KNOWBEL

ENLIGHTENING THE NOBLES!

MAY 2020 • ISSUE NO. 5

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KNOWBEL

Enlightening the nobles !

WELCOME !

To the fifth issue of KNOWBEL.

We are back with the fifth issue of
Knowbel magazine to quench your curiosity with
loads of knowledge and fun.
In the wake of the worldwide lockdown we seek to revitalize
your minds with entrancing games in this issue
to boost up your ardour.
Let's fight off Coronavirus and break through the shackles of
boredom.

Stay home & Stay safe !

SPECIAL THANKS TO

DR. APARNA DESHPANDE
Faculty Advisor

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Image by Pete Linforth from Pixabay

NUCLEAR FUSION: ACHIEVABLE? OR JUST ANOTHER PHYSICS CONCEPT?

Many scientists around the around the world believe that one of the best alternatives to fossil fuels is nuclear energy. There are two ways to harness nuclear energy : Nuclear fission and fusion. All the nuclear reactors which are active currently, are fission reactors. Fission involves splitting of a heavier atom's nucleus into smaller nuclei, releasing energy in the process. However, we all know the adverse effects of nuclear waste generated by fission reactions. Hence, fusion seems to be promising and clean. Fusion involves fusing two smaller atomic nuclei to form a bigger one, which also releases energy. However, since lighter nuclei like hydrogen or deuterium are used, the amount of radioactive waste generated in much less. Also, the energy output is also supposed to be higher than that of fission. The sun, gets all its energy from fusion (so do all the other stars). However, we require very high temperatures to kick start the process. Why is that so? The answer is simple. Nuclei are made up of protons (positively charged) and neutrons (neutral). So, nuclei have an overall positive charge and hence, they repel each other if brought too close together. This is called the Coulomb barrier. To overcome this, we need to speed up the nuclei so that they collide. For this we require a minimum temperature of about 15-20 million Kelvin! There is also a much simpler problem. Suppose we do heat the chamber/container having the fuel to 15 million Kelvin. However, there will be energy losses to the environment, and so, we need to maintain the temperature conditions for a considerable amount of time. This is just like heating a cup of tea continuously so that it doesn't cool down. Furthermore, the fuel that will be used, which would be in a plasma state (the fourth state of matter, found only at high temp.), would have to be dense enough to give a good output of energy. It is found that if the density decreases by 2 times, then the power generated can decrease by 4 times! Because of such problems, sustainable fusion seems to be out of reach for another decade (at least). However, we have had some breakthroughs such as the ITER tokamak experiment.

RIVETING READS IN THIS ISSUE:

02 - WATER MIGHT NOT BE A SINGLE LIQUID !!?

Water has about 66 properties that differ from other liquids, like a high boiling point and heat capacity, a high surface tension value, and the most famous of all, the unique relation between its density and temperature. Most liquids undergo an increase in density as we cool them, which is expected as the molecules of the liquid come closer. However, for water, the density reaches a maximum at 4 degrees Celsius, and then decreases as it forms ice. This anomalous behaviour is attributed to the hydrogen bonding between water molecules. The water molecules form a strong Hydrogen bond network, which leads to lower random movement of its molecules. This structured state made some scientists think that water is actually two liquids! The two forms represent low and high density forms/arrangements of water molecules. The low-density version is more ordered (less ordered than ice but more than water), with one molecule of water surrounded by 4 molecule (like a tetrahedron!), much like the structure of ice. The higher-density liquid has a higher packing of molecules, and due to a high number of water molecules, the hydrogen bonding structure gets disrupted leading to weaker interactions. According to this theory, the proportion of each component changes with temperature, with more low-density water forming as temperature decreases. So, though we expect density to decrease with temperature, more low density water is formed as we decrease the temperature leading to a competition between the effect of temperature and the formation of low density water. This leads to a density maximum at 4°C (as till 4°C, the temperature factor dominates) after which the low density water dominates and the density decreases.

