_1 = 0$ and $ax + by + c_2 = 0$ is given by $\left|\frac{c_1-c_2}{\sqrt{a^2+b^2}}\right|$.

Image of a Point and Foot of Perpendicular from a Poin

- The image of (x_1, y_1) in the line $ax + by + c = 0$ is given by (x_2, y_2), if $\frac{x_2-x_1}{a} = \frac{y_2-y_1}{b} = \frac{-2(ax_1+by_1+c)}{a^2+b^2}$.
- If (x_2, y_2) be the foot of the perpendicular from (x_1, y_1) to the line $ax + by + c = 0$, then $\frac{x_2-x_1}{a} = \frac{y_2-y_1}{b} = \frac{-(ax_1+by_1+c)}{a^2+b^2}$.

Family of Lines

Let $L_1 : a_1x + b_1y + c_1 = 0$ and $L_2 : a_2x + b_2y + c_2 = 0$ be two lines, then $L_1 + \lambda L_2 = 0$ or $L_2 + \lambda L_1 = 0$ gives family of lines passing through the point of intersection of L_1 and L_2.

Condition of Concurrency of Three Lines

- If $L_r : a_rx + b_ry + c_r = 0$ (where $r = 1, 2, 3$) then $\begin{vmatrix} a_1 & b_1 & c_1 \\ a_2 & b_2 & c_2 \\ a_3 & b_3 & c_3 \end{vmatrix} = 0$
- $\lambda_1L_1 + \lambda_2L_2 + \lambda_3L_3 = 0$, where $\lambda_1, \lambda_2, \lambda_3 \in R$, not all zeros.

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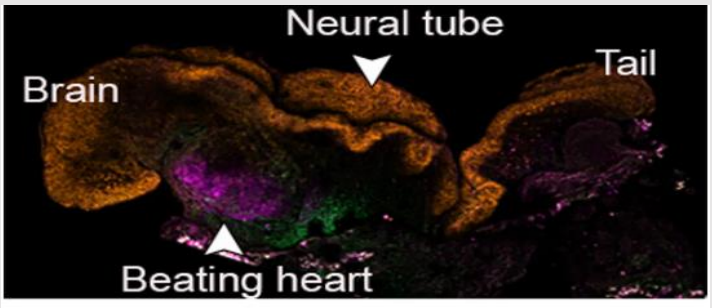
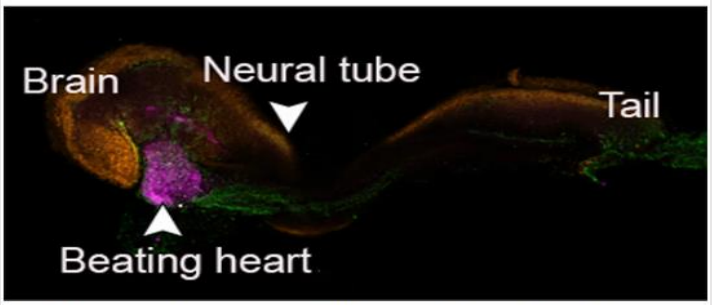
Science & Technology

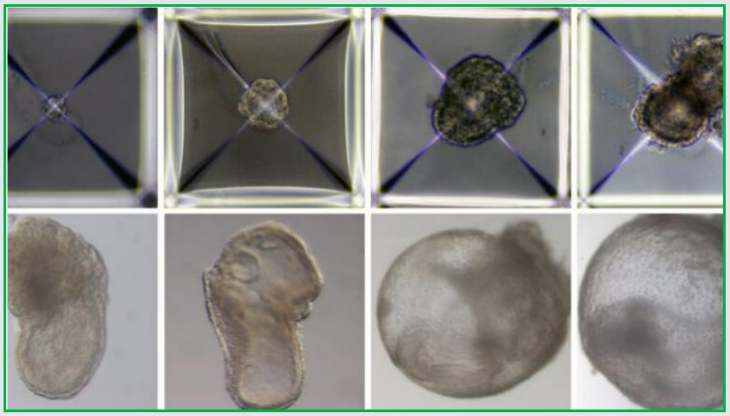
SYNTHETIC MOUSE EMBRYOS CREATED FROM STEM CELLS — WITHOUT SPERM, EGGS, OR A UTERUS

Researchers at the Weizmann Institute of Science cultivated fully synthetic mouse embryos using stem cells, as outlined in a study published in Cell. These embryos underwent a remarkable transformation, starting as translucent spheres and elongating into cylinders by day 3. By day 8, a pulsating heart began circulating blood. These embryos didn't originate from the conventional union of an egg and a sperm, nor did they develop within a female mouse's uterus. Instead, they flourished within a bioreactor, nurtured solely by stem cells. These experiments constitute the first instance of generating entirely synthetic mouse embryos externally.





