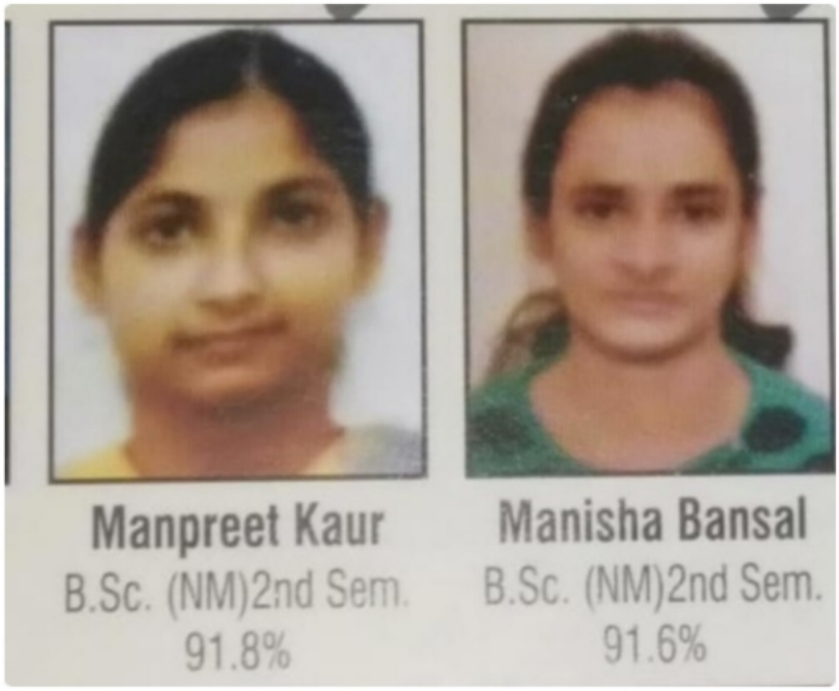
Wall magazine

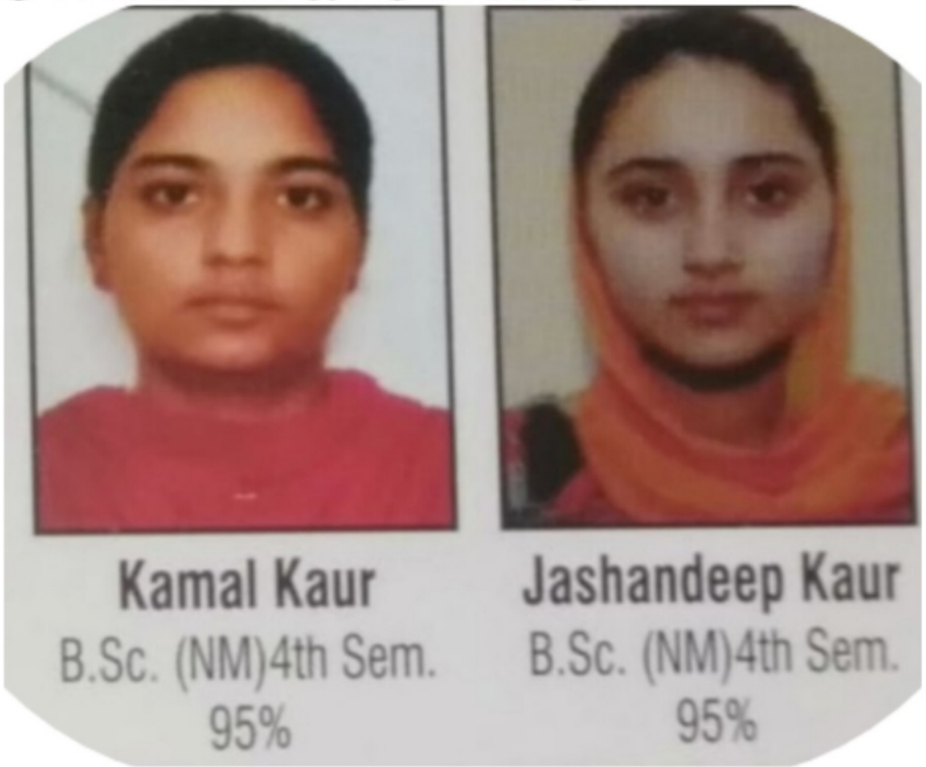
Department of Science



Manpreet Kaur
B.Sc. (NM)2nd Sem.
91.8%

Manisha Bansal
B.Sc. (NM)2nd Sem.
91.6%

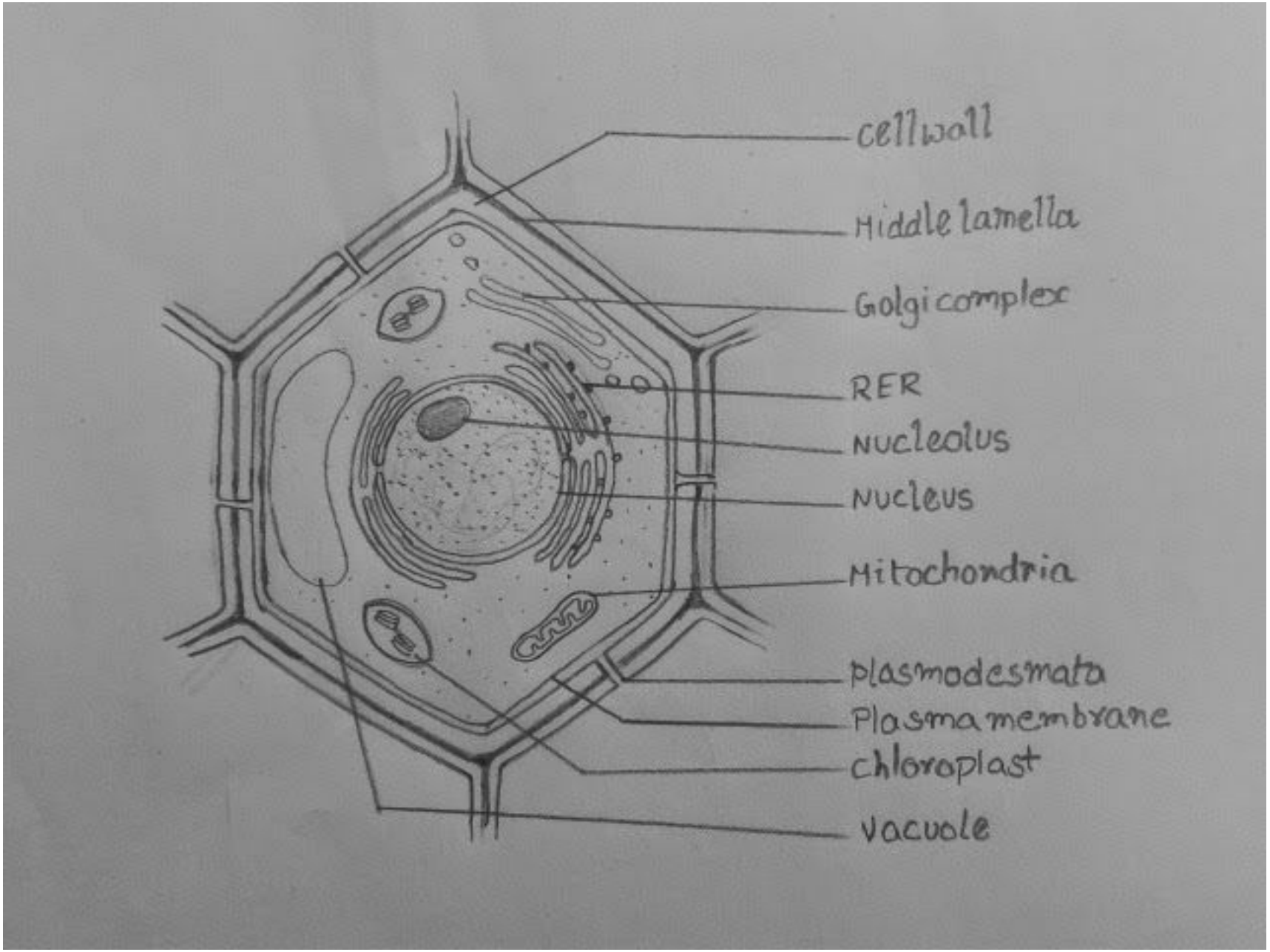
SHINNING STARS



Kamal Kaur
B.Sc. (NM)4th Sem.
95%

Jashandeep Kaur
B.Sc. (NM)4th Sem.
95%

ATHLETIC ACHIEVEMENT


cellwall
Middle lamella
Golgi complex
RER
Nucleolus
Nucleus
Mitochondria
plasmodesmata
Plasma membrane
Chloroplast
Vacuole

GRAVITATIONAL POTENTIAL ENERGY

The Energy Stored in an Object Due to its high POSITION over Ground

EXAMPLE

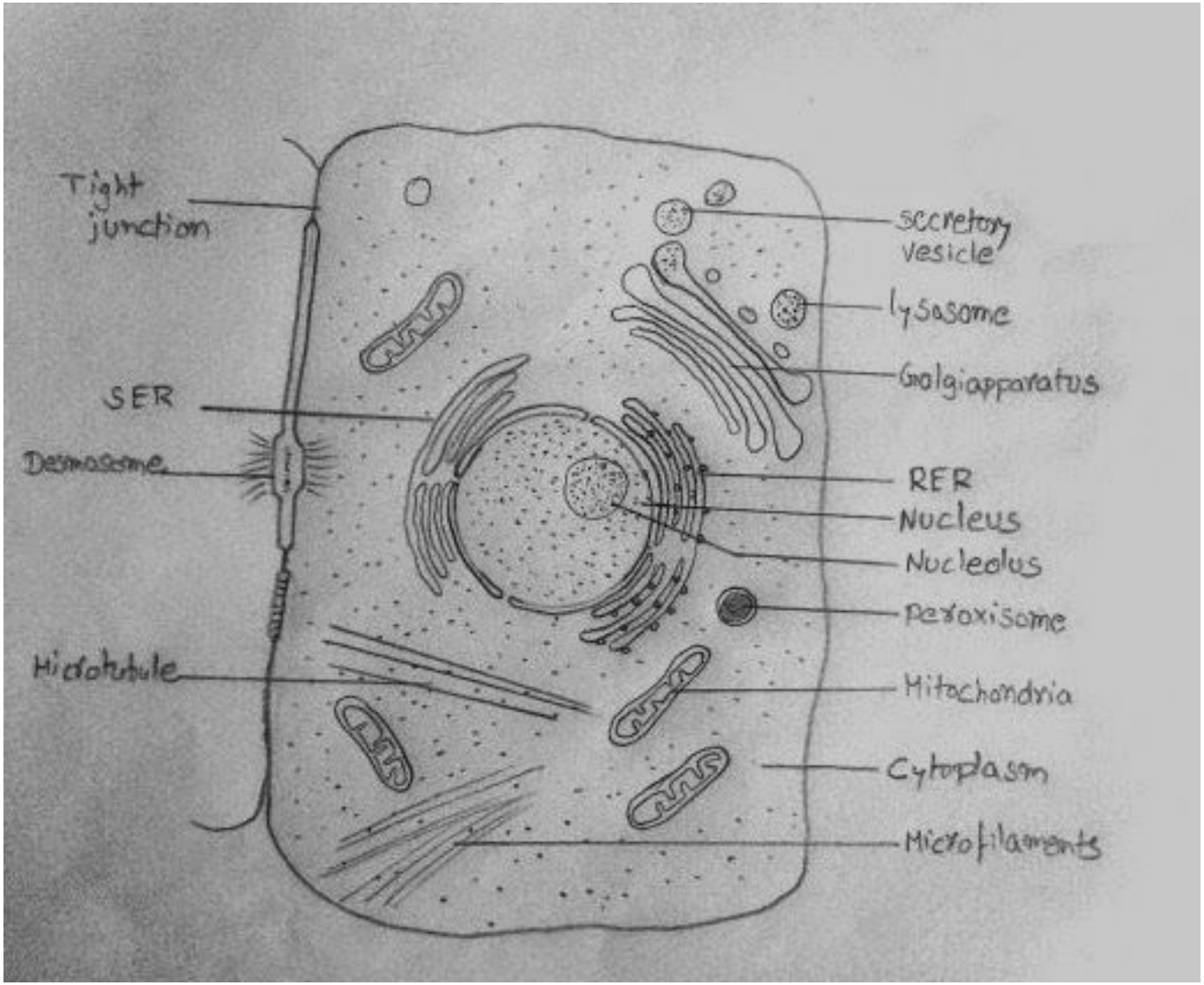
A RIPE APPLE THAT IS ABOUT TO FALL

$$U = mgh$$

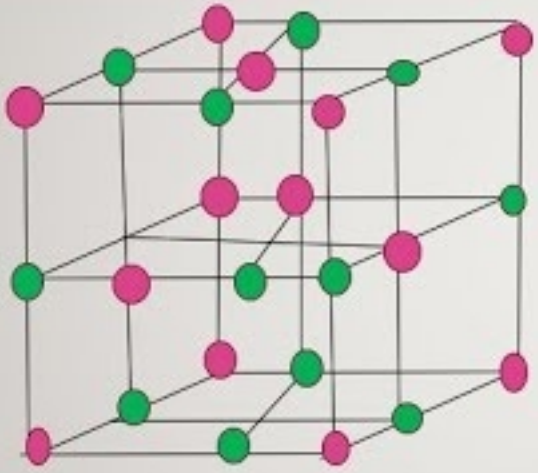
M = mass

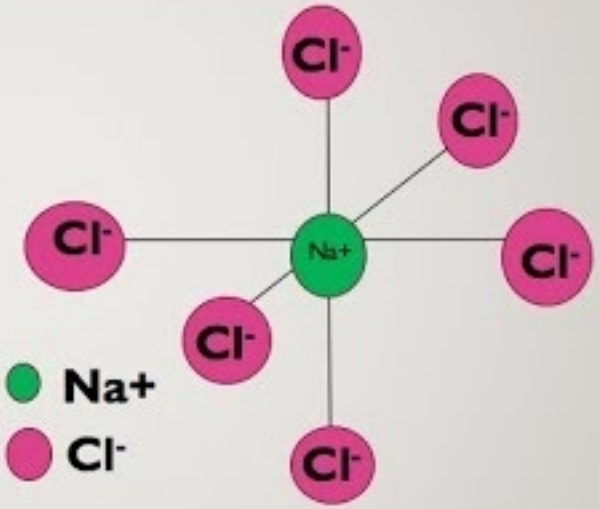
h = height

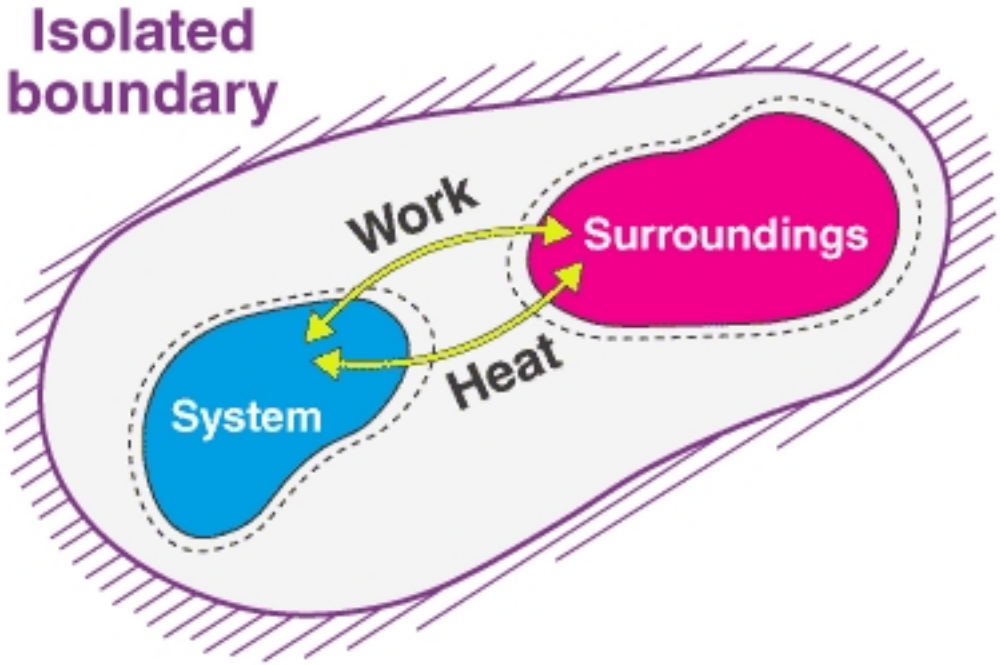
g = Earth gravity


Tight junction
SER
Desmosome
Microtubule
Secretory vesicle
lysosome
Golgiapparatus
RER
Nucleus
Nucleolus
Peroxisome
Mitochondria
Cytoplasm
Microfilaments

CRYSTAL LATTICE OF NaCl:







System boundary

A boundary is a closed surface surrounding a system through which energy and mass may enter or leave the system.

Surroundings

Everything that interacts with the system

System

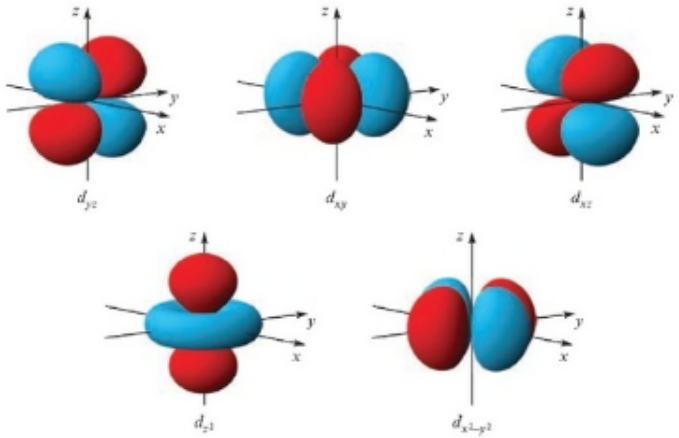
A system is a region containing energy and/or matter that is separated from its surroundings by arbitrarily imposed walls or boundaries

Crystal Field Theory

Explain Crystal Field Theory

CFT

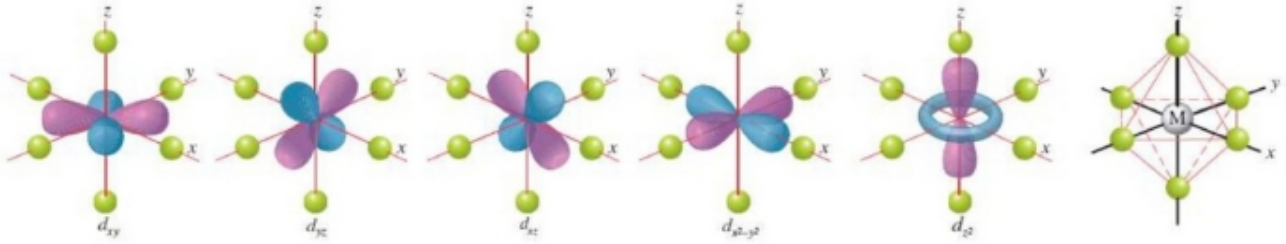
- Crystal field theory is based upon orbitals but does not go fully into all of the molecular orbitals and potential combinations etc. (That is called Ligand Field Theory–vide supra)
- With CFT we are just going to consider the d-orbitals and how they can interact with ligands
    - d-orbitals are highly directional



- most TM compounds adopt an octahedral geometry with six ligands about the metal centre
    - Overall this is a highly energetically favourable process (opposite charges attract)

Bonding in Transition Metal Complexes

- Crystal field theory of bonding in octahedral coordination complexes
- *In the absence of any ligands, the five d-orbitals are degenerate.*
- An octahedral metal complex, $[M(L)_6]^{n+}$, can be viewed as six negative point charges approaching a metal cation (overall, a very stabilizing interaction).