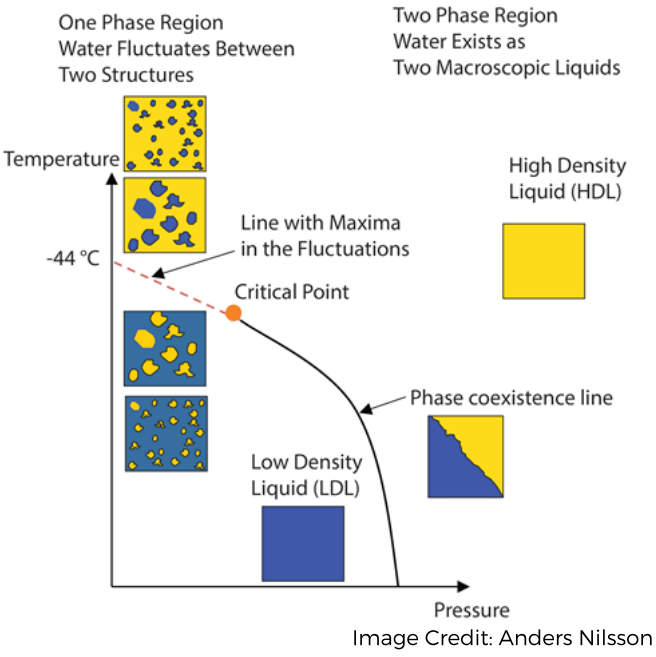


Image Credit: Anders Nilsson

PHASE DIAGRAM FOR THE TWO LIQUID COMPONENTS OF WATER

IMAGE BY RONY MICHAUD FROM PIXABAY

03 - CAN A CANCER DRUG PROVE EFFECTIVE AGAINST COVID-19?

AstraZeneca Plc, which a British multinational pharmaceutical company suggested using one of its new cancer drugs to fight covid-19. The drug, called Calquence, is actually meant to treat Lymphoma, a form of cancer in which the some of the immune system's cells grow out of control. In the case of covid 19 infections, many of the deaths are due to inflammation, which caused by our own immune system! Cytokine, is a chemical used by immune cells to kill germs/microbes that invade our body. However, those with a faulty immune system, might have a large amount of cytokine released by their immune system, in order to kill the corona virus, which leads to excessive inflammation of the lung tissue, and can lead to death! The medicine targets a protein known as BTK that regulates inflammation.The drug will be tested on hospitalized Covid-19 patients, some of which will be ICU patients as well (patients will be selected randomly). The first set of trial patients will be from US and then from other European countries. This combined with good supportive care can help reduce the need to place patients on ventilators.
"Unfortunately there are so many in need that we are hoping that we could enroll very fast. This is a trial that will enroll in weeks, not in months," said Jose Baselga, Astra's head of cancer research. "We do believe that if we can block the inflammatory response that this virus induces we could save lives."

IMAGE BY PDPICS FROM PIXABAY

MORE INFORMATION:
https://www.bloomberg.com/news/articles/2020-04-14/astra-to-test-cancer-medicine-for-lethal-covid-19-reaction

OR SCAN/CLICK THE FOLLOWING QR CODE -

04 - SUPERCONDUCTING METEORITES

Two different meteorites have been observed to have grains inside them that exhibit natural superconductivity! This is the first time scientists have observed such a thing. Normally, they do find many weird things from objects that crash land on earth like exotic minerals and even proteins, but something like this has never been observed. Superconductivity is the property of a substance to conduct electricity “perfectly” (that is to say, the resistance of the material becomes zero) below a certain temperature. Most of the substances found on earth are almost never naturally superconducting. However, in space , due to the extreme extraterrestrial radiation and phenomena involving high pressure and huge amounts of energy can create such minerals. A study led by researchers from UC San Diego, involved investigating fragments from 15 different meteorites, using a technique known as “magnetic field modulated microwave spectroscopy” to detect traces of superconductivity inside the meteorite samples. They found two samples with trace of such minerals, first, in an iron meteorite called Mundrabilla, one of the largest meteorites ever found, which was discovered in Australia in 1911; the second, a urelite meteorite (urelites have a very different chemical composition than other meteorites and are quite rare) called GRA 95205, located in Antarctica a quarter-century ago. "Naturally occurring superconductive materials are unusual, but they are particularly significant because these materials could be superconducting in extraterrestrial environments" says James Wampler who is a physicist and nanoscientist. According to the team's measurements, using techniques like vibrating sample magnetometry (VSM) and energy dispersive X-ray spectroscopy (EDX), both of these space rocks contain minute amounts of extraterrestrial superconductive grains.

IMAGE BY JOCHEN SCHAFT FROM PIXABAY

MORE INFORMATION :
https://www.sciencealert.com/superconductivity-has-been-discovered-in-meteorites-for-the-first-time

OR SCAN/CLICK THE FOLLOWING QR CODE -

05 - PLANTS MIGHT NOT BE "BRAINLESS" AFTER ALL !