Developmental structures visible in an 8-day-old synthetic embryo (top) and natural embryo (bottom)



This remarkable advancement not only widens avenues for comprehending how stem cells orchestrate the formation of various organs within the developing embryo but also enhances insights into the mechanisms through which specific mutations trigger diverse developmental disorders. However, these cellular structures of mouse and human origin displayed limitations in longevity when grown in lab environments, compelling the need for a conducive living environment for continued maturation. Jacob Hanna, an embryonic stem cell biologist at the Weizmann Institute, invested seven years in constructing a system of rotating glass vials ensconced in an incubator. His mechanical uterine setup was previously able to sustain natural mouse embryos for up to 11 days outside the uterus. Hanna's next objective was to ascertain whether stem cells could flourish similarly within this contraption, a query yet unanswered in the field

CHAPTER OF THE MONTH : GRAVITATION

Newton's Law of Gravitation

Gravitational force (F) between two bodies is directly proportional to product of masses and inversely proportional to square of the distance between them.

$$\vec{F} = -\frac{Gm_1m_2}{r^2}\cdot\hat{r}$$

Kepler's Laws of Planetary Motion

Law of orbits : Every planet revolves around the sun in an elliptical orbit and the sun is situated at one of its foci.

Law of areas : The areal velocity of the planet around the sun is constant

i.e., $\frac{dA}{dt}$ = a constant

Law of periods : The square of the time period of revolution of a planet is directly proportional to the cube of semi major axis of the elliptical orbit.

$T^2 \propto a^3$

Acceleration due to gravity

- For a body falling freely under gravity, the acceleration in the body is called acceleration due to gravity.
- Relationship between g and G

$$g = \frac{GM_e}{R_e^2} = \frac{4}{3}\pi GR_e\rho$$

where G = gravitational constant

ρ = density of earth

M_e and R_e be the mass and radius of earth

Characteristics of gravitational force

- It is always attractive.
- It is independent of the medium.
- It is a conservative and central force.
- It holds good over a wide range of distance.

Gravitational Potential Energy

Work done in bringing the given body from infinity to a point in the gravitational field.

$U = -GMm/r$

Gravitational potential

Work done in bringing a unit mass from infinity to a point in the gravitational field.

$$V = \frac{-GM}{r}$$

Escape speed

The minimum speed of projection of a body from surface of earth so that it just crosses the gravitational field of earth.

$$v_e = \sqrt{\frac{2GM}{R}}$$

Variation of acceleration due to gravity (g)

Due to altitude (h)

$$g_h = g\left(1 - \frac{2h}{R_e}\right)$$

The value of g goes on decreasing with height.

Due to depth (d)

$$g_d = g\left(1 - \frac{d}{R_e}\right)$$

The value of g decreases with depth.

Due to rotation of earth

$g_\lambda = g - R_e\omega^2\cos^2\lambda$

At equator, $\lambda = 0°$

$g_{\lambda_{min}} = g - R_e\omega^2$

At poles, $\lambda = 90°$

$g_{\lambda_{max}} = g_p = g$

Earth's Satellite

Types of Satellite

Polar satellilte

- Time period : 100 min
- Revolves in polar orbit around the earth.
- Height : 500-800 km.
- Uses : Weather forecasting, military spying

Geostationary satellite

- Time period : 24 hours
- Same angular speed in same direction with earth.
- Height : 36000 km.
- Uses : GPS, satellite communication (TV)

Time period of satellite

$$T = \frac{2\pi}{R_e}\sqrt{\frac{(R_e + h)^3}{g}}$$

For satellite orbiting close to the earth's surface

$$T = 2\pi\sqrt{\frac{R_e}{g}} = 84.6 \text{ min}$$

Orbital speed of satellite

The minimum speed required to put the satellite into a given orbit.

$$v_0 = R_e\sqrt{\frac{g}{R_e + h}}$$

For satellite orbiting close to the earth's surface

$v_0 = \sqrt{gR_e}$

Energy of satellite

- Kinetic energy $K = \frac{GM_em}{2(R_e + h)}$
- Potential energy $U = \frac{-GM_em}{R_e + h}$
- Total energy

$$E = K + U = -\frac{GM_em}{2(R_e + h)}$$

The mentors Digest

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) Mr. Manoj P L (Industrial expert & Academician) and Ms. Chitra Jayasankar (Former 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.

Interested parents who are willing to associate with this concept are requested to contact

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