- In presence of ligands, degeneracy is removed. That means the d-orbitals have different energies or they are split
    - The net result is the colouration of transition metal complexes.

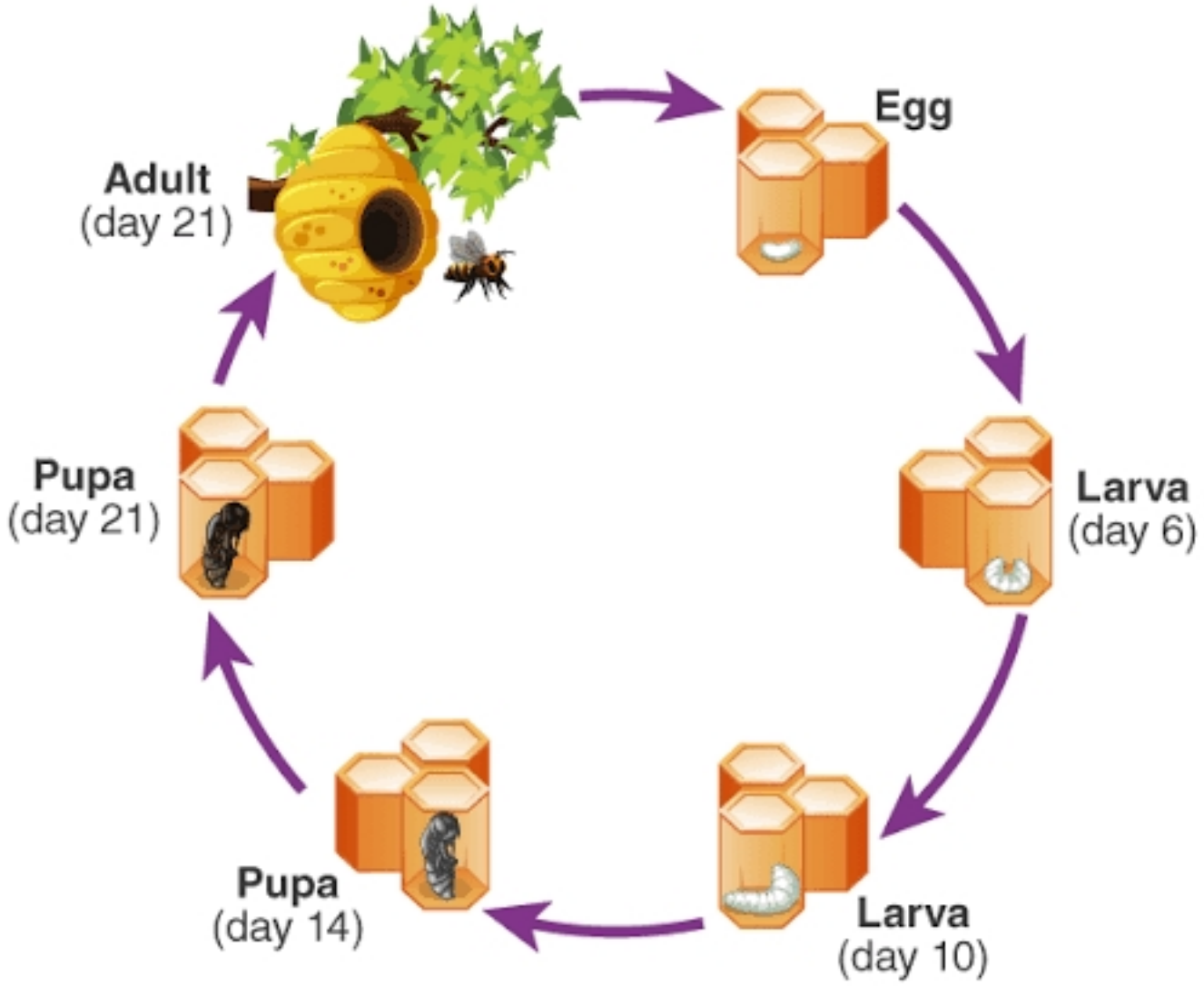
Crystal Field Theory: d-Orbital Splitting

- Each ligand lone pair about the metal centre represents a negative point charge directed towards the metal atom.
- These 'charges' coulombically repel electrons in those d-orbitals closest to them, leading to destabilisation (i.e. an increase in energy of those d-orbitals that are close)

Explain the impacts of crystal theory on the degeneracy of the d-orbitals

Construct an Orbital Diagram to show d-orbitals in an octahedral complex

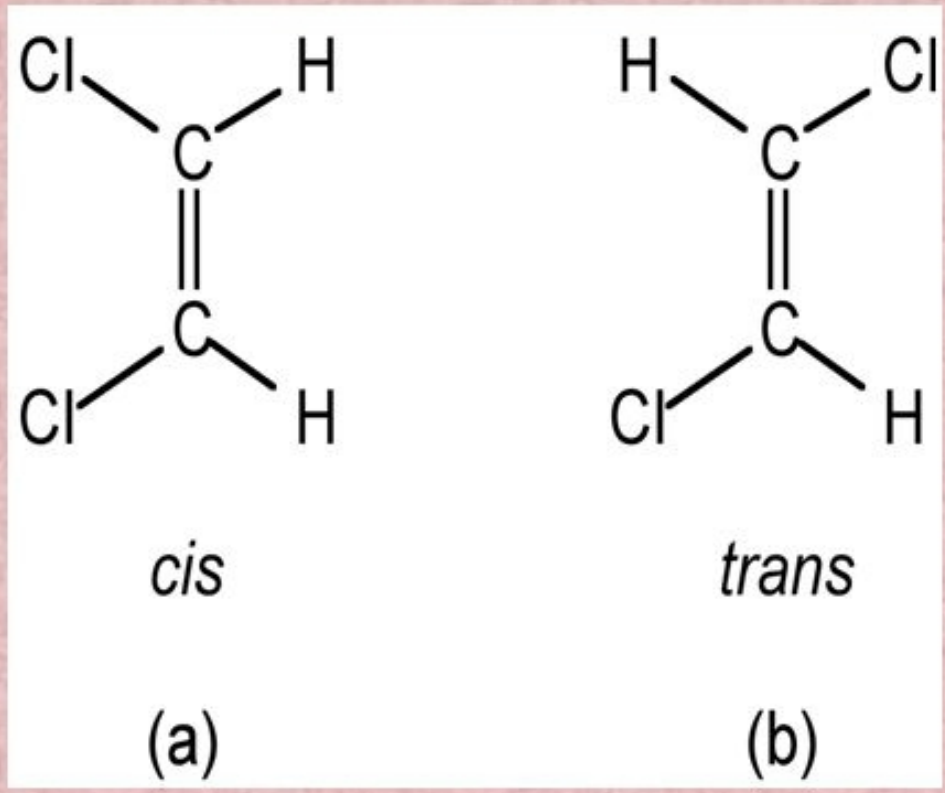
HONEY BEE LIFE CYCLE



Conditions for geometrical isomerism

There are two necessary conditions for a compound to exhibit geometrical isomerism:

1. The molecule must contain a carbon-carbon double bond, the rotation around which is strongly hindered.
2. Each of the two doubly bonded atoms should have two unlike groups attached to it as, for instance, abC=Cab.

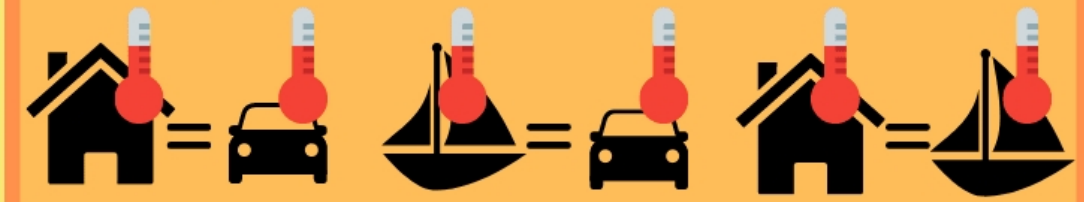


Laws of Thermodynamics

Zeroeth law

Temperature

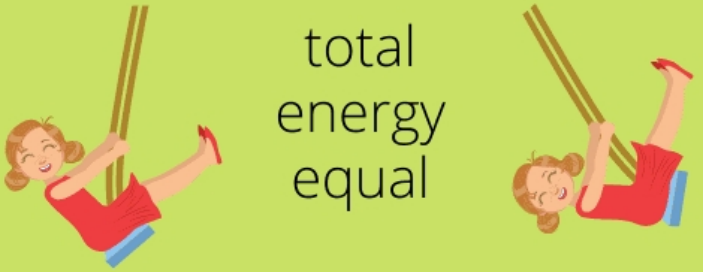
Two systems in equilibrium with a third system are in thermal equilibrium with each other.



First law

Conservation of Energy

Energy can change forms, but is neither created nor destroyed.



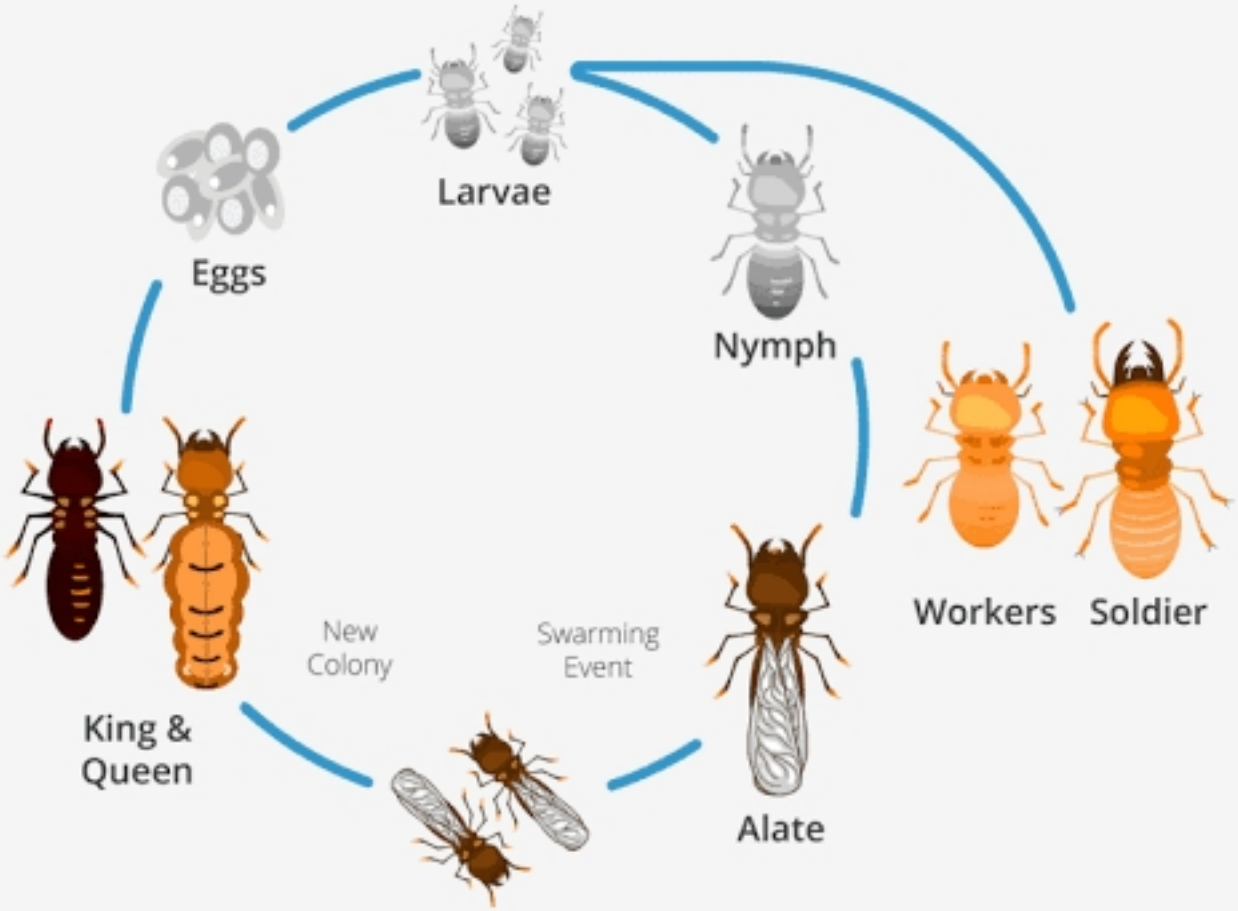
Second law

Entropy of an isolated system always increases.

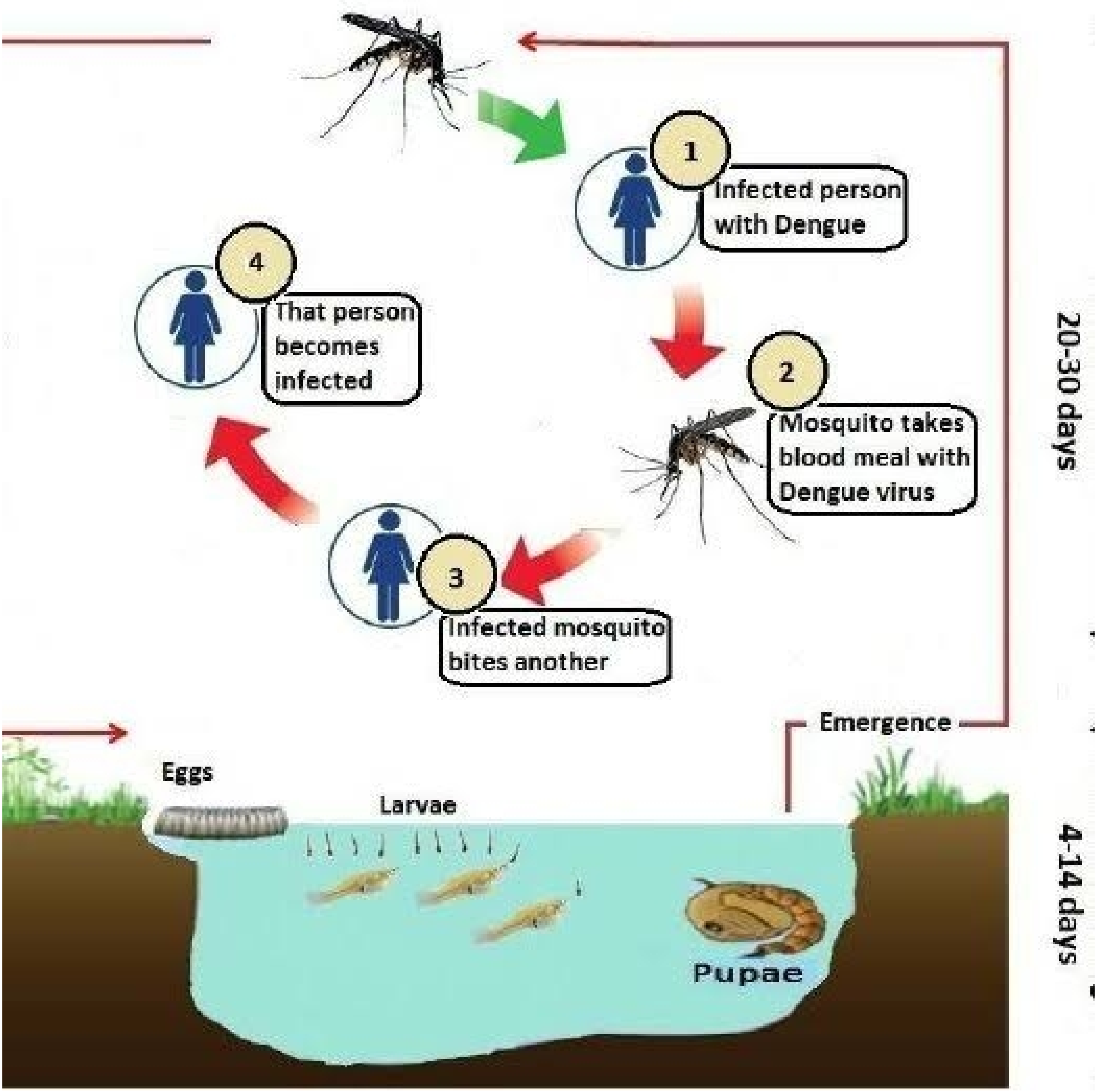
Third law

Entropy of a system approaches a constant as temperature approaches absolute zero.