Stefano Manusco studies what we may call plant intelligence (a plant neurologist). He and his colleagues have found evidence that plants can memorize stuff they experience, and that too for a pretty long time. For e.g. the Mimomsa Pudica , recoils its leaves when u let a drop of water fall on it. However, if u keep doing this for a long time, the plant realises that the water is harmless and doesn't react. This memory lasts for about a week or two! Compare that with an insect, i.e an organism with a brain, whose average memory retention is only about 1-2 days! According to Manusco, plants dont have a single organ designated for such responses, as they are very good at diffusing the function over the entire body. Hence, the entire plant is to be viewed as a single brain (although it might not be as effective or responsive as an animal brain). Another aspect of this study, which might be controversial, is plant consciousness. Manusco says that plants are aware about their own presence and their surroundings. A simple example is when one plant overshadows another, the shaded plant will grow faster to reach the light. He also advocates the fact that plants are good at communicating as well, using scents/ chemicals as warning signals or to attract pollinators. When corn is nibbled by caterpillars, for example, the plant emits a chemical distress signal that lures parasitic wasps to exterminate the caterpillars. The main reason why we aren't able to see their behaviour is due their ridiculously slow lives. Some trees are about 5000-6000 years old, and hence, their activities over a few second, minutes or hours is negligible compared to other species with short lifetimes like humans. "When you feel yourself better than all the other humans or other living organisms, you start to use them. This is exactly what we've been doing. We felt ourselves as outside nature." says Manusco.

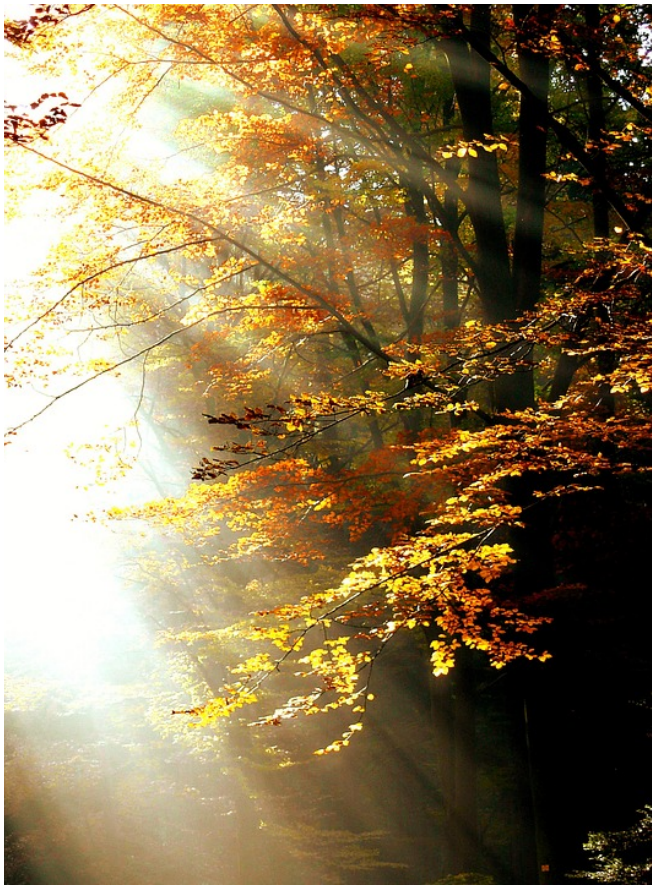
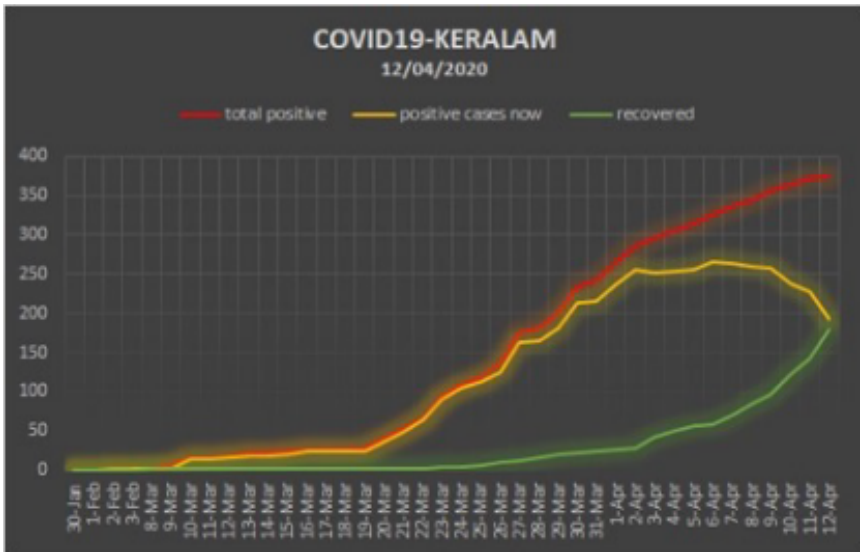


IMAGE BY 371865 FROM PIXABAY

MORE INFORMATION :
https://www.theguardian.com/environment/2020/apr/05/smarty-plants-are-our-vegetable-cousins-more-intelligent-than-we-realise

OR SCAN /CLICK THE FOLLOWING QR CODE -

06 - COVID-19 UPDATES . . .



SYMPTOMS OF COVID 19

- Sore Throat and dry cough
- Headache /Body ache/ Fatigue
- Running nose
- High Grade Fever (103 Fahrenheit or above)
- Shortness of breath/Difficulty in breathing (severe case)
- Diarrhea

LESSONS TO BE LEARNED FROM KERELA.

- The corona curve of Kerela is beginning to flatten as the number of active cases daily have been decreasing, with 334 recovered patients (out of 458).
- There has been an exponential rise in the number of recovered patients. About 230 of the total patients were people with a travel history while 147 people got infected through local transmission.
- "The present numbers indicate that out preventive measures have paid off well. However, we need to be cautious as even a single patient can multiply the rate of infection many times. We can't let our guard down now", said KK Shailaja, the health minister of Kerela.

OKAY LET'S MAKE SOME THINGS CLEAR!	FLATTENING OF CURVE:-
• Total cases = all the people infected till date • Active cases= currently infected people • Mortality rate= (total deaths)/ (total cases) • Deaths per million (also a measure of death rate) which is =(total deaths) x (1,000,000)/(total population)	Refers to the decrease in new cases. For example, if on 11th April, new cases= 1000, on 12th April new cases =800, on 13th April= 568, then we can say that the curve is flattening.

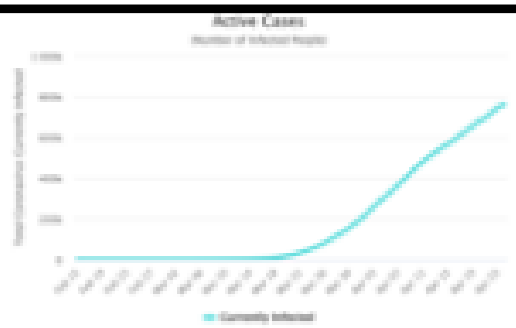
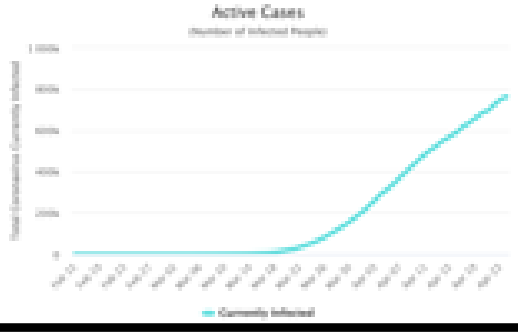
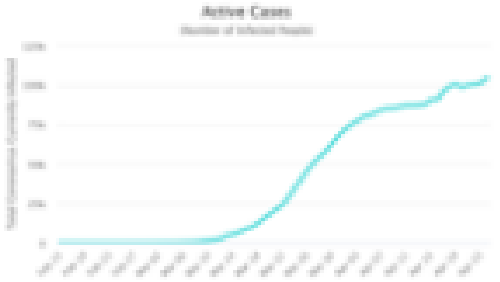
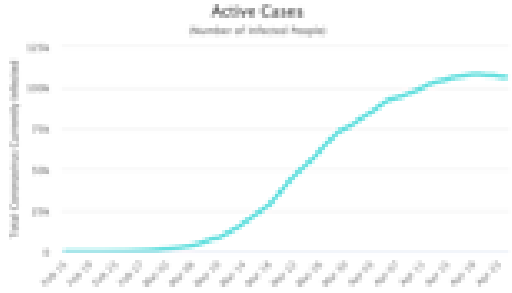
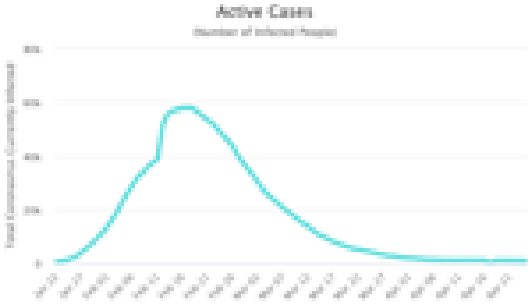
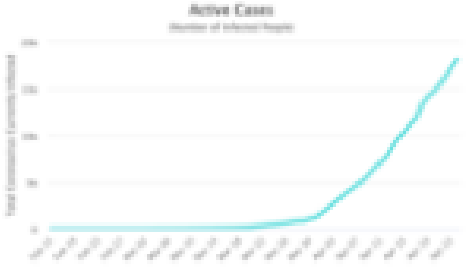
CLASSIFICATIONS OF CITIES/DISTRICTS INTO ZONES:

- RED ZONE (or hotspots) - large no. of cases, growth rate of cases is also very high. Currently, there are 170 hotspots in India. To see a list of hotspots visit: https://economictimes.indiatimes.com/news/politics-and-nation/govts-plan-to-contain-local-outbreak-is-yielding-results-lav-agarwal/articleshow/75159535.cms

- ORANGE ZONE (non hot-spot)- less number of cases and low growth rate. A red zone can turn into an orange zone if no new cases are reported for 14 days.