THE LIFE CYCLE OF A TERMITE



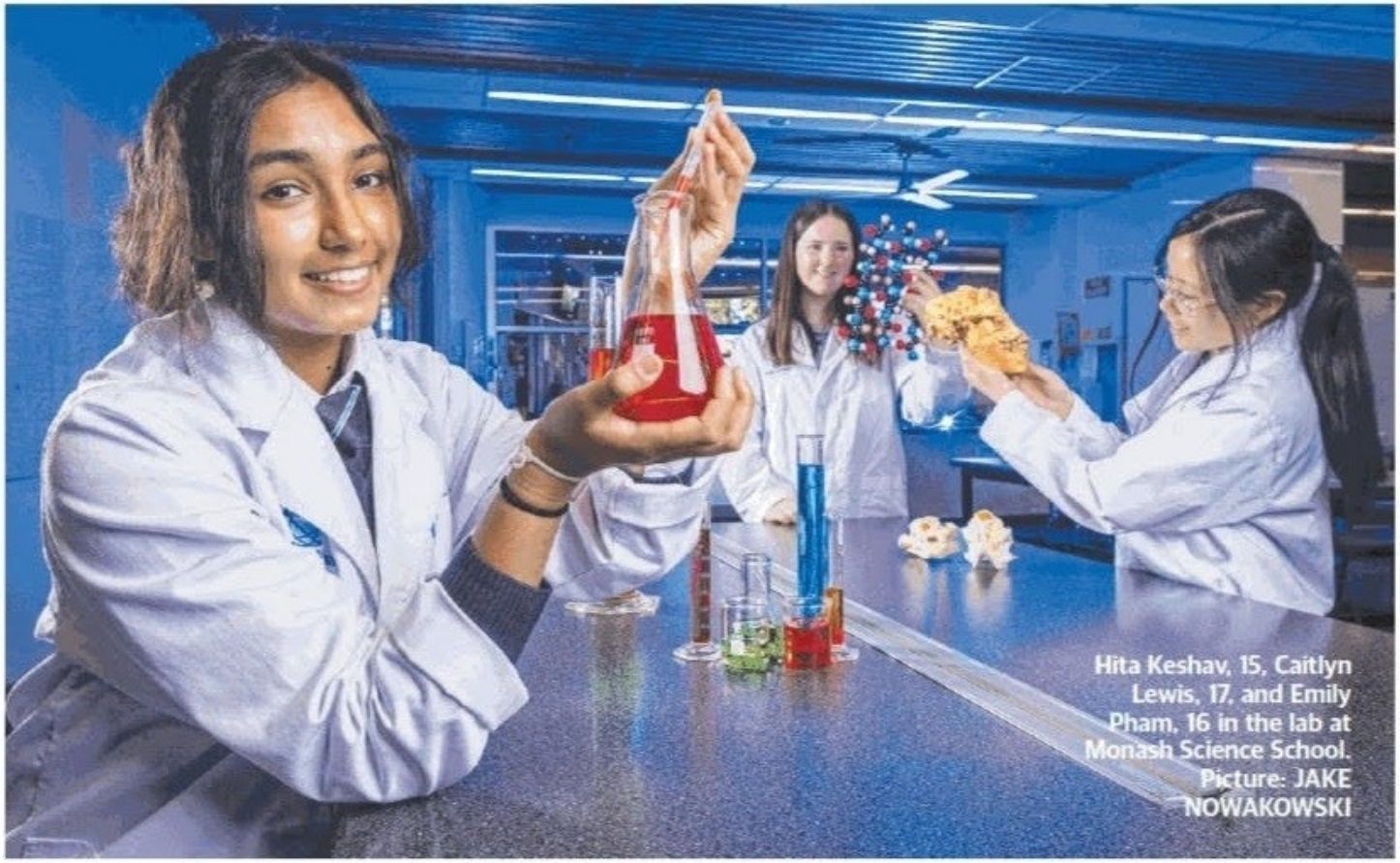
Pestech
Pest Solutions


1
Infected person with Dengue
2
Mosquito takes blood meal with Dengue virus
3
Infected mosquito bites another
4
That person becomes infected
Emergence
Eggs
Larvae
Pupae
20-30 days
4-14 days

Scientific approach

Push to attract girls to STEM

ALANAH FROST



Hita Keshav, 15, Caitlyn Lewis, 17, and Emily Pham, 16 in the lab at Monash Science School. Picture: JAKE NOWAKOWSKI

GIRLS are pursuing careers in science despite being outnumbered by their male peers.

More than 317,000 women were employed in areas of science, technology, engineering or mathematics (STEM) in November 2020 — making up 42.6 per cent of the state workforce for such occupations.

This is an increase on 2019, where 41.4 per cent of STEM workers were women.

But women and girls are still less likely to complete tertiary education in STEM than their male counterparts, something the science, medical and education communities are trying hard to change.

Liz Baker, a neonatologist and researcher at the Royal Women's Hospital, works with babies who are born premature or sick.

"There's lots of stereotypes about labs and white coats, but what a career in science can actually look like is so much more varied," Dr Baker said. "Research wasn't at the forefront of my career plans when I started medicine and it was probably being exposed to that as a junior doctor that inspired me to go down that path."

Dr Baker is taking part in the hospital's virtual Meet A Scientist event, which is being held on Thursday to mark the International Day of Women and Girls in Science, and will be broadcast to more than 4500 Australian school girls.

Caitlin Lewis, 17, a year 12 student and vice-captain at John Monash Science School in Clayton, will be attending.

"My first dream career was to be an astronaut, so I've always wanted to go into STEM," she said. "I want to try and make the world a better place and by going into science you learn about how the world works and what needs to be improved."

She said it was daunting that in many areas, particularly engineering, women were still outnumbered, but said it was "important to try and break the stereotypes, and try and spark some curiosity" so women will pursue a career in STEM.

Sue Matthews, chief executive at RWH said: "In Australia, just 20 per cent of girls are interested in a STEM-related career, versus 40 per cent of boys.

"Statistics like this underline the importance of supporting, encouraging and elevating women in science."

alanah.frost@news.com.au

ExpreS^2 Platform Solves Tough Protein Expression Challenges

ExpreS^{2}ion Biotechnologies specialises in solving the toughest protein expression challenges using a tailor-made Schneider 2 (S2) system, derived from one of the most commonly used Drosophila melanogaster (fruit fly) cell lines.

The highly experienced scientists at ExpreS2ion Biotechnologies are driven by the idea that they can solve uniquely difficult protein challenges that no one else can. They are specialised in developing cell lines and processes based on a non-viral Drosophila S2 cells expression system.

"Over 250 proteins have so far been expressed by using our proprietary non-viral insect cell expression system, ExpreS2. It has demonstrated a success rate of 90% even for proteins where other systems have failed," says Steen Klysner, PhD, CEO of ExpreS2ion Biotech Holding AB and ExpreS^{2}ion Biotechnologies ApS in Hørsholm, Denmark.

One of the advantages of their system is that it's very robust, which means that their products are easier to handle and more harmonious up-stream. The stable cell lines also contribute to higher yields and the system is generally faster than mammalian systems. "Our platform perfectly supports all phases of drug discovery, R&D and manufacturing," he adds.

The system has been developed since 2002 and has been commercially available since 2010. Recently, some of the projects using the ExpreS2 platform have entered clinical phase. In October 2016, ExpreS^{2}ion Biotechnologies for instance announced that its collaboration partner, the Jenner Institute of the University of Oxford, initiated a Phase I/IIa clinical study to assess the safety, immunogenicity, and efficacy of the blood-stage Plasmodium falciparum malaria antigen RH5.1, which is produced with ExpreS2.

"In this particular case the Jenner Institute faced recombinant protein challenges which could not be solved before they applied our protein expression platform ExpreS^2," Steen Klysner comments.

Process and Production Tool

ExpreS^{2}ion Biotechnologies sell research licences to both companies and academic research labs and they want ExpreS2 to be identified as a process and production tool and to enter their customers' processes at an early stage.

"Market wise, Europe and the US are closest to where we are and our most recent licence was signed with the American company VaxInnate. However, Asia is clearly rising and emerging as an interesting market. In Asia, good entry points to the individual markets are the many fine science parks that have been established throughout the continent, offering both state-of-the-art equipment as well as good contacts."

The entry point doesn't necessarily have to be a company or a university. Organisations like the Bill & Melinda Gates Foundation, WHO and others offer grants to companies fighting Zika, malaria and other diseases. "As soon as there's an indication relevant to what we do, we apply for grants," says Steen Klysner.

How Data Science is making inroads into the Social Sciences

A degree in Social Science with exposure to technological applications and the latest trends and tools of data analytics will allow tomorrow's youth to foray into a plethora of career opportunities

Rajlakshmi.Ghosh
@timesgroup.com

In a world where there is a need to pursue programmes, which equip students with skills that employers demand, the sharing of data resources, collaborative activities, and a culture of drawing from each other's work has become all too important. "An education system that does not equip social science students with tech-driven applications is greatly limiting their career prospects," says James Abdey, associate academic director of the University of London programmes at the London School of Economics (LSE). He explains, "Take the case of a Geography graduate for instance; there is a tremendous demand for Geographic Information Systems (GIS) analysts who are required to routinely deal with large datasets to process and analyse into user-focused displays such as graphics, maps and charts. This work requires extensive knowledge and experience with GIS techniques, technology, and principles, as well as strong proficiency with computers, including R, Python, HTML and Microsoft Office software."

James Abdey

"Today, an Economics graduate will be highly valued as a compliance analyst, with responsibility for ensuring that compliance has been achieved internally as well as externally for a company. Similarly, a graduate who is aiming for public policy can conduct quantitative research using advanced computational and data science techniques such as machine learning (ML)," says Abdey.

While a social science degree can get one started on a wide array of careers in economics, management, social work, law, academia and policymaking, the key here is to have had the relevant exposure to tech applications and data analysis tools needed for the job. "Superior career prospects, job retention, promotion prospects, as well as a marked higher pay bracket are a clear advantage for people with the right technical skills," adds Abdey.

DATA SCIENCE IN DECISION-MAKING

One of the key challenges for decision makers and managers is to understand what makes for good data science, and how the evidence from this field should be used in evaluation and decision-making. "Effective use of data and machine learning tools is critical in making adaptive and personalised policies that improve the standard of living and paves way for the development of society. If integrated well into the policy making process and understood well by policymakers, data analysis has tremendous potential to lead to better decisions. Policy-makers in state departments, for instance, can avail data science to tackle social issues such as traffic, road safety and crime," says Abdey.

"Specific data science tools like R and Python, along with Tableau, will do wonders for various tracks of SocialScience. Then there is Deep Learning, a part of the ML family. At a 'deeper' level, it helps to understand hierarchies, and patterns that can help a system to learn complex functions mapping the input to the output directly from data, without depending entirely on human-made features," says Abdey.

He feels social scientists must shed their inertia and train themselves in data science techniques because these are, ultimately, languages and can be acquired with a finite amount of effort.

More importantly, the data science techniques can help take the investigation of social science questions much deeper; hence facilitate better and smoother social decision-making.

SHUTTERSTOCK

Indian focus on data science

"The Indian education system has traditionally been slow in keeping up with changing industry trends. Thus, the direct integration of data science within social science curricula is still nascent. Some institutes have taken steps such as the School of Management and Labour Studies of the Tata Institute of Social Sciences (TISS) that offers an Executive PG Diploma in Analytics (EPGDA), and Indian School of Business & Finance (ISBF), New Delhi that offers a PG Diploma Programme in Data Science. Academic content for the latter comes from the London School of Economics (LSE)," says Yavar Ehsan, associate professor of Management and Information Systems, ISBF

Engineering students develop robotic arm

It meets the basic daily requirements of an amputee

SPECIAL CORRESPONDENT
KOCHI

Five engineering students of Toc H Institute of Science and Technology at Arakunnam near here have come up with an Electromyography (EMG) controlled prosthetic arm.

The students - Mereena Baby, Aysha Zenab Kenza, Nikitha Sajan, Lakshmi Mohan, and Sharon Alex - are in the final year of their B.Tech Computer Science programme.

A release issued by the college claimed that the robotic arm would meet the basic daily requirements of an amputee, even though it lacked advanced features.

The prosthetic arm is priced at ₹2 lakh while those with advanced features cost anywhere between ₹15 lakh to ₹25 lakh, which is out of the reach of the common man, it said.

The students said that the Myo-armband interprets the electric signals produced as a result of the muscle movements and converts them into accurate hand gestures. They are then read by a micro-controller through a Bluetooth dongle.

Students of Toc H Institute of Science and Technology, Arakunnam, with the Electromyography-controlled prosthetic arm that they developed.

Server motors

Based on those signals read, an appropriate number of server motors are rotated to move the prosthetic limb, they said.

The release said that the product could be made faster and easier by using advanced technologies such as artificial intelligence.

The students expressed the hope that they would get support from investors to take the product to users.

Role of science, technology councils important: Dutta

Three-day annual meeting begins
MPCST Bhopal hosts it for first time

OUR STAFF REPORTER
city.bhopal@fpj.co.in

The role of science and technology councils is important in building the regional ecosystem for science technology and innovation in the country, said Debapriya Dutta.

Advisor and Head, SEED and SSTP Division of Science and Technology, Govt of India, Dutta was speaking on the inaugural day of a three-day annual meeting of the science and technology councils of different states at Amer Greens hotel in the city on Monday.

Madhya Pradesh Council of Science and Technology (MPCST), Bhopal, has organised the event for the first time.

Dutta informed about the meeting and about the plans of DST.

"We cooperate with 29 science and technology councils of the country under the programme and our plan is to encourage the ecosystem of science technology and innovation at the state level," he said.

He further said "We have included 6 parameters to catalyse science, technology and innovation, which are research and development, institutional and human resource development, innovation, technological development for socio-economic development, science communication, science based schemes of the state."

Director of MPCST, Bhopal, Anil Kothari welcomed the heads of the institutions from other states of the country. He said that the meeting would be successful in achieving its objectives as well as it will become a powerful medium to develop STI system for science technology and innovation.

IIT Mumbai Prof B Satish Agnihotri presided over the event. He said that important work was being done for the development of science and technology in the country.

The annual meeting is organised by the Department of Science and Technology, Government of India every year at different places in the country.

It is attended by the Director General/Member Secretary and senior scientists of the Science and Technology Councils of the states.

During this, the expert committee constituted by the Ministry of Science and Technology, Government of India, is reviewed by eminent scientists of the country and suggestions are made for new activities/programmes.

Bengaluru gets India's first space tech gallery

TIMES NEWS NETWORK

Bengaluru: Imagine experiencing live satellite launches held at Sriharikota's Satish Dhawan Space Centre in Bengaluru. Now this is possible at the country's first Space Technology Gallery, set up at Visvesvaraya Industrial and Technological Museum (VITM), in collaboration with Indian Space Research Organization (Isro).

The gallery, which is dedicated to Indian space technology and its space-related achievements, has been curated with smaller replicas of launchpads at the Sriharikota launch complex and demonstrates how rockets are used to launch satellites. It shows the actual launch sequence from countdown till the rocket takes off, at the press of a button.

The gallery was inaugurated by Isro chairman A S Kiran Kumar and chairman of National Education Policy and Karnataka Knowledge Mission,K Kasturirangan, on Tuesday. "This gallery will give students a chance to learn about India's achievement in space technology over the years. And you never know when this will push imagination of youngsters to do something more innovative in the field," said Kasturirangan.

Kiran Kumar said, "Isro is trying to reach out to many people to impart knowledge about Indian space technologies. Soon, young scientists can pick a satellite and do research with data available with Isro."

A special section has been dedicated to APJ Abdul Kalam, who headed the Rohini satellite project at Isro. The original heat shield – SLV 3 – used at that time has been displayed at the gallery, said VITM director K G Kumar. Starting from Aryabhata, India's first satellite, to Aditya, a satellite to study the sun, the gallery has an interactive display of many Isro satellites.

MAIN ATTRACTIONS

NEW CHAPTER: The space gallery was inaugurated by Isro chairman A S Kiran Kumar and K Kasturirangan, chairman of National Education Policy

- A peep into lives of Wing Commander Rakesh Sharma, Kalpana Chawla and Sunita Williams
- A mission control room to show how satellites are launched
- Inner structures and components of satellites and rockets
- Images of Himalyan glaciers and Bengaluru Metro stations taken from space
- Real-time satellite feeds from Isro

Next gallery in New Delhi

After setting up the first one in Bengaluru, the National Council of Science Museums is planning the next Space Technology Gallery in New Delhi. "We are holding talks with Isro," said AS Manekar, director general, NCSM.

Using insect cells in biotechnology for better protein production

ExpreS2ion Biotechnologies ApS is a contract research organisation and vaccine development company with a development and production platform based on S2 fruit fly cells. Its ExpreS2 platform plays a key role in drug discovery, R&D, GMP manufacturing and in human clinical trials

For a company that only started in 2010 as a spin out of the proprietary S2 protein expression platform from the Danish company Affitech A/S, ExpreS2ion Biotechnologies ApS is completing 2017 celebrating some key events: a grant for development of a Zika vaccine; agreements including Abivax SA, Integrated BioTherapeutics, Inc., the University of Pennsylvania, Institut Virion/Serion GmbH, and Intravacc; creation of a joint venture, AdaptVac ApS, with NextGen Vaccines ApS; beginning a Phase 2a clinical trial for a malaria vaccine; and proof-of-concept in animals for a prophylactic breast cancer vaccine.

"ExpreS2ion Biotechnologies grew out of our founders' expertise in protein expression, production and vaccine development. We started from a small place, but we are now gaining traction, and getting repeat business for our services," said Bent U. Frandsen, vice president, Business Development.

ExpreS2ion Biotechnologies is built around the ExpreS2 non-viral insect cell expression system. This is based on Drosophila cells and provides high protein expression levels with high batch to batch consistency. ExpreS2 is a protein expression system that can express proteins when other systems fail. The company has several arms: services, diagnostics, tools for R&D, a platform for vaccine development with collaborators, and finally, its own pipeline, through a new joint venture, AdaptVac, established in 2017.

Services

ExpreS2ion provides a range of services based on its protein expression platform. These include feasibility studies confirming that proteins can be expressed by the system, protein production, process development, and the provision of R&D reagents. Process development starts with a DNA sequence and moves through cloning, screening and expression tests, through establishment of stable cell lines and providing production and purification batches, to scale up and developing GMP (good manufacturing practice)-compatible processes. In December 2017, ExpreS2ion signed a collaboration agreement with the Netherlands-based Intravacc (the Institute for Translational Vaccinology), making Intravacc a preferred GMP partner to ExpreS2ion.

"The development timeline of applying ExpreS2 is fast, which is advantageous because speed is important in research. The time from DNA to stable cell line and material can be as little as three weeks. Our platform has been approved for clinical applications," said Frandsen.

ExpreS2ion has a variety of different partners and customers in biotech, big pharma, medtech, diagnostics and academia, including Novartis, Roche and Merck Millipore. The company has made over 250 proteins and virus-like particles for clients to date, with over half targeting parasites and virus for use in vaccines. Other applications include toll-like receptors, cytokines and enzymes. ExpreS2ion also offers licenses to its expression system for use in house.

"These deals typically run for 6 or 12 months initially, but they are often extended," said Frandsen.

A number of vaccines developed using ExpreS2ion's technology platform have moved into preclinical and clinical development with partners and collaborators, validating the company's platform. The France-based company Abivax entered a commercial license agreement to use ExpreS2ion's technology for its preclinical ABX544 Ebola prophylactic and therapeutic anti-serum programme. ExpreS2ion is also involved in two malaria programs, that have moved into clinical trials: a blood stage malaria vaccine candidate developed by the University of Oxford/Jenner institute that is presently in a Phase 2a clinical trial; and a placental malaria vaccine candidate presently in Phase 1a/b trials in collaboration with University of Tübingen and University of Copenhagen made under an EU FP7 grant.

VP Bent U. Frandsen. Photo: Louise Dyring Mbae

Building a pipeline through a joint venture

Established in June 2017, AdaptVac, the joint venture between ExpreS2ion and NextGen Vaccines, combines ExpreS2ion's ExpreS2 platform and NextGen's virus-like particle technology. The lead candidate, AV001, is a HER-2 VLP protein using ExpreS2 technology for expression, which is currently in preclinical development for breast cancer. In an animal model, the vaccine was able to both prevent and treat breast cancer.