- GREEN ZONE- Areas with no reported cases. Any red zone with no new cases for 28 days can turn into a green zone.

ALL GRAPHS BELOW ARE FROM *https://www.worldometers.info/coronavirus/*

LOCATION	GRAPH (FOR ACTIVE CASES)	CONCLUSION FROM GRAPH
WORLD		• curve still far from the flattening phase, as confirmed by the head of WHO • 1 million cases around 3rd April, now 2 million around 14-15 April, indicating rapid growth
USA		• curve could flatten soon, says Trump and some other ministers. • Highest no. of deaths (53,243) officials say that no. of daily • cases might be decreasing
SPAIN		• showed signs of curve flattening but then a significant no. of new cases began to appear again • largest no. of infections in Europe.
ITALY		• already seems to be past curve flattening as the graph has a dip at the end. • has a very high mortality rate (about 13.5%).
CHINA		• Cases have dropped (only 838 active cases as of 24th April) • Wuhan has already opened up • However, there has been a recent increase in cases (about 80-100 cases initially, now about 10-20). • about 77,000 patients have recovered
INDIA		• Is witnessing increasing growth of infections(about 1500 cases each day) • lockdown might have prevented a very high growth rate • curve far from flat, hence social distancing is important to avoid further growth of coivd-19.

May 2020 *Issue No. 5*

GOBBLE THE FACTS !

Get ready to guzzle down these interesting facts...

DOG DAYS OF SUMMER.

The "dog days of summer" refer to the weeks between July 3 and August 11 and are named after the Dog Star (Sirius) in the Canis Major constellation. The ancient Greeks blamed Sirius for the hot temperatures, drought, discomfort, and sickness that occurred during the summer.

GROWTH SPURT OF EIFFEL TOWER !

In the summer heat, the iron in France's Eiffel Tower expands, making the tower grow more than 6 inches.

Image by Pete Linforth from Pixabay

Image by M-CARLOS from Pixabay

JULY'S SECRET !

Marc Antony named the month of July, in honor of Julius Caesar.

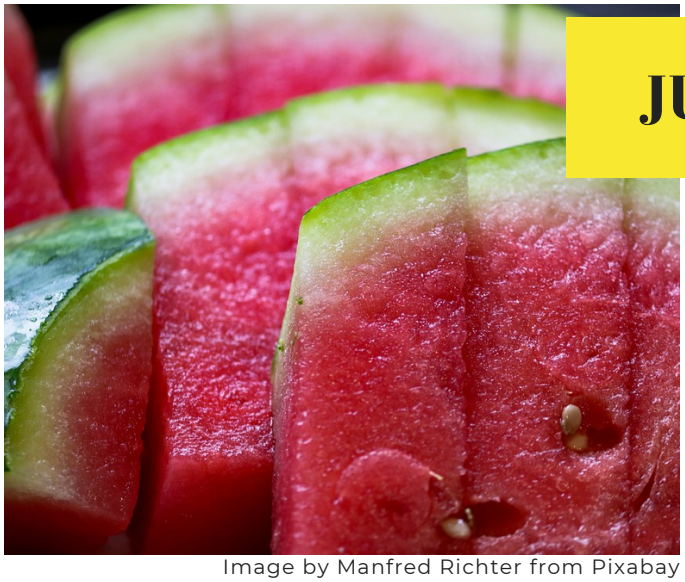


Image by Manfred Richter from Pixabay

JUICY WATERMELON !

A ubiquitous summer treat is watermelon. Watermelon is part of the cucumber, pumpkin, and squash family and consists of 92% water. On average, Americans consume 15 pounds of watermelon annually.

SUMMER MOOD SWINGS !

Scientists argue that summer babies are significantly more likely to suffer from mood swings than babies born in other seasons.

Image by esudroff from Pixabay

Image by Free-Photos from Pixabay

AMERICAN CUSTOM !

According to custom, in the United States, a person can wear white pants only during the summer, or between Memorial Day and Labor Day.

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THE QUIZOPEDIA

Are you ready to get your brain busted !

Quizopedia Reloaded

A brain-storming contest and a chance for you to become famous.

But hold your horses right there! Check out the instructions below before you begin :

Here we are with a new version of quizopedia to help you all enjoy your vacation with puzzles. Yes!
We have upgraded the format of quizopedia to ease down your effort. Now all you need to do is fill up these boxes and send us a photo of completed crossword puzzle. Answers would be officially released via mail on 25/05/2020.
(Competition begins on 01/05/2020 at 6 pm)

The winners would be chosen based upon
1. No. of correct answers
2.Time of submission
Deadline : 20/5/2020

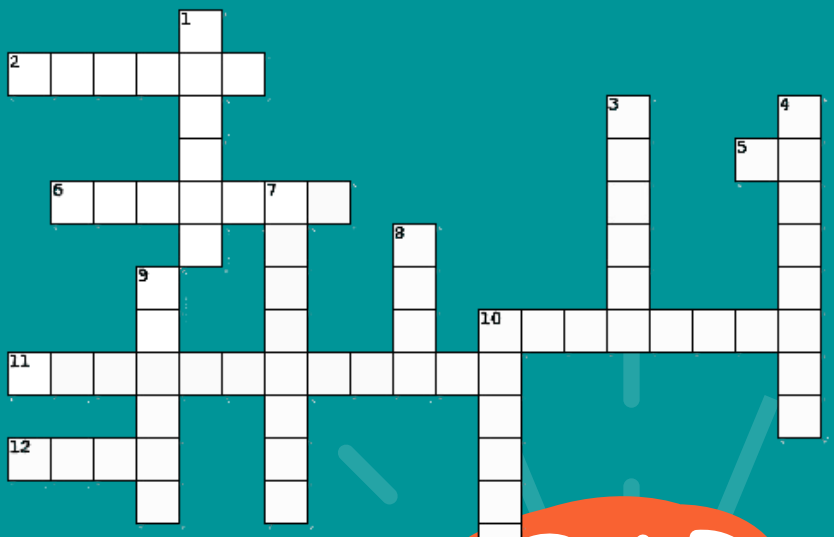
So let's begin...

Quizopedia winner:
Riddhi Patil St Joseph's College Class 12

Answers to the previous quiz have been mailed to the participants.

Across
2. Former name of Chennai
5. Distance between Earth and the Sun
6. Main character in Disney show a about crazy adventures in Summer vacation
10. Most abundant element in the Universe
11. Produces energy inside human cells
12. Sugreeva's older brother, killed by Rama
14. World's smallest satellite

Down
1. Anandibai Joshi was originally named after this river
3. Tropic latitude that passes through India
4. Comic character in Tinkle magazines
7. King of mangoes
8. Norse god and one of the Avengers
9. A string instrument played with a bow
10. Virus transmitted from rodents.
13. Known as the 'Golden Fibre'



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

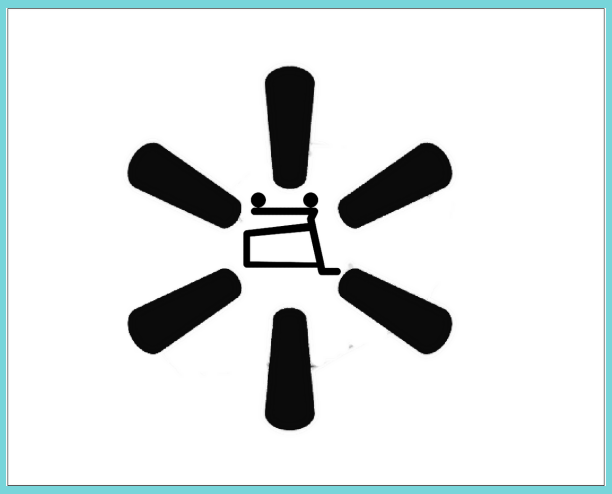
D-CODE

Here is a chance to set the detective within you into motion! Rack your brains to decipher the code and arrive at the right answer. Your answer can be a single word or a phrase containing 2-3 words. Scan the QR code below to send us your findings. The top early-bird answers get a chance to be featured in our next issue and who knows, you might be one of them! **Competition starts on 01/05/2020, 6pm.**

Here comes the question:

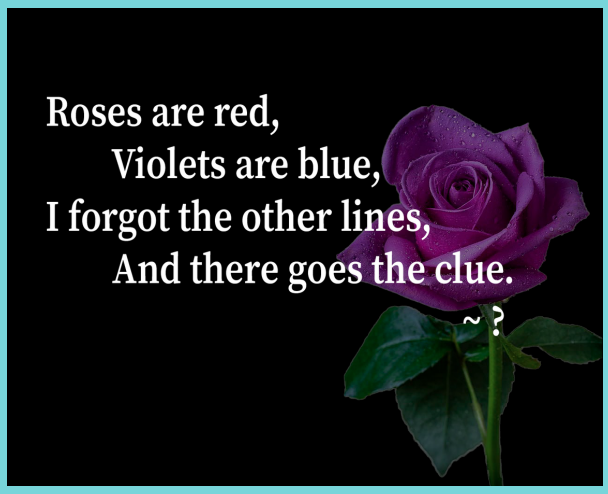
1.) Deal?