"What makes the AdaptVac vaccines different is that these deliver the right protein to the right target by using VLP technology to deliver direct to the target for a better uptake," said Frandsen.

AdaptVac also has a second vaccine candidate, AV002, in the pipeline for an undisclosed indication.

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Indian Ocean warming has reduced rainfall, says study

Sudha.Nambudiri
@timesgroup.com

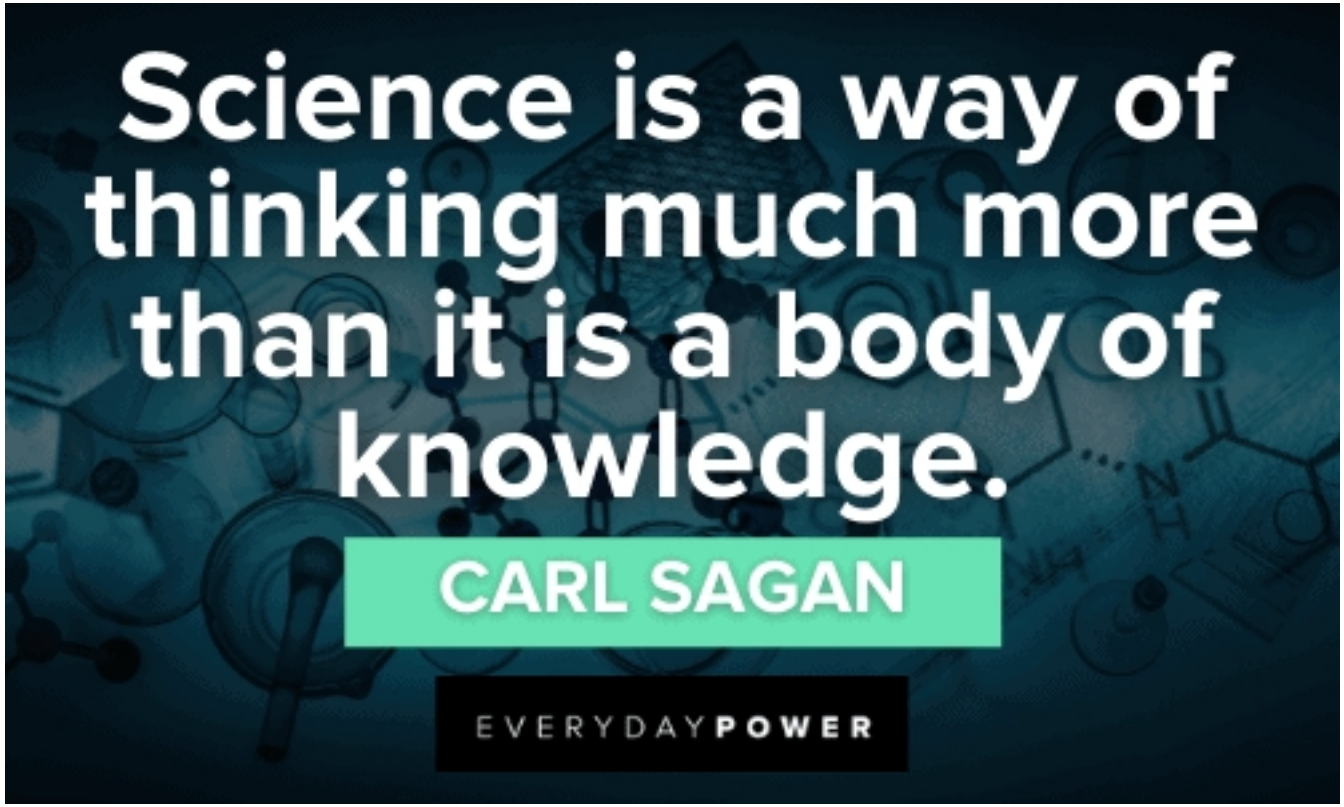
Kochi: Contradicting earlier climate models that indicated that land was warming faster than the ocean, and thus bringing more rainfall, a new study published in journal 'Nature Communications' on Tuesday suggests a significant decreasing trend in the Indian monsoon over central India in the past century.

The study suggests that Indian Ocean warming has reduced rainfall in the region by 10-20%.

"In the existing global warming scenario, it was projected that land was warming faster than the ocean which meant that there would be more rainfall in the monsoon period. But it is not so in case of the Indian summer monsoon," said Roxy Mathew Koll, scientist and lead author at the Centre for Climate Change Research, Indian Institute of Tropical Meteorology (IITM).

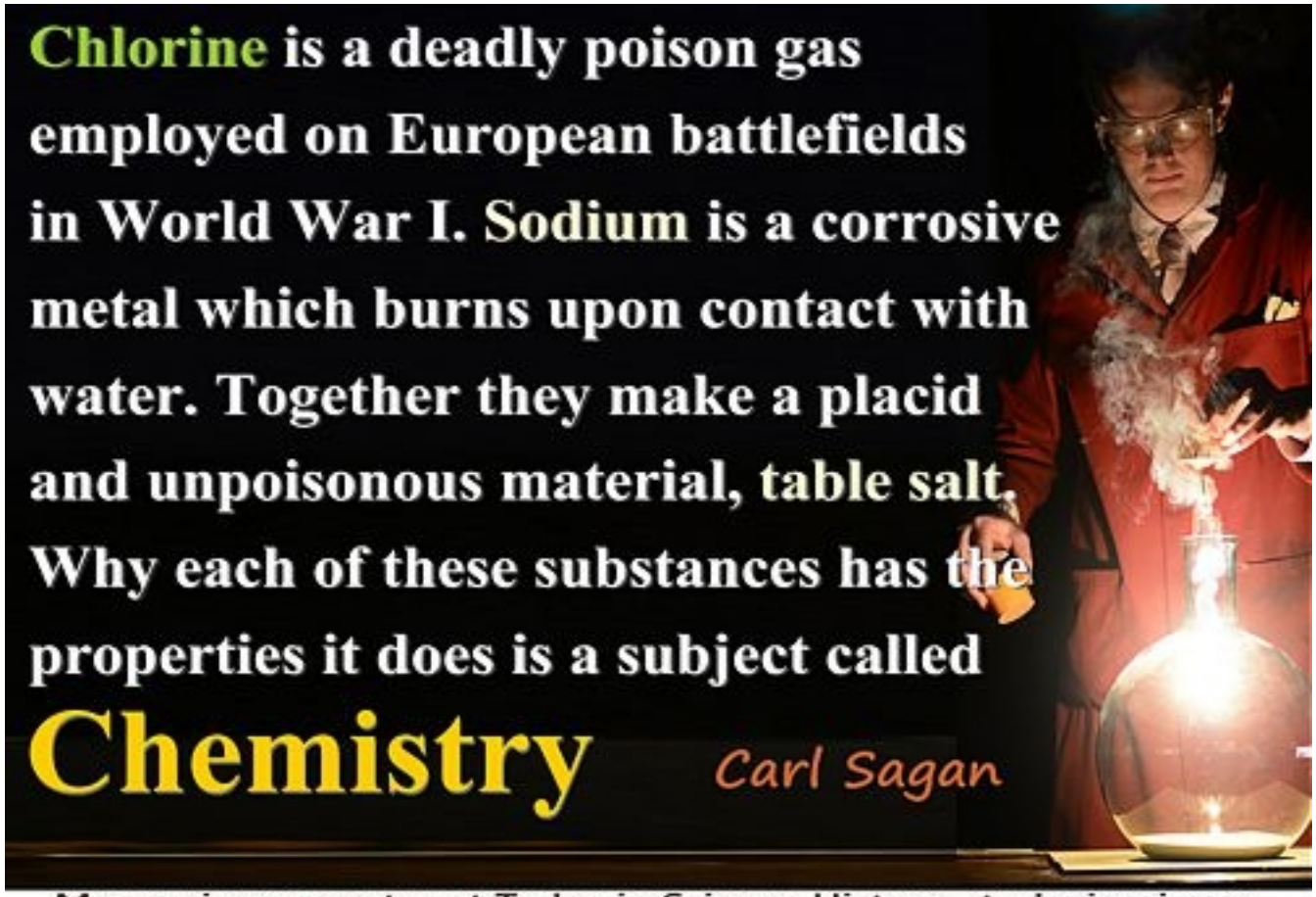
At a time when a back-to-back drought is looming, the study points out that monsoon drivers – land-sea temperature difference and sea surface temperatures – which bring in rains have not become stronger. The El Nino-La Nina imbalance, it adds, has played a role in the Indian Ocean warming.

Authors of the study used India Meteorological Department data from the 1870s and data from other sources from 1901 to 2012 to run their climate model. "We found that the rainfall is decreasing over central South Asia – from south of Pakistan through central India to Bangladesh," Roxy said. "With this, we have to take a relook at climate models which suggested that land in the region was warming faster than the ocean."


Science is a way of thinking much more than it is a body of knowledge.
CARL SAGAN
EVERYDAYPOWER

“Nothing in life is to be feared, it is only to be understood. Now is the time to understand more, so that we may fear less.”

—Marie Curie



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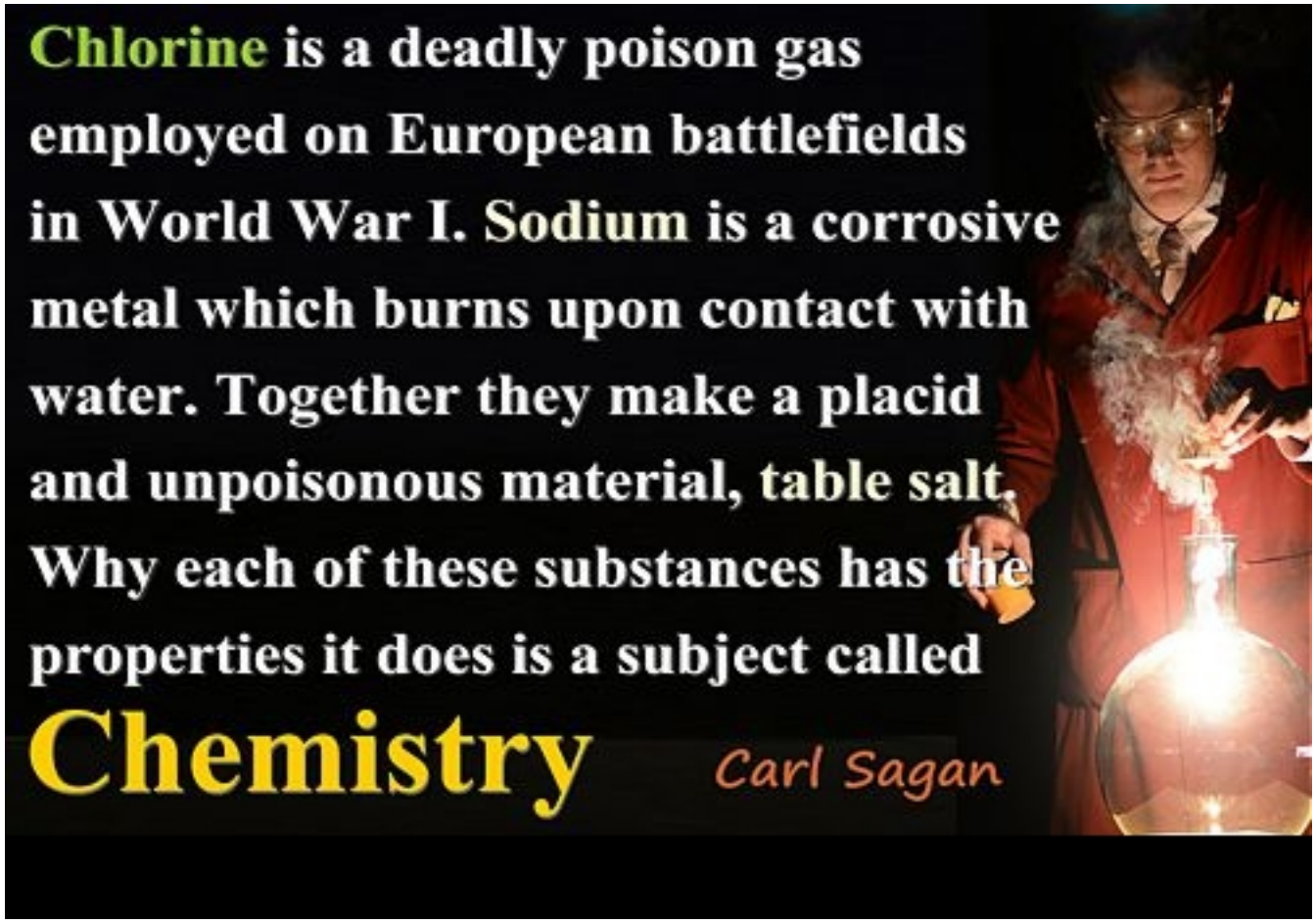
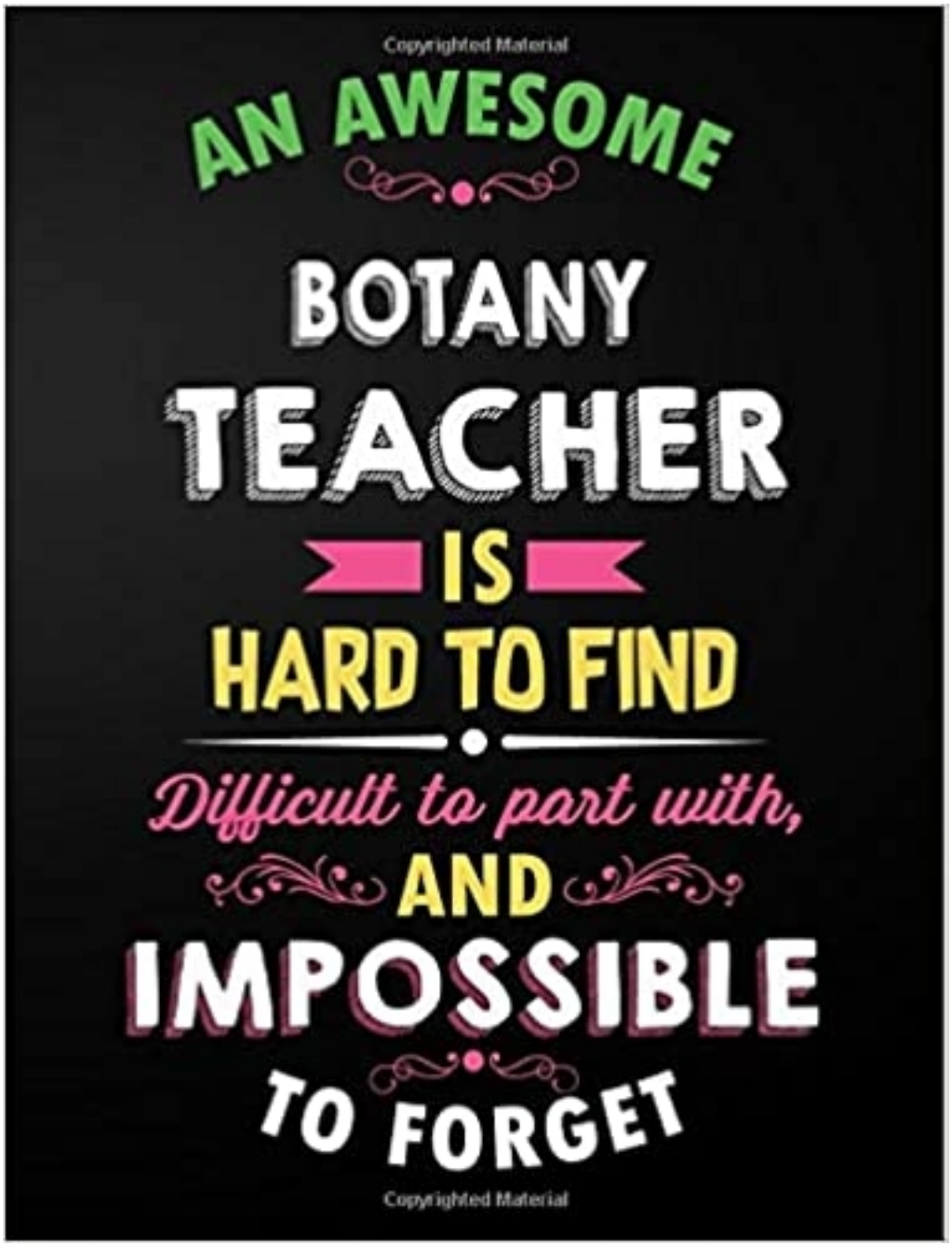
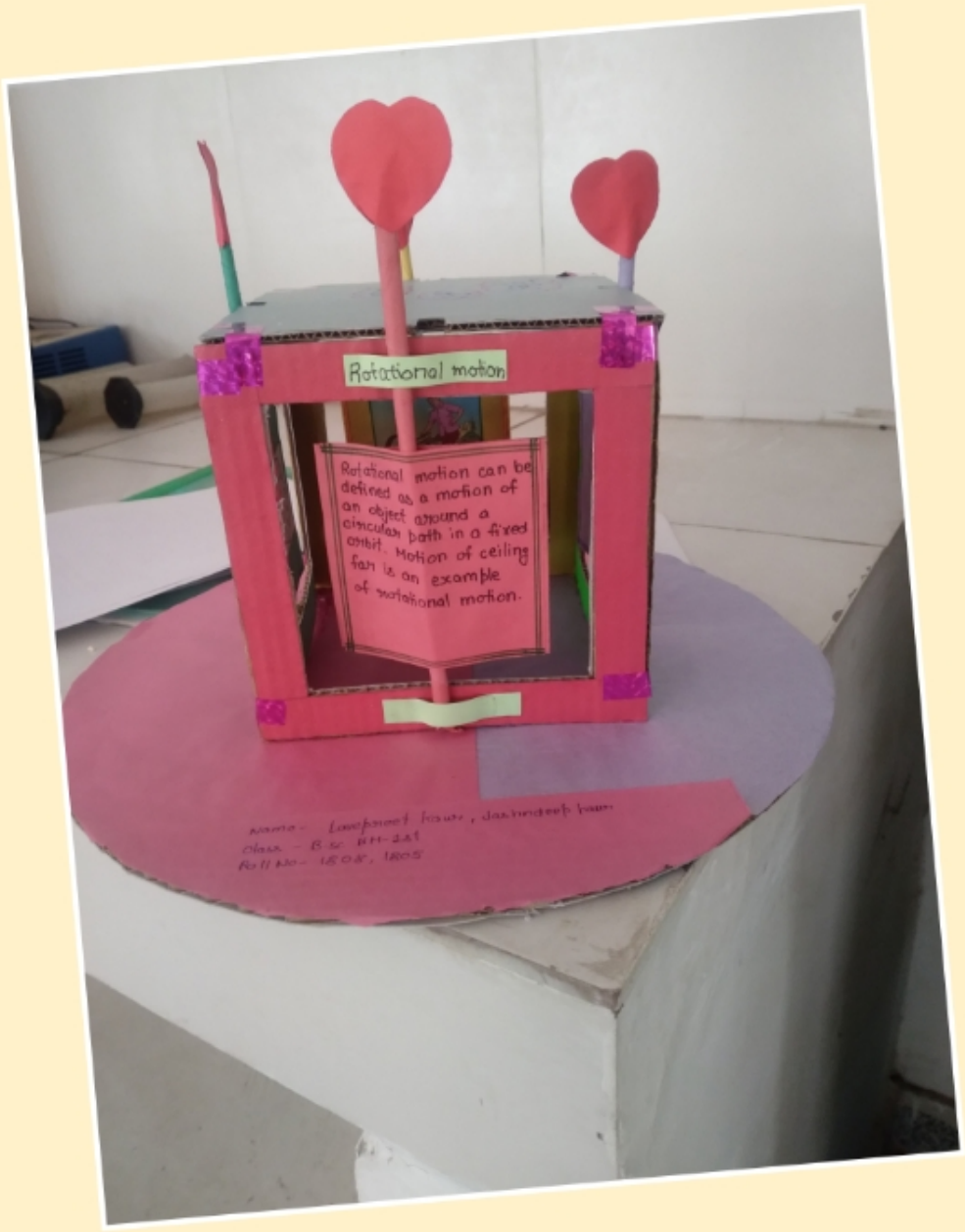