1.)



2.) The Origins.

2.)



D-code Winner:

Winner- Parth Khose DAV public school Aundh Class 10

Deadline: 20/5/2020

- **QR code for hints : (Remember hints would be released 48 hours after the start of the contest)**

- **To submit your answer scan the following QR code :**

KNOWBEL CONTEST

KNOBBY'S WORLD

Thank you for your overwhelming response to the 'Knobby's World' Contest and making it a grand success. We hope it helped all of you develop your skills and discover talents you never knew you had. We believe that you loved this fun-filled adventure and we promise to soon be back with more such events in the upcoming months.

Checkout a few glimpses of the 'Knobby's World' Contest:

RESULTS

TEAM SUPERMAN

- Dnyaneshwari
- Akshada
- Tanvi Mote
- Tanvi Kulkarni
- Aboli Aher
- Kanchan

TEAM SCORE-1930

TEAM IRONMAN

- Shruti Jawale
- Vaishnavi Deokar
- Vishal Raut
- Pallavi Dalvi
- Vaibahv Ingale

TEAM SCORE-4680

TEAM SHAKTIMAN

- Samyuktha
- Sonal
- Sakshi
- Aishwarya
- Priyasha

TEAM SCORE-3570

TEAM SPIDERMAN

- Om Adarsh
- Shreya Kharde
- Yash Tapadia
- Saloni Sarnot

TEAM SCORE-3740

Winning Team: Team Iron-Man
Runner up: Team Spiderman

Individual Round Winners:

Round 1: Art
Vaishnavi Deokar

Round 2: Poem Writing
Pallavi Dalvi

Round 3: Best from Waste
Sonal Gadankush

All Round Performers:

1. ***Vaishnavi Deokar***
2. ***Aishwarya Singh***
3. ***Sonal Gadankush***

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INSPIRON

KNOWBEL

Enlightening the nobles !

THE SYMBOL OF BENEVOLENCE

Mother Teresa

"There are no great things, only small things with great love"

Illustration by Ritu

On 26th August 1910, the world saw the birth of an extremely noble soul - Mother Teresa. Known for her efforts to help the poor and needy, Mother Teresa had a deep faith in the power of goodness - a virtue that set her apart from a common person. She led a simple life with almost no exciting adventures. Yet, there is something about her ways that piques the interest of people. She is an embodiment of the saying 'Simple living and high thinking'.

WITHIN THESE PAGES:

01. Morality rooted in Early Years

Ever since childhood, Mother Teresa was taught by her mother to devote a significant amount of time and energy for the service of the poor and needy. Her mother was was immensely pious but at the same time, she was a stern taskmaster. She did not entertain useless talk or frivolous behaviour. On one such occasion, the children were chattering light-heartedly when the conversation began growing sillier. Her mother listened but did not say anything. Finally, she quietly left the room and turned off all the lights in the house. “There is no use of wasting electricity so that such foolishness can go on”, she said. This indeed influenced Mother Teresa and instilled the quality of discipline and productivity within her. Mother Teresa lost her father when she was only eight years old. However, her mother ensured that the children grew up well and developed a righteous attitude. She always found innovative ways of instructing them. One day, she showed them a basket of delicious ripe apples and asked them to inspect it. She then placed a rotten apple in the same basket and covered it with a cloth. The next day, she asked the children to inspect the apples again. To their bewilderment, they found out that all the apples, that once looked bright and luscious, had begun to rot.

Illustration by Ritu

> *Kind words can be short and easy to speak, but their echoes are truly endless.*

The message her mother was trying to convey was simple yet profound - It takes only one person to corrupt the others. It reminded the children the importance of remaining in good company and not face the same fate as the apples in the basket. Despite her mother's need to work and manage a business, and despite her devotion to the poor, she still spent time with her children, who benefited immeasurably from her guidance. So powerful was her presence that Mother Teresa recalled: "Home is where the mother is."