Chlorine is a deadly poison gas
employed on European battlefields
in World War I. Sodium is a corrosive
metal which burns upon contact with
water. Together they make a placid
and unpoisonous material, table salt.
Why each of these substances has the
properties it does is a subject called
Chemistry
Carl Sagan

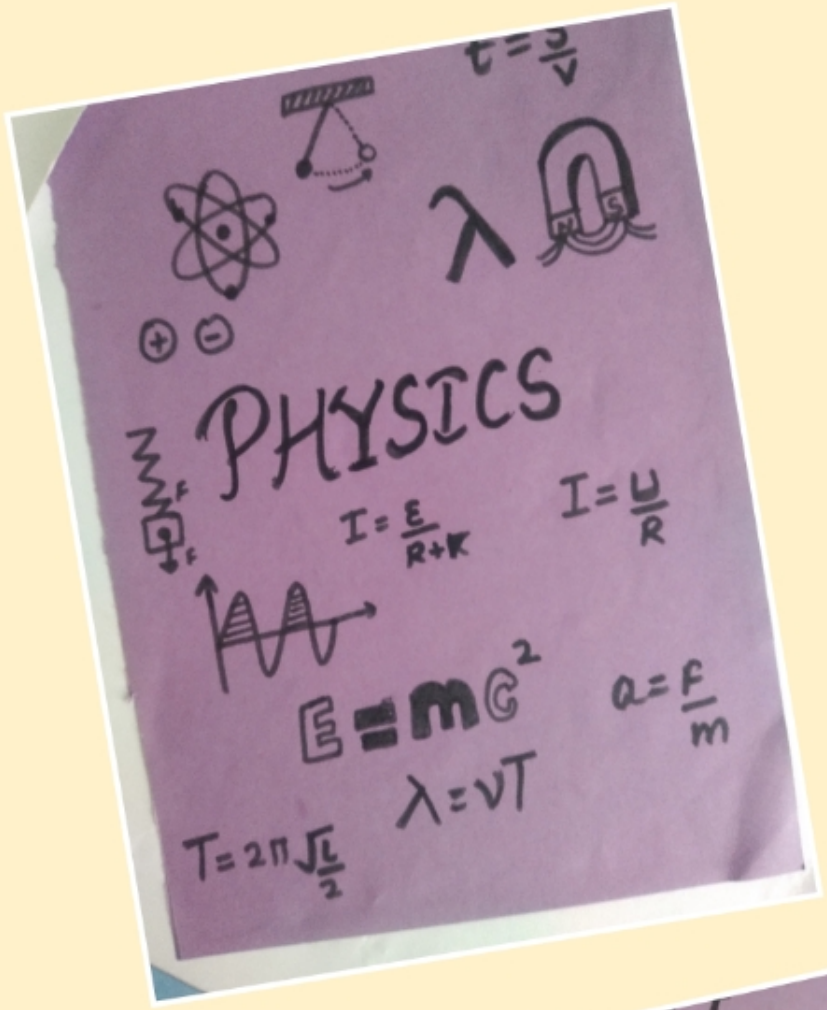

Copyrighted Material
AN AWESOME
BOTANY
TEACHER
IS
HARD TO FIND
Difficult to part with,
AND
IMPOSSIBLE
TO FORGET
Copyrighted Material

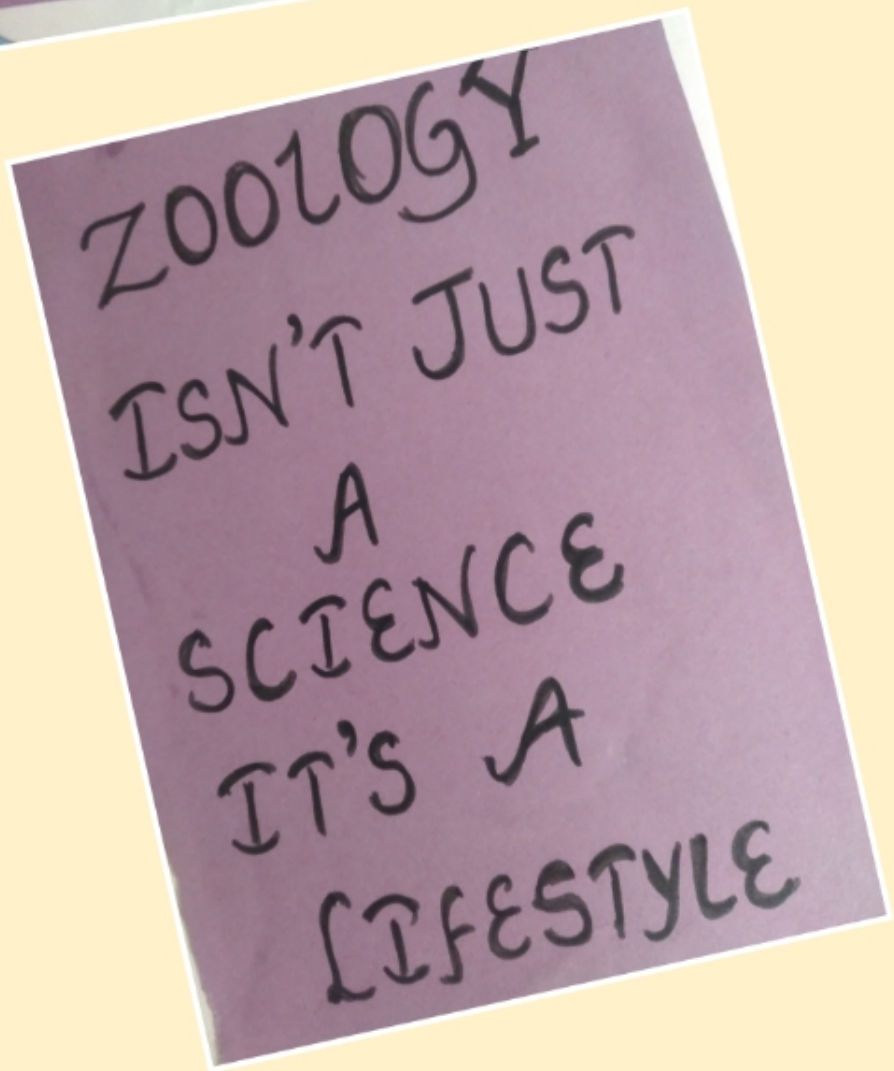

Eco Club
Under
National Green Corps Programme-2022

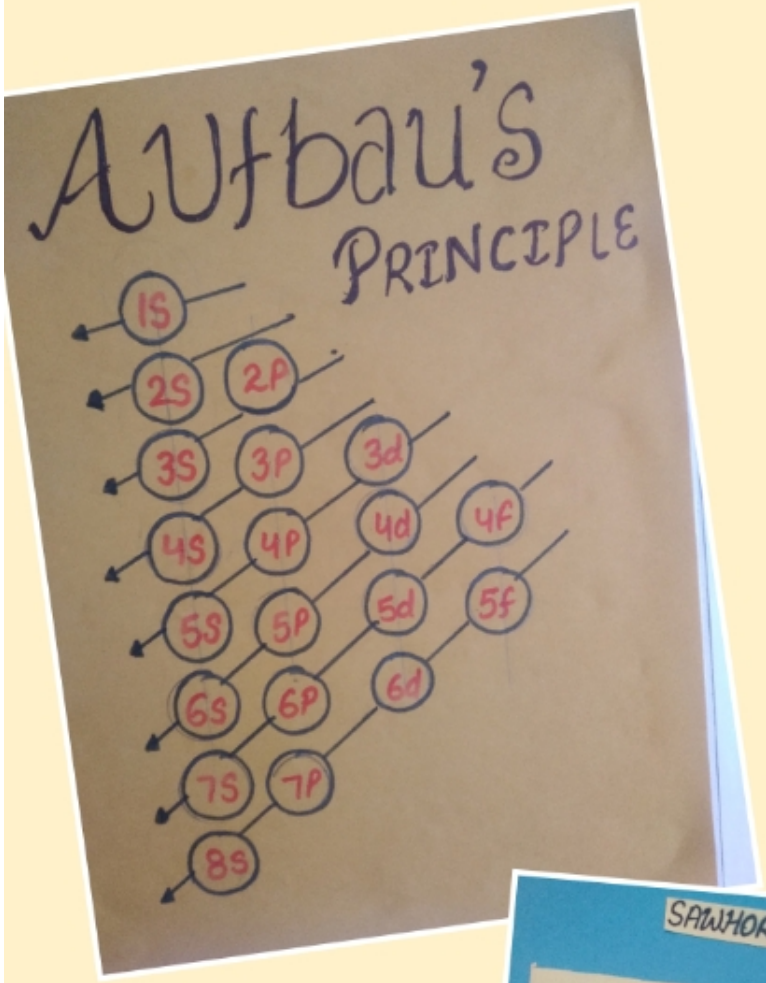

Eco Club
Under
National Green Corps Programme-2022

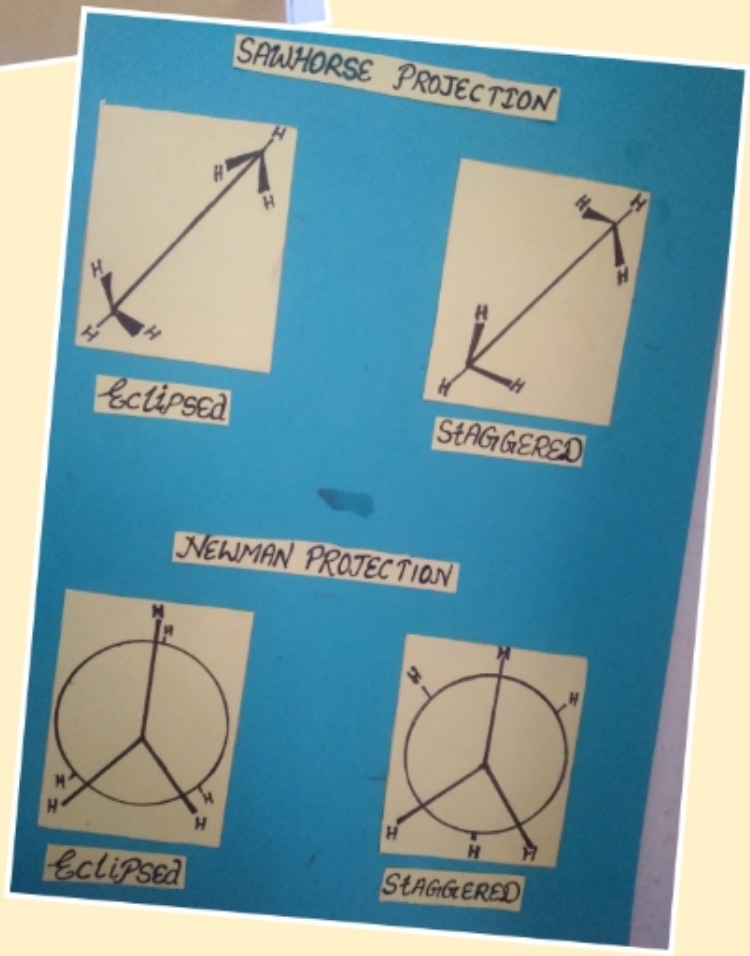

Rotational motion
Rotational motion can be defined as a motion of an object around a circular path in a fixed orbit. Motion of ceiling fan is an example of rotational motion.


A FOOD WEB
GLOBAL WARMING


PHYSICS
$t=\frac{s}{v}$
λ
$I=\frac{\varepsilon}{R+r}$
$I=\frac{U}{R}$
$E=mc^2$
$a=\frac{F}{m}$
$\lambda=vT$
$T=2\pi\sqrt{\frac{l}{g}}$

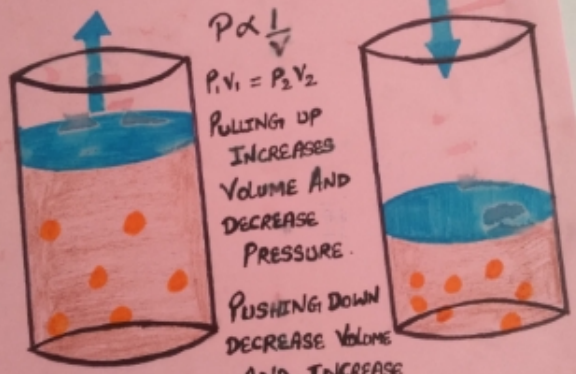

ZOOLOGY
ISN'T JUST
A
SCIENCE
IT'S A
LIFESTYLE


Aufbau's
PRINCIPLE
1S
2S
2P
3S
3P
3d
4S
4P
4d
4f
5S
5P
5d
5f
6S
6P
6d
7S
7P
8S


SAWHORSE PROJECTION
Eclipsed
STAGGERED
NEWMAN PROJECTION
Eclipsed
STAGGERED

BOYLE'S LAW

THE PRESSURE OF A GAS INCREASES AS ITS VOLUME DECREASES. ASSUMING CONSTANT MASS AND VOLUME.



$P \propto \frac{1}{V}$

$P_1V_1 = P_2V_2$

PULLING UP INCREASES VOLUME AND DECREASE PRESSURE.

PUSHING DOWN DECREASE VOLUME AND INCREASE PRESSURE.

atom

DALTON

THE SMALLEST PARTICLE OF MATTER IS INDIVISIBLE AND INDESTRUCTIBLE.
ATOM OF SAME ELEMENT ARE THE SAME.

THOMSON

THE SMALLER PARTICLE IS DISCOVERED.
HE ELECTRONS HAVE MASS AND CHARGE.
HE ATOM IS INDIVISIBLE.

RUTHERFORD

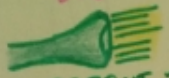
DISCOVERY OF PROTONS.
NOT COMPACT ELECTRONS ARE SPINNING.

BOHR

HE ELECTRONS MOVES BY LEVELS.
OT ALL LEVELS ARE ALLOWED.
HE ENERGY IS ABSORBS IS THE 'PHOTON'

Light Energy

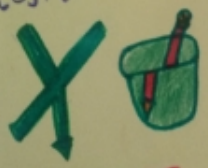
Light travels in a



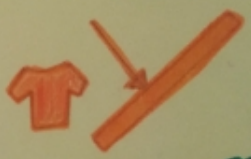
STRAIGHT LINE

DISPERSION

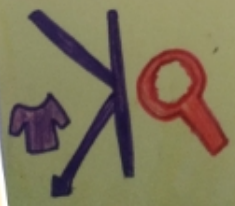
REFRACTION



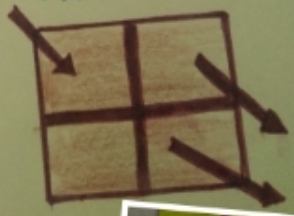
Absorbs



REFLECTION



TRANSMITS



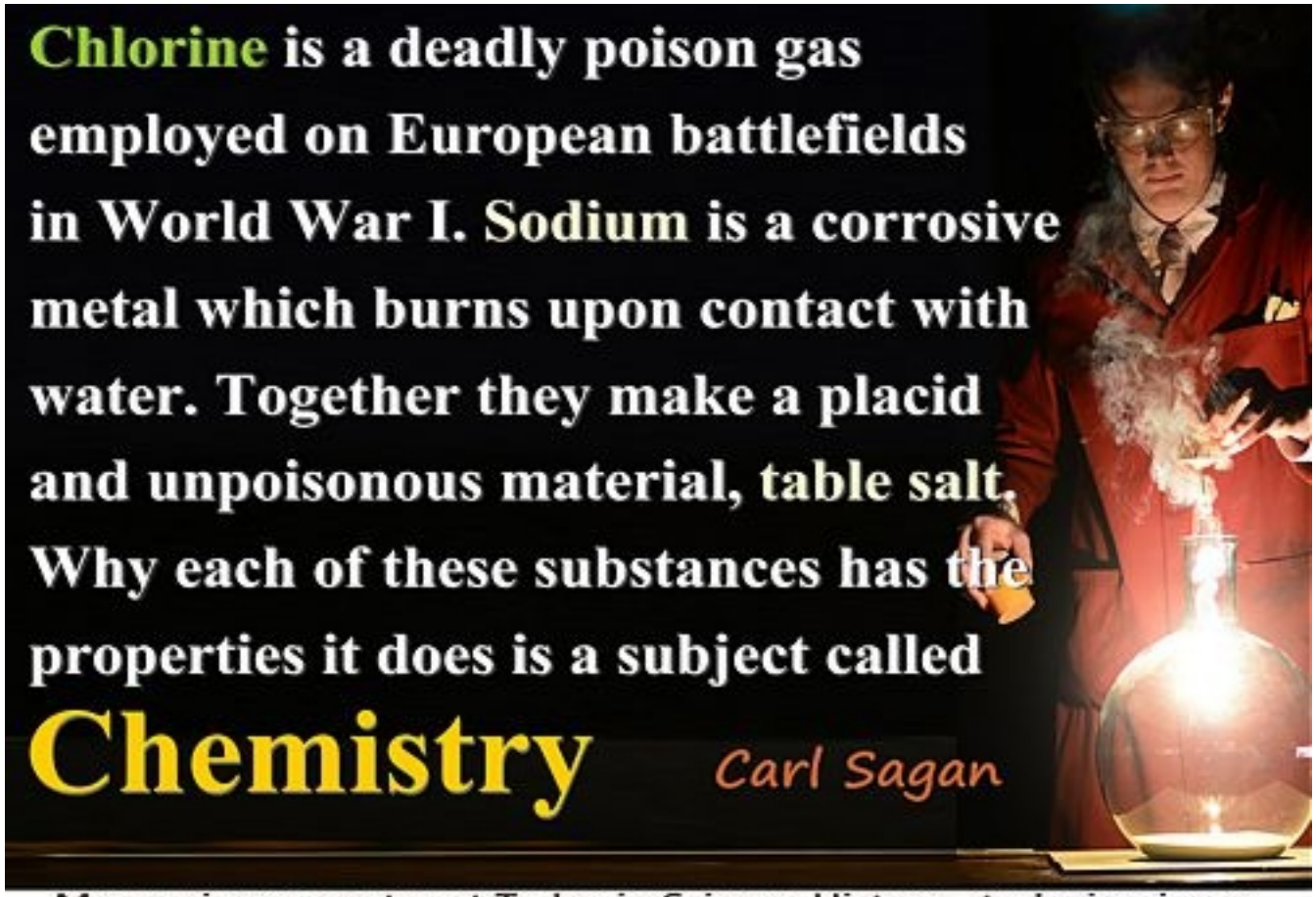
LAWS OF MOTION

FIRST LAW :→ EVERY BODY REMAINS IN REST OR UNIFORM MOTION UNLESS AN EXTERNAL FORCE APPLIED.

SECOND LAW :- FORCE IS DIRECTELY PROPORTIONAL TO CHANGE IN MOMENTUM OVER TIME

$$F = \frac{-dP}{dt}$$

THIRD LAW :→ TO EVERY ACTION THERE IS EQUAL AND OPPOSITE REACTION.



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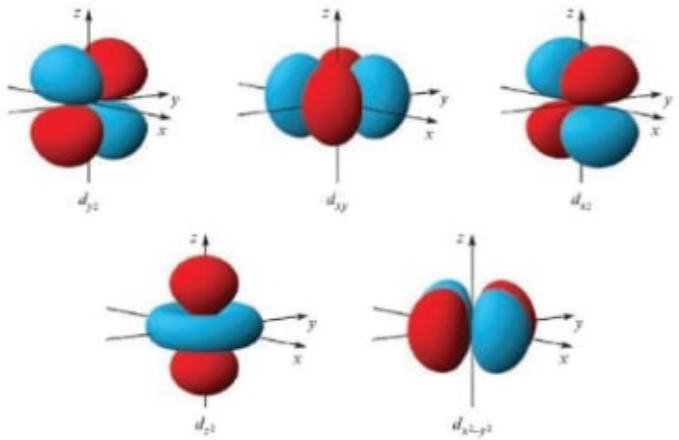
Crystal Field Theory

Explain Crystal Field Theory

CFT

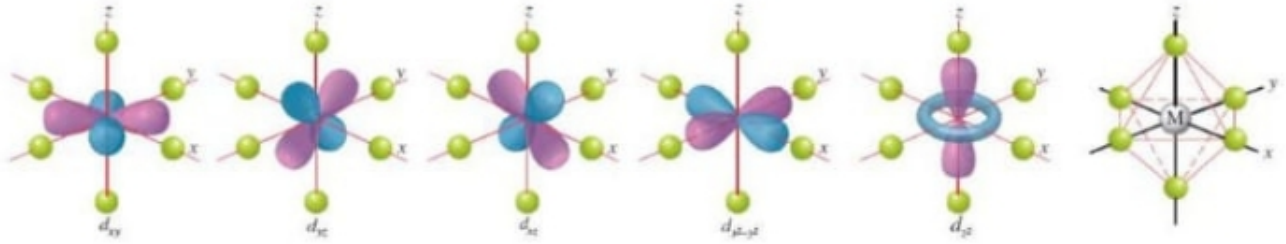
- Crystal field theory is based upon orbitals but does not go fully into all of the molecular orbitals and potential combinations etc. (That is called Ligand Field Theory–vide supra)
- With CFT we are just going to consider the d-orbitals and how they can interact with ligands
    - d-orbitals are highly directional



- most TM compounds adopt an octahedral geometry with six ligands about the metal centre
    - Overall this is a highly energetically favourable process (opposite charges attract)

Bonding in Transition Metal Complexes

- Crystal field theory of bonding in octahedral coordination complexes
- *In the absence of any ligands, the five d-orbitals are degenerate.*
- An octahedral metal complex, $[M(L)_6]^{n+}$, can be viewed as six negative point charges approaching a metal cation (overall, a very stabilizing interaction).



- In presence of ligands, degeneracy is removed. That means the d-orbitals have different energies or they are split
    - The net result is the colouration of transition metal complexes.

Crystal Field Theory: d-Orbital Splitting

- Each ligand lone pair about the metal centre represents a negative point charge directed towards the metal atom.
- These 'charges' coulombically repel electrons in those d-orbitals closest to them, leading to destabilisation (i.e. an increase in energy of those d-orbitals that are close)

Explain the impacts of crystal theory on the degeneracy of the d-orbitals

Construct an Orbital Diagram to show d-orbitals in an octahedral complex

Wall Magazine

Department of Mathematics

Harmandeep Kaur

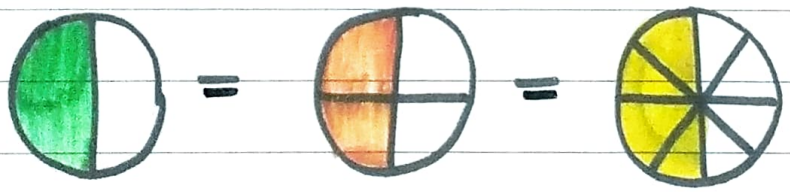
Equivalent Fractions

Equivalent means EQUAL!

* Fraction that are the same size cover the same area of a whole or are on the same point on a # line

* A fraction that's has the same value but has a different numerator and deromінator

∴ Numerador/Denome



Harmandeep Kaur

HOW TO Make Equivalent Fractions

Multiply or divide a fraction by another fraction that is equal to one

Examples:

$\frac{1}{3} \times \frac{2}{2} = \frac{2}{6}$ $\quad\quad$ $\frac{1}{3} \times \frac{4}{4} = \frac{4}{12}$

$\frac{24}{36} \div \frac{12}{12} = \frac{2}{3}$ $\quad\quad$ $\frac{18}{24} \div \frac{6}{6} = \frac{3}{4}$

Check to see if fraction are equivalent

$\frac{1}{2} \times \frac{2}{4} = \frac{4}{4}$ $\quad\quad$ $\frac{1}{2} \times \frac{3}{6} = \frac{6}{6}$

Topic

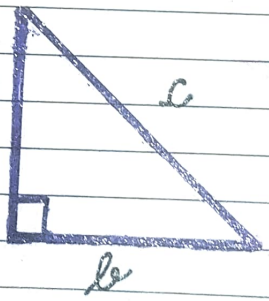
Date

Pythagoras' Theorem :

Phythagoras's Theorem states that the square of the longest side of a right angled triangle (called the hypotenuse) is equal to the sum of the squares of the other two sides.

Pythagoras' Theorem is:

$$a^2 + b^2 = c^2$$



Perpendicular + Base
= Hypotenuse

Topic

Date

All Formula Of Trigonometry

$$\sin\theta = \frac{\text{Perpendicular}}{\text{Hypotenuse}}$$

$$\cos\theta = \frac{\text{Base}}{\text{Hypotenuse}}$$

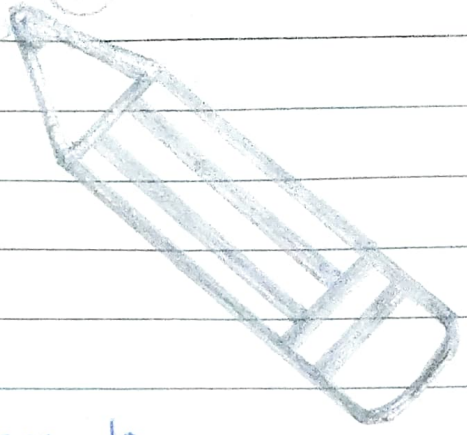
$$\tan\theta = \frac{\text{Perpendicular}}{\text{Base}}$$

$$\text{Cosec}\,\theta = \frac{\text{Hypotenuse}}{\text{Perpendicular}} = \frac{1}{\sin\theta}$$

$$\sec\theta = \frac{\text{Hypotenuse}}{\text{Base}} = \frac{1}{\cos\theta}$$

$$\cot\theta = \frac{\text{Base}}{\text{Perpendicular}} = \frac{1}{\tan\theta}$$

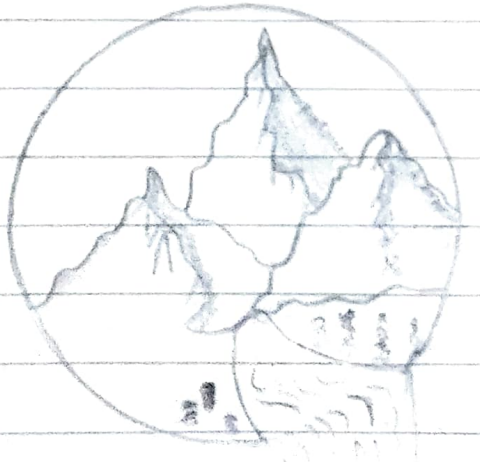
TOPIC DATE



without Mathematics,
There's Nothing you can do.

Everything around you
is mathematics.

Everything around you
is Numbers.



MATH OPERATIONS

+ADD+

$$\begin{array}{r} {\scriptstyle 1\ 1} \\ 128 \\ +\,114 \\ \hline 242 \end{array}$$

128 ← addend
114 ← addend
242 ← sum

combine +
find sum +

-SUBTRACT-

find the difference

$$\begin{array}{r} {\scriptstyle 2}\quad{\scriptstyle 12} \\ 5\not{3}\not{2} \\ -\,209 \\ \hline 323 \end{array}$$

compare
take away
find missing part
how many more?

×MULTIPLY×

— group of —

(III) + (III) + (III) = equal group

array 3×5=15

— rows of —

4×3=12

5+5+5=15 Repeated addition

÷DIVIDE÷

split — divide into

— groups

pass out

divide equally

15÷3 = 5

— split into — rows

PRODUCT OF SUM FORMULAS

$$\sin x \sin y = \frac{1}{2}[\cos(x-y) - \cos(x+y)]$$

$$\cos x \cos y = \frac{1}{2}[\cos(x-y) + \cos(x+y)]$$

$$\sin x \cos y = \frac{1}{2}[\sin(x+y) + \sin(x-y)]$$

$$\cos x \sin y = \frac{1}{2}[\sin(x+y) - \sin(x-y)]$$

$$\sin x + \sin y = 2\sin\left(\frac{x+y}{2}\right)\cos\left(\frac{x-y}{2}\right)$$

$$\sin x - \sin y = 2\cos\left(\frac{x+y}{2}\right)\sin\left(\frac{x-y}{2}\right)$$

$$\cos x + \cos y = 2\cos\left(\frac{x+y}{2}\right)\cos\left(\frac{x-y}{2}\right)$$

$$\cos x - \cos y = -2\sin\left(\frac{x+y}{2}\right)\sin\left(\frac{x-y}{2}\right)$$

Topic Date Page

Mathematics

Mean

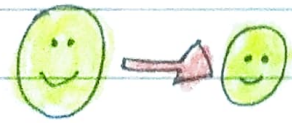
The **sum** of a set of numbers **divided** by the numbers in the set.

Median

The **middle** number when data are arranged in numerical order.

Mode

The number that occurs **most often** in a set of numbers



Range

The **difference** between the **greatest** and **least** number in a set of data.

Topic _____ Date _____ Page _____

Algebraic formulas

$(a+b)^2 = a^2 + b^2 + 2ab$

$(a-b)^2 = a^2 + b^2 - 2ab$

$a^2 - b^2 = (a+b)(a-b)$

$a^2 + b^2 = (a+b)^2 - 2ab$ or $a^2 + b^2 = (a-b)^2 - 2ab$

$a^3 + b^3 = (a+b)(a^2 - ab + b^2) = (a+b)^3 - 3ab(a+b)$

$a^3 - b^3 = (a-b)(a^2 + ab + b^2) = (a-b)^3 + 3ab(a-b)$

$2(a^2 + b^2) = (a+b)^2 + (a-b)^2$

$(a+b)^2 - (a-b)^2 = 4ab$

$a^4 + b^4 = (a+b)(a-b)[(a+b)^2 - 2ab]$

$(a-b)^2 = (a+b)^2 - 4ab$

$(a+b)^2 = (a-b)^2 + 4ab$

$a^4 + b^4 = [(a+b)^2 - 2ab]^2 - 2(ab)^2$

$(a+b+c)^2 = a^2 + b^2 + c^2 + 2ab + 2bc + 2ca$

$(a-b-c)^2 = a^2 + b^2 + c^2 - 2ab + 2bc - 2ca$

$a^3 + b^3 + c^3 - 3abc = (a+b+c)(a^2 + b^2 + c^2 - ab - bc - ca)$

$a^4 + a^2b^2 + b^4 = (a^2 + ab + b^2)(a^2 - ab + b^2)$

if $a+b+c = 0$ then $a^3 + b^3 + c^3 = 3abc$

$a^8 - b^8 = (a^4 + b^4)(a^2 + b^2)(a+b)(a-b)$

Serial No. Notes Date

Mathematics Symbols

Symbol	Meaning	Symbol	Meaning
+	Plus	:	Ratio; Is to
−	Minus	::	As
±	Plus or Minus	'	First Derivative
×	Multiplied by	''	Second Derivative
·	Multiplied by	~	Difference
÷	Divided by	...	Ellipse
/	Divided by	!	Factorial
=	Equals	∀	For All
>	Is Greater than	∃	Exists
<	Is less than	Δ	Finite Difference, Increment
≤	Is less than or Equal to	∴	Therefore
≥	Is Greater than or Equal to	∵	Because
%	Percent	⊥	Perpendicular
√	Root	∝	Proportional to
π	Pi (3.1416)	∩	Intersection
°	Degree	∪	Union
∞	Infinity	⊂	Subset
≡	Identical to, Congruent	⊄	Not a Subset
∠	Angle	∈	Belongs To
≠	Does not equal	∉	Doesn't Belong to

Serial No. Notes Date

Symbol	Meaning	Symbol	Meaning
∇	Vector Differential	Π	Product of Terms (Omega)
$\Leftrightarrow$	Is Equivalent To	$\rightarrow$	Approaches the Limit
$\Rightarrow$	Implies	$\varnothing$	Empty Set
Σ	Sum of Terms (Sigma)	$<$	Mean (Left Side)
$\int$	Integral	$>$	Mean (Right Side)
$\mathbb{C}$	Complex Set	$\mathbb{N}$	Natural Set
$\mathbb{Z}$	Natural Set	$\mathbb{R}$	Real Set.

GRAPHING

Collect data

Favorite color

red	IIII I	6
blue	IIII IIII	10
green	IIII III	8

Pictograph

Favorite color

red ★ ★ ★

blue ★ ★ ★ ★ ★

green ★ ★ ★ ★

Bar graph

Favorite Color

Calculas:- One of the most complex Branch of mathematics, which is fact itself has levels to it, be its the Calculas, advanced Calculas, Accelerated Multivariable calculas, differential calculas, integral Calculas etc. Calculas is today used in a vast number of fields one of the most fundamental Branches of pure mathematics that are used the most in applied mathematics

STATISTICS AND PROBABILITY:- This is one of the most important and underrated Branches of maths. It is also one of the easiest, or at least easier when compared to Branches like Calculas. This Branch utilises mathematical concepts to predict events that are likely going to happen. It does so by organising, analyzing and interpreting a collection of data. It also involves a set of Rules and Formulas.

STATISTICS:- It is all about that and now with the evolution of technology, more important and impactful than ever. It is applied in various fields of natural and social sciences such as marketing.

Topic Date.....

Prime Numbers

- The prime numbers are the natural numbers which are having factors one and the number itself i.e. the prime numbers are divisible by one and the number itself.
- If we divide them by other number then the remainder will not be zero.
- The prime numbers starts from 2, 3, 5, 7, 11..... And so on.
- The prime number are not expected expressed in the product form of other numbers expect one and itself.

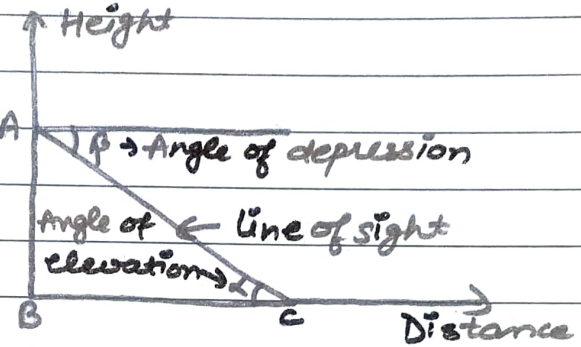
For example

- 2 is the prime number which is expressed as $2 = 2 * 1$ only
- it has no other factors, hence it is the first prime number

TOPIC

DATE .....

SOME APPLICATIONS OF TRIGONOMETRY



LINE OF SIGHT :- It is drawn from the eye of the observer to the point in the object viewed by the observer. AC is the line of sight.

ANGLE OF ELEVATION :- It is the angle formed by the line of sight with the horizontal when object is above point of observation. α is angle elevation.

ANGLE OF DEPRESSION :- It is the angle formed by the line of sight with the horizontal when object is below the point of observations.

HEIGHT AND DISTANCE :- AB is the height BC is the distance.

TOPIC

DATE _____

MATHS

The golden ratio and symmetry,
Every construction's backbone is Geometry
Algebra and statistics help us all,
In creating structures like home or mall
Mathematics has made everything possible,
by identifying coordinates and make everything traceable
It helps us make combinations find Probability
Trigonometry is used to find the distance
between rivers we also use mathematics to
find the height of Pillars
From counting stars and birds
To learning area, Volume and laws of surds.
In real word it has an Imaginary numbers
It is Just to use it in the right way
All ideas are Proved, none is stay
It never stops but goes on till infi
Look around you and you'll find all
examples of mathematics in your surroundings

Topic Date.....

Key points to note:

The interesting things is that every prime number greater than 3 can be expressed in the from (6n+1) or (6n-1), but the converse is not true.

For example:

- The first prime number greater than 3 is 5, which is expressed as

$5 = 6n-1 = 6*1-1 = 6-1 = 5$

- $7 = 6n+1 = 6*1+1 = 6+1 = 7$
- $11 = 6*2-1 = 12-1 = 11$
- $13 = 6*2+1 = 12+1 = 13$

Prime numbers between 1 and 100

- The prime numbers between 1 and 100 are 2, 3, 5, 7, 11, 13, 17, 19, 23, 29, 31, 41, 43, 47, 53, 59, 61, 67, 71, 73, 79, 83, 89 and 97

- All these are the prime numbers as they are having factors only 1 and the number itself.
- If we observe that expect the prime number 2 all the other prime numbers are odd numbers only.