02. A Perfect Example

Teresa's decision to become a nun and serve the needy came quite early in her life. She joined a church and took to teaching the children from poor families in Bengal. She taught history and geography. She also became more comfortable in her use of the Bengali language. The living conditions were terrible. Every day, before beginning the day's lessons, Mother Teresa rolled up the sleeves of her habit, found water and a broom, and proceeded to sweep the floor, much to the delight and amazement of her students. Only people of the very lowest caste performed menial duties such as these. When Teresa saw where the children ate and slept, she was distressed at the terrible condition there. Yet, she also found solace and comfort through the happiness and gratitude of her young charges. Merely placing a hand on a dirty forehead or holding the hand of a small child brought her great joy. Many of the children took to calling her "Ma" which meant "Mother," a term that she treasured. As one sister who lived with her during this period recalled, "She was very ordinary. We just looked upon her as one of our Sisters who was very devoted and dedicated."

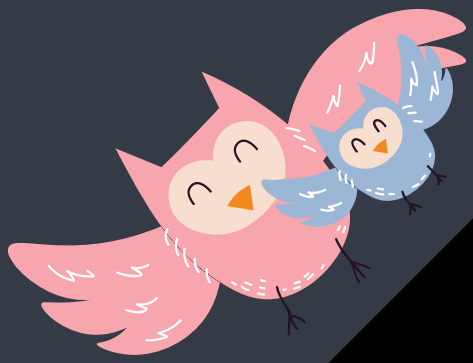
By Philip K on flickr

It was this very ordinariness that made the journey Mother Teresa embarked upon so extraordinary. No task was too menial or disgusting for Mother Teresa to undertake. One sister, repelled at the thought of cleaning the toilet, hid away. Mother Teresa passed by, not noticing the sister in the hall. Seeing the state of the toilet, she immediately rolled up her sleeves and cleaned the toilet herself. The sister never forgot the experience and applied herself more fully to her tasks.

03. The Drive to Serve

There were several incidents that contributed to Mother Teresa's firm resolve to help the underprivileged. One day, when she and another sister were just beginning their work, they encountered what appeared to be a bundle of rags lying on a street. As they approached, they realized, to their horror, that the bundle was not a mere bundle of rags, but a middle-aged woman, half-conscious, her face half-eaten away by rats and ants. Together, Mother Teresa and her companion carried the woman to the nearest hospital. The nurses refused to take the woman, claiming the hospital had no beds. When Mother Teresa asked hospital officials where she could go, they told her to take the woman back where she had found her. Frustrated, Mother Teresa refused to leave until she had a promise that the hospital would make room for the sick woman. In the end, hospital authorities relented and gave the dying woman a mattress on the floor. She died a few hours later with Mother Teresa by her side. It was then, Mother Teresa told her audiences, that she had decided to find a place for the dying and take care of them herself.

> *Be faithful in small things because it is in them that your strength lies.*



> *Let us always meet each other with smile, for the smile is the beginning of love.*

Illustration by Ritu

04. Pragmatism Personified

Besides being extremely service-minded, Mother Teresa never prided in herself. Humility was so ingrained within her, probably due to her mother's wonderful upbringing. While in Calcutta, Mother Teresa lived in a small shelter with a few orphans. On one occasion, it so happened that there was no food to feed them. Completely helpless, she asked the children to pray to the almighty before they set out to beg for alms. As they went from one house to the next, they came across a shop and pleaded to the shopkeeper to give them some food. The shopkeeper was an arrogant man and to the shock of the children, he spat on Mother Teresa's hand. Instead of getting enraged at his conceit, she gently wiped the saliva to her sari and said, "Thank you for what you have given for me. Will you give something to my children?" The shop keeper was stunned at her humility and asked her to pardon for his folly. Then on, he began helping the orphans regularly.

05. A Living Memory

Mother Teresa was honored with several awards, including the Nobel Peace Prize and the Bharat Ratna, which she graciously accepted in the name of the poor. Teresa has been commemorated by museums and named the patroness of a number of churches. She has had buildings, roads and complexes named after her. Several films and documentaries have been made based on her life. Mother Teresa continued to work in her later years despite her failing health and on 5th September 1997, she breathed her last. Even so, her memory lives, vivid and influential, in the minds of people today. She was, by all means, an epitome of selflessness.

Roads

by Pallavi Dalvi
Winner of poem contest
Knobby's World

You start out your way
And find someplace to stay
For your long journey was
To be named success

Every junction you stop
Your brain takes a stop
'Cause you have to decide
which road is correct.

Whichever road you take
Your brain keeps you awake
As you have to find
The next road to success

Every correct step
Covers a wrong step
As mistakes are what
Correct you always

The last steps are never
Going to get over
As every road leads on
To a new road to success

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Thank you for reading our 5th issue. Hope you enjoyed it. Stay tuned at - https://knowbel.wordpress.com/

~Painting by
Vaishnavi Deokar
(winner of Paintdemic)

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