TOPIC DATE

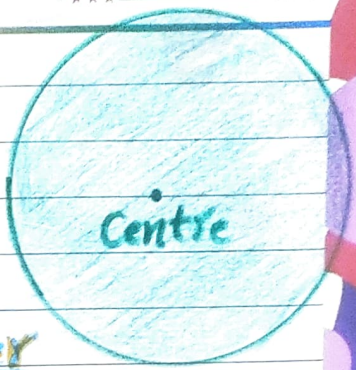
1) Closure Property
(2) Associative Property
(3) Commutative Property
~~(4) Closure P~~
(1) Closure Property
- If we add any any two numbers then their sum ~~example~~ is also the whole number.

(2) Associative Property
The addition and multiplication is associative in case of set of whole numbers

(3) Commutative Property:
If we reversed the order of whole numbers in case of addition and multiplication then the answer will not be Changed.

(4) Distributive Property
According of this Property the whole numbers are distributed over addition.

Circles



Radius of Circle ⇒ $\frac{\text{diameter}}{2}$

Diameter = 2 × Radius

Circumference ⇒ The length of curved line which forms the boundary of a circle is called its circumference.

Circumference = 3.14 × diameter

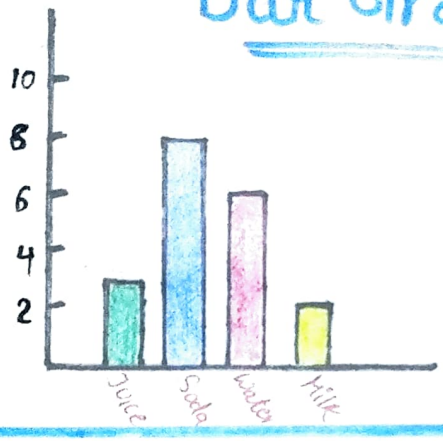
Chord of Circle ⇒ A line segment whose end points lie on the circle is called a chord of the circle.

A diameter is the longest chord.
We can draw infinite number of chords of a circle.

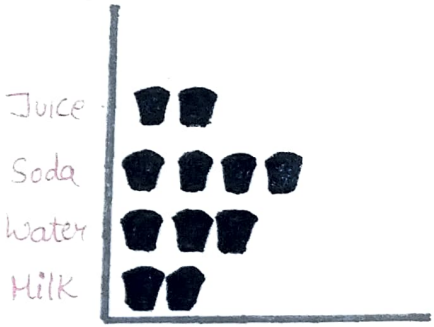
Types of Graph

Graph your results:

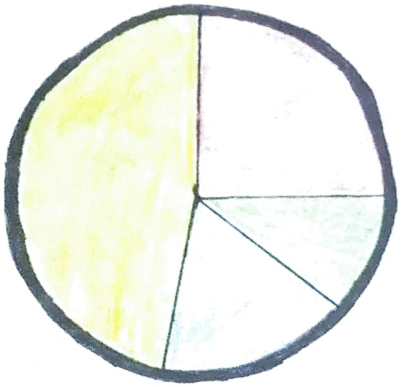
Bar Graph

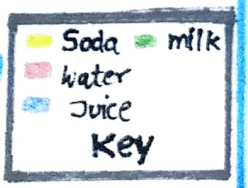


Pictograph



Circle Graph

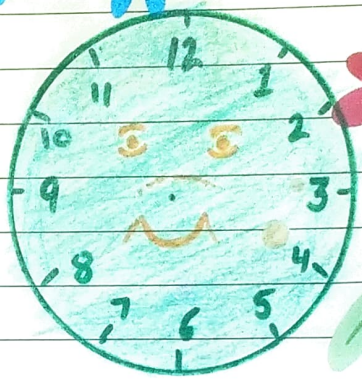




Line Graph

Topic _____ Date _____ Page _____

Time



1 Day ⇒ 24 hours

1 hour = 60 minutes

1 minute ⇒ 60 seconds

1 year = 12 months

1 decade = 10 years

1 Century = 100 years

1 Month = 4 weeks = 30 days

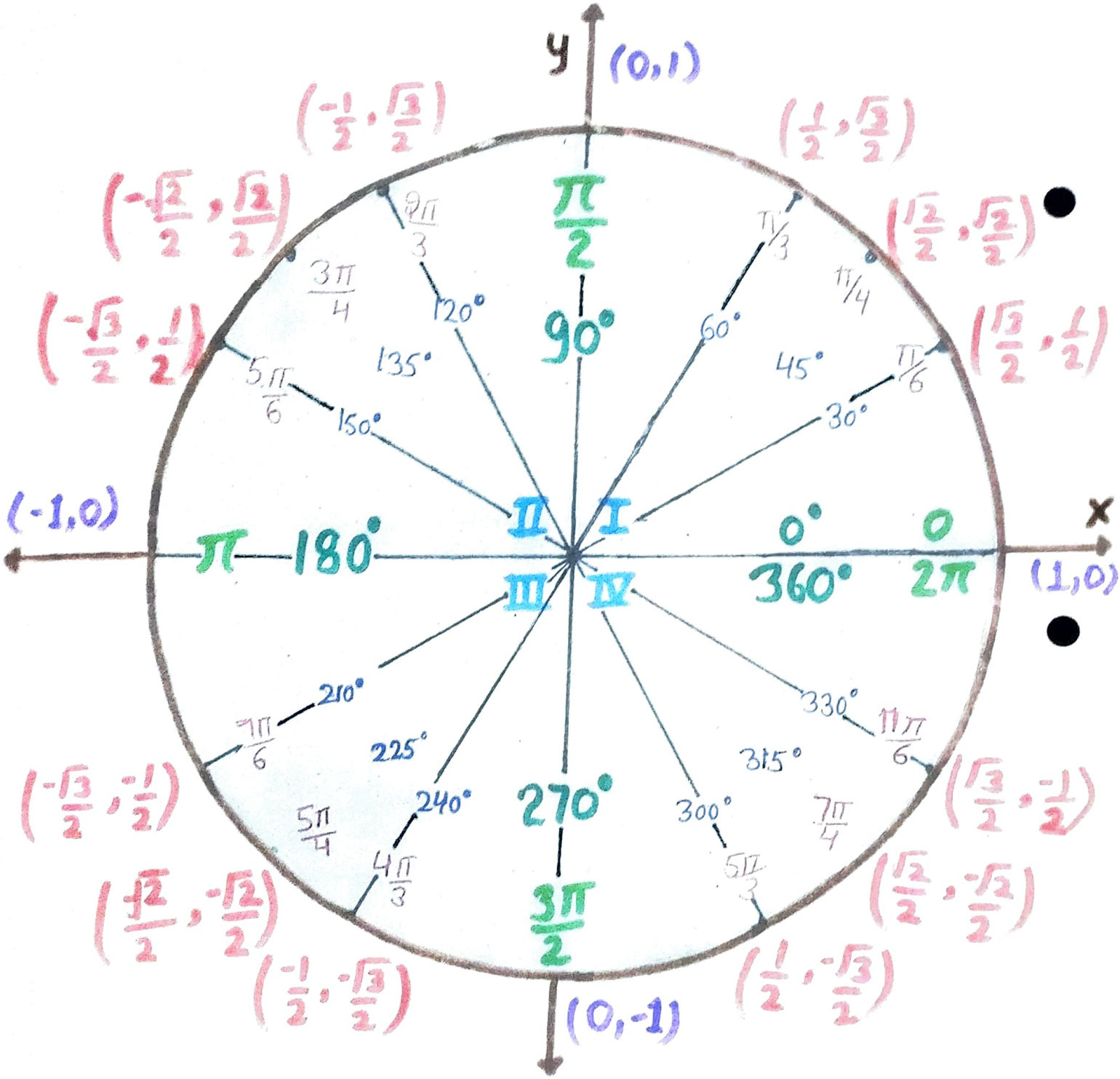
1 week = 7 days

1 fortnight = 2 weeks

1 leap year = 366 days

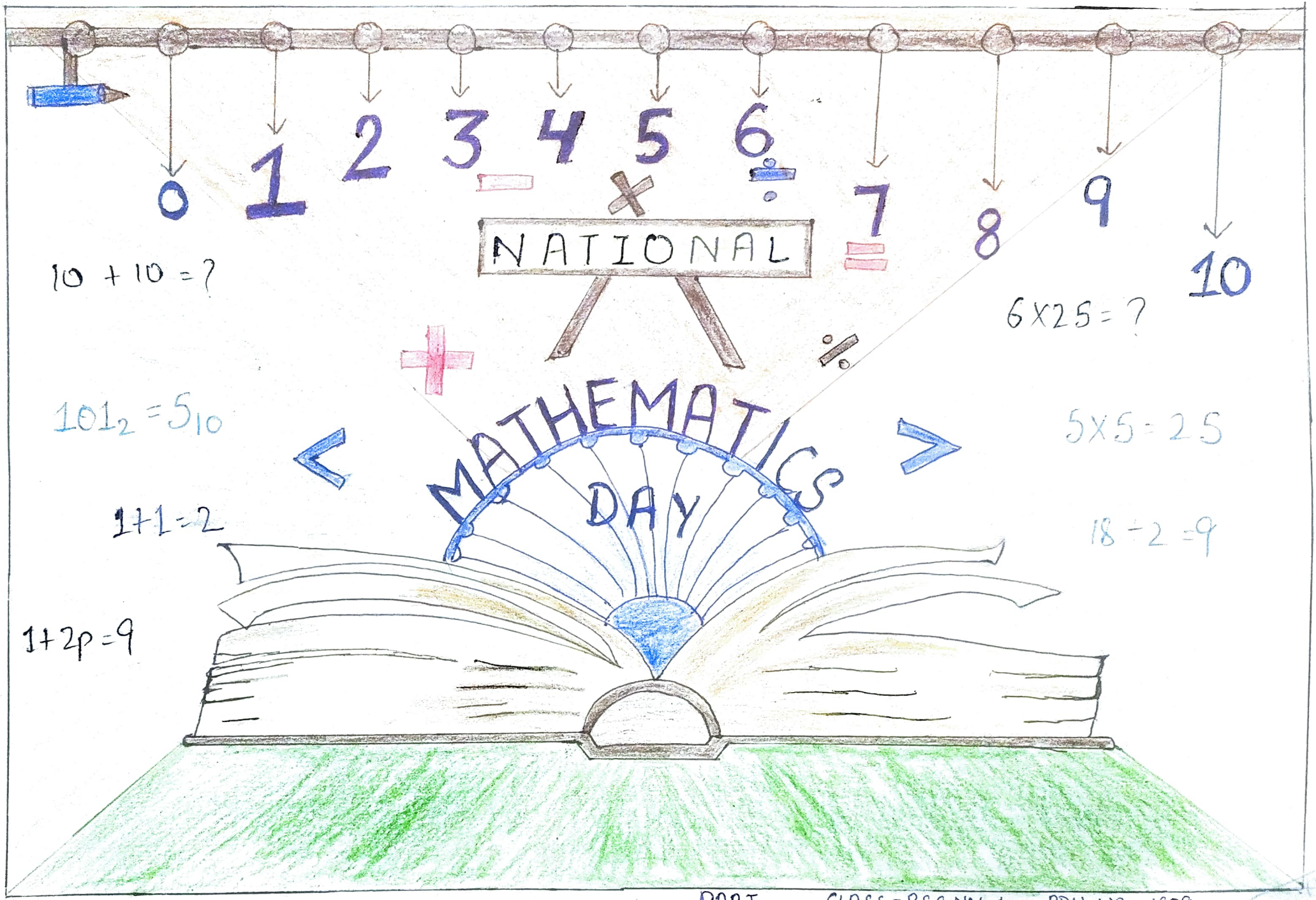
1 millennium = 1000 years

Unit Circle


y
x
(0,1)
(1,0)
(-1,0)
(0,-1)
$\frac{\pi}{2}$
90°
π
180°
0°
0
2π
360°
I
II
III
IV
$\frac{\pi}{3}$
60°
$\frac{\pi}{4}$
45°
$\frac{\pi}{6}$
30°
$\frac{2\pi}{3}$
120°
$\frac{3\pi}{4}$
135°
$\frac{5\pi}{6}$
150°
$\frac{7\pi}{6}$
210°
$\frac{5\pi}{4}$
225°
$\frac{4\pi}{3}$
240°
$\frac{3\pi}{2}$
270°
$\frac{5\pi}{3}$
300°
$\frac{7\pi}{4}$
315°
$\frac{11\pi}{6}$
330°
$(\frac{1}{2}, \frac{\sqrt{3}}{2})$
$(\frac{\sqrt{2}}{2}, \frac{\sqrt{2}}{2})$
$(\frac{\sqrt{3}}{2}, \frac{1}{2})$
$(-\frac{1}{2}, \frac{\sqrt{3}}{2})$
$(-\frac{\sqrt{2}}{2}, \frac{\sqrt{2}}{2})$
$(-\frac{\sqrt{3}}{2}, \frac{1}{2})$
$(\frac{\sqrt{3}}{2}, -\frac{1}{2})$
$(\frac{\sqrt{2}}{2}, -\frac{\sqrt{2}}{2})$
$(\frac{1}{2}, -\frac{\sqrt{3}}{2})$
$(-\frac{\sqrt{3}}{2}, -\frac{1}{2})$
$(-\frac{\sqrt{2}}{2}, -\frac{\sqrt{2}}{2})$
$(-\frac{1}{2}, -\frac{\sqrt{3}}{2})$

Conversion Chart of All Metric Measures

King	Henry	Doesn't	Usually	Drink	Chocolate	Milk
Kilo	Hecto	Deca	Unit	Deci	Centi	Milli
10 x 10 x 10 x Larger than a unit	10 x 10 x Larger than a unit	10 x Larger than a unit	Metre (length) Gram (weight) Litre (capacity) 1 unit	10 x Smaller than a unit	10 x 10 x Smaller than a unit	10 x 10 x 10 x Smaller than a unit
1 kilo = 1,000 units	1 hecto = 100 units	1 deca = 10 units		10 deci = 1 unit	100 Centi = 1 unit	1,000 milli = 1 unit
km = kilometre kl = kilolitre kg = kilogram	hm = hectometre hl = hectolitre hg = hectogram	dam = decametre dal = decalitre dag = decagram	m = metre l = litre g = gram	dm = decimetre dl = decilitre dg = decigram	cm = Centimetre cl = Centilitre cg = Centigram	mm = millimetre ml = millilitre mg = milligram
Examples: 5 kilo	50 hecto	500 deca	5,000 units	50,000 deci	500,000 Centi	5,000,000 milli



PART CLASS-BSCNM-1 ROLL NO -1809

MATH TEACHES US
THAT THERE IS EVERY
REASON TO BELIEVE THAT
EVERY PROBLEMS HAS
A SOLUTION.

[illegible], Roll No- 453

Differential Equations

* Ordinary Differential Equation

It is a differential equation that involves one or more ordinary derivatives, but without having partial derivatives. $m\frac{d^2x}{dt^2} = f(x)$

* Partial Differential Equation

Partial differential equation is a differential equation that involves partial derivatives. It has two or more independent variables.

$$\frac{\partial^2 u}{\partial x^2} + 4xy\frac{\partial^2 u}{\partial y^2} + u = 2\left(\frac{\partial^2 u}{\partial x^2}\right) + 4\frac{\partial^2 u}{\partial x \partial y^2} = 10x$$

* Linear Differential Equation

It is first degree with respect to the dependent variable(s) and its derivatives that can be expressed in the form

$$\frac{dy}{dx} + P(x)y = Q(x)$$

* Non-Linear Differential Equation

It is second degree or higher with respect to dependent variables and its derivatives.

$$\frac{d^2y}{dx^2} - \left(\frac{dy}{dx}\right)^2 + 12y = \cos x$$

* Homogeneous Differential Equation

It is first order differential equation which can be in written as.

$$y'' + f(x)y' + g(x)y = 0$$

Lovepreet kaur, Roll No.- 1808, Class - B.Sc NM-1st

DIFFERENTIATION BY TRIGONOMETRICAL SUBSTITUTIONS

1. $\sin 2x = 2\sin x \cos x$
2. $\cos 2x = \cos^2 x - \sin^2 x$
3. $1 + \cos 2x = 2\cos^2 x$
4. $1 - \cos 2x = 2\sin^2 x$
5. $\sin 2x = \dfrac{2\tan x}{1+\tan^2 x}$
6. $\cos 2x = \dfrac{1-\tan^2 x}{1+\tan^2 x}$
7. $\tan 2x = \dfrac{2\tan x}{1-\tan^2 x}$
8. $\sin 3x = 3\sin x - 4\sin^3 x$
9. $\cos 3x = 4\cos^3 x - 3\cos x$
10. $\tan 3x = \dfrac{3\tan x - \tan^3 x}{1-3\tan^2 x}$
11. $\sin^{-1} x \pm \sin^{-1} y = \sin^{-1}(x\sqrt{1-y^2} \pm y\sqrt{1-x^2})$
12. $\cos^{-1} x \pm \cos^{-1} y = \cos^{-1}(xy \mp \sqrt{1-x^2}\sqrt{1-y^2})$
13. $\tan^{-1} x + \tan^{-1} y = \tan^{-1}\left(\dfrac{x+y}{1-xy}\right)$
14. $\tan^{-1} x - \tan^{-1} y = \tan^{-1}\left(\dfrac{x-y}{1+xy}\right)$

* Important

1) $a^2 - x^2 \rightarrow$ $x = a\sin\theta$ or $x = a\cos\theta$
2) $x^2 - a^2 \rightarrow$ $x = a\sec\theta$ or $x = a\operatorname{cosec}\theta$
3) $a^2 + x^2 \rightarrow$ $x = a\tan\theta$ or $x = a\cot\theta$

"Mathmatics"
is a great
Motivator for all
Humans Because
Its carrer start
with Zero and
Never ends
Infinity

NAME - JASHAN DEEP KAUR ROLL NO = 1805 CLASS - BSC (N-M)

TOPIC DATE .....

ARYABHATTA

- Aryabhatta was the first Indian mathematician, physicist and astronomer who created groundbreaking theories & Inventions.

- Aryabhatta was born in a small place called Aryabhatta in Bihar during the Gupta dynasty.

- Aryabhatta worked out the value of pi which is used today by scientists and mathematicians all around the world.

- It was Aryabhatta who discoverd the formula for the area of a triangle and the volume of the Sphere which has given birth to various inventions and discoveries in the field of engineering today.

Gytri Devi

Roll No.: 69

B.A

What is a Fraction

Part of a Whole

$\frac{2}{3}$ $\frac{1}{2}$ $\frac{3}{4}$ $\frac{4}{7}$

a number that expresses equal parts of a whole objects or set of objects

Parts of a function

Part / Whole

$\frac{1}{2}$

- 1 ← Numerator: how many fraction pieces you have
- 2 ← Denominator: how many fraction pieces you whole is broken into

Fraction bar * Represents division

Key WORDS: halves, thirds, fourths, fifths, sixths etc.

Different ways to Represent a fraction

1. Part of a Group: $\frac{1}{4}$
2. Number Line: $\frac{1}{4}$
3. fraction Bar: $\frac{1}{4}$
4. fraction Circle: $\frac{1}{4}$

Improper fractions and mixed Numbers

Mixed to Improper

$7\frac{8}{14} = \frac{106}{14}$

Step 1: Multiply den. and whole #
$14 \times 7 = 98$

Step 2: Add Product to the num.
$98 + 8 = 106$

Step 3: Put new num. over the orig. den
$\frac{106}{14}$

Improper to Mixed

$\frac{106}{14} = 7\frac{8}{14}$

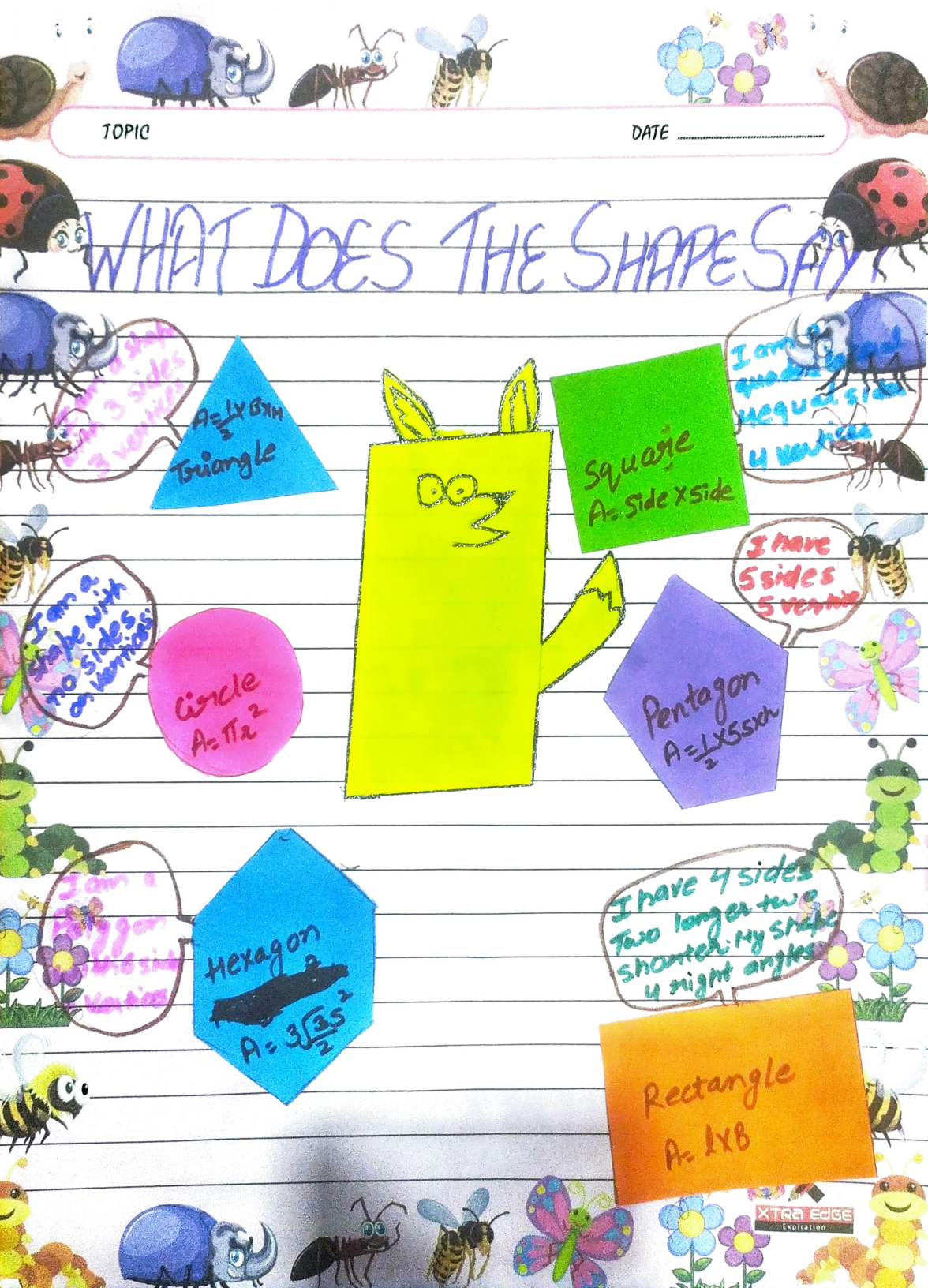
Step 1: divide 106 by 14

$$14\overline{)106} \quad 7\frac{8}{14}$$
$$-98$$
$$8$$

Step 2: Quotient is the whole # den. stays same num is the Remain

TOPIC DATE .....

WHAT DOES THE SHAPE SAY?



BRANCHES OF MATHS

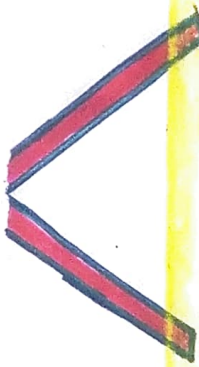
Geometry :- Geometry mainly includes the shapes and sizes of different objects. The Practical side of mathematics is interested in polygons and geometrical objects. There main geometry types are Euclidean, spherical and hyperbolic.

Arithmetic :- It is an important Branch of maths as it used in our everyday life for various reasons from typical calculations to profit or loss computation. It deals with numbers and their applications. Multiplications, addition, division and Subtraction are used to solve arithmetic problems.

Algebra :- Algebra is branch of maths, and it deals with Solving generic algebric expressions and manipulating them to get the intended results, unknown quantities Solve alphabets that form a part of equation, and we have to determine the value of each variable. It engages complicated formulas and Solutions to get answers that will solve the problem in question.

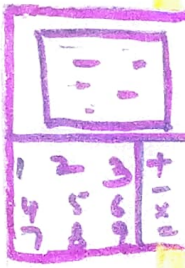
Trigonometry :- It is one of the advance branch of mathematics and involves the study of triangles and triangles only whereas geometry involves the study of all shapes and Angles. It specifically focuses on studying the angles and sides of the triangle in order to determine its distances, lengths and other properties.

TOPOLOGY :- This is one of the newest branches of mathematics that is concerned with the deformations and changes in different shapes due to stretching, crumpling, twisting, bedding etc. It includes Calculus, Knot Theory, Riemann Surfaces etc.



COMBINATORICS :- This is a Branch of mathematics that mainly involves counting to obtain solution to the problems of selection and arrangement. It is also used to determine certain properties and of finite structures or discrete systems and operations within them.

MATHematical ANALysis :- It is a advance Branches of pure mathematics, the analysis deals with limits, and theories related to it such as to measure, infinite series, analytics functions and pre-Calculus, i.e- differentiation and Integration.



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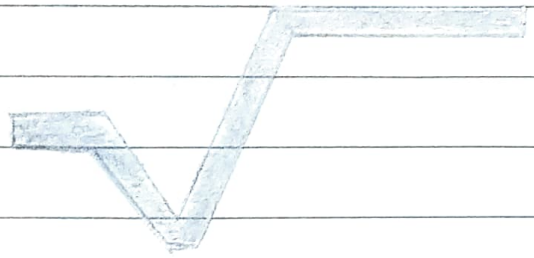
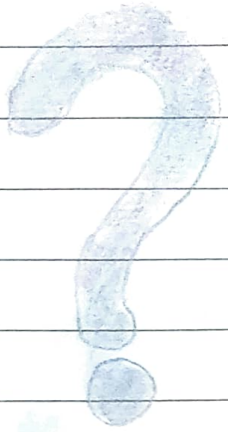
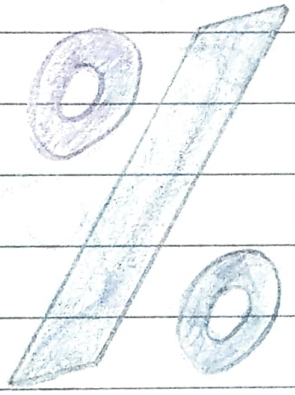
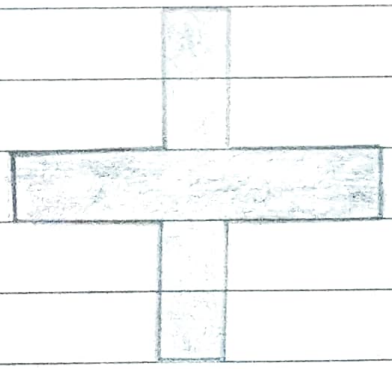


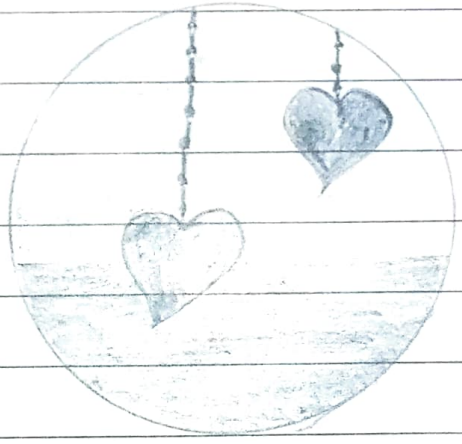


Life is a math equation
In order to gain the most,



you have to know
how to convert
Negatives Into Positives

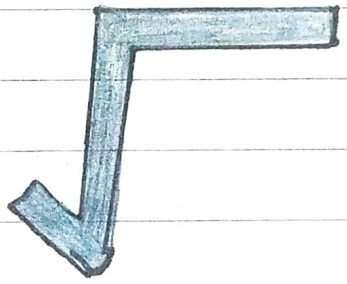


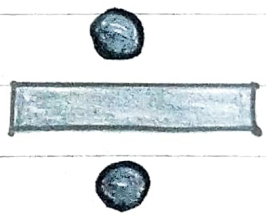


Without mathematics,
there's nothing you can do.

Everything around you
is mathematics.

Everything around you
is numbers.





Serial No. Notes Date

ARITHMETIC Mean

Arithmetic mean is the only average which qualifies almost all the essential requisities of good measure of central tendy wherever the tearm 'mean' is used to its awaly refers to the arithmetic mean or average. It is also called 'common Average each every item has equal share in determing the arithmetic mean

Definition

Arithmatic mean is a numerical value obtained by adding all value of series and dividing the total by number of value

(Clark)

Types of Arithmetic mean

Arithmetic mean

↓ Simple arithmetic mean

↓ weighted arithmetic Mean.

- Simple arithmetic mean : In Calculation of Simple arithmetic mean, all item of a series are given equal important.
- Weighted arithmetic mean : In Calculation of weighted arithmetic mean different types / item in series are assigned different weighted according to their relative importance.

METHODS of Calculating Simple arithmatic mean

Arsh™ Always Ahead

Serial No. Notes Date

Arithmetic mean may be calalted with respect to diffrent series

(a) Individual series

b) Discrete frequaug series

(c) Continous freqveny series

Individual series

Direct Method | Shortcut Method | Step Deviation Method

Direct Method formula

$$\bar{X} = \frac{\Sigma x}{n}$$

Short Cut Method

$$\bar{X} = A + \frac{\Sigma d}{n}$$

Step deviation Method

$$\bar{X} = A + \frac{\Sigma d'}{n} \times C$$

Calculate arithmetic Mean from following data using Short Cut Method:

RollNo	1	2	3	4	5	6	7	8	9	10
Marks	5	10	20	25	45	50	45	35	30	55

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Serial No. Notes Date

Roll No	Marks	A=25 d=x-A
1	5	-20
2	10	-15
3	20	-5
4	25	0
5	45	20
6	50	25
7	45	20
8	35	10
9	30	5
10	55	30
n=10		Σdx = 70

Arithmetic mean ($\bar{x}$) $= A + \frac{\Sigma dx}{n}$

Arithmetic mean ($\bar{x}$) $= A + \frac{\Sigma dx}{n}$

$= 25 + \frac{70}{10}$ $= 25 + 7$

$= 32$ Ans

MERITS of Arithmatic mean

(i) It is rigidly defined

(ii) It is easy to understand and simple to calulte

(iii) It is based on all observations.

(iv) It acts as basic for statical method.

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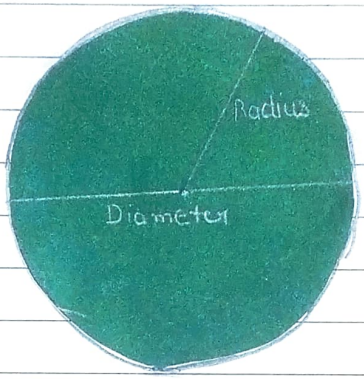
Circle



C

- Circle having equal radii are congruent.
- Circle having different radii are similar.
- The radius perpendicular to a chord bisects are chord.
- The chords equidistant from the center are equal.

Area of a Circle = πr^2 r = radius

Circumference of Circle = $2\pi r$

Diameter of a Circle = $2r$

Radius of a Circle = $\sqrt{\frac{A}{\pi}}$ A = Area of Circle

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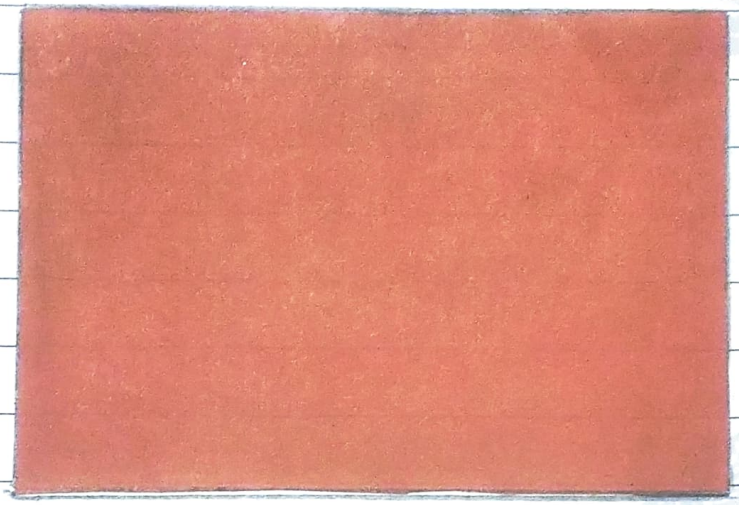
Rectangle



- Opposite sides are equal.
- All angles in a rectangle is 90°.
- Diagonals are equal and they bisect each other. They are also congruent.
- Square of Length of diagonals is the sum of squares of length and breath.

Area of a Rectangle = $L \times B$

Perimeter of a Rectangle = $2(L+B)$

Diagonal = $\sqrt{L^2+B^2}$

Serial No. [ ]

Notes

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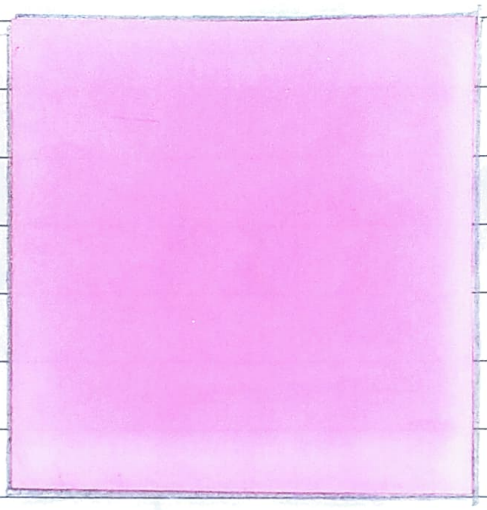
SQUARE



- All four sides of a square are equal.
- All four angles of a square are equal.
- The diagonals of a square are equal.
- The diagonals of a square bisects its angles.
- Opposite sides of a square are both parallel and equal in length

Area of a Square = Side x Side

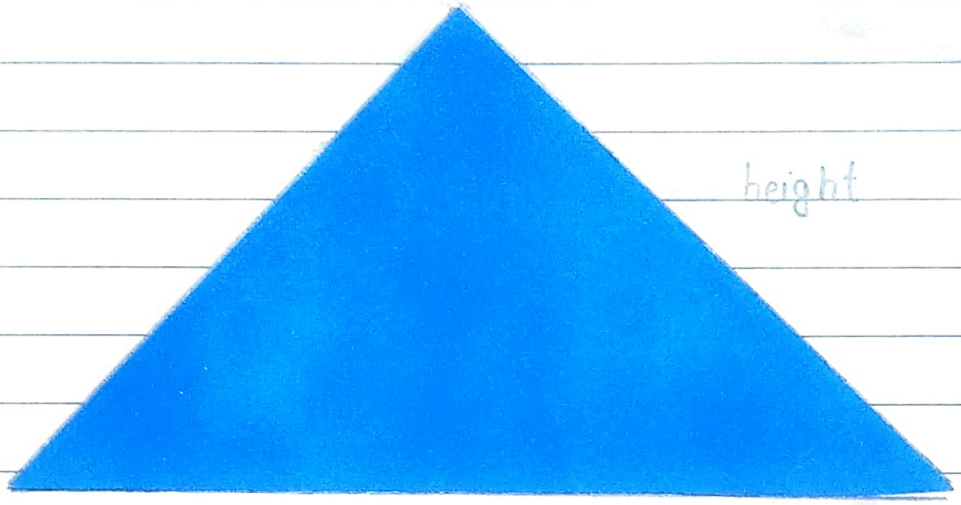
Perimeter of a Square = 4 x Side

Diagonal = $\sqrt{2}\,a$ a = side

Side = $\frac{P}{4}$

Serial No. Notes Date

TRIANGLE



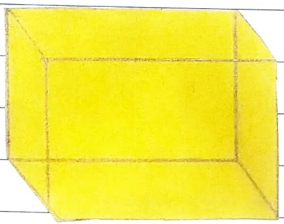
- A triangle has three sides, three vertices and three angles.
- The sum of the three interior angles of a triangle is always 180°.
- The sum of the length of two sides of a triangle is always greater than the length of the third side.

Area of a Triangle = $\frac{\text{height} \times \text{base}}{2}$

Perimeter of a Triangle = $a + b + c$

Serial No. Notes Date

CUBOID



This is a 3-D figure.
This contain width, depth and Height
where, the size of width, Height and depth are totally different from each other.

Lateral Surface Area = $2(l * b) \times h$
Total surface Area = $2(lb + bh + hl)$
Volume = $L \times B \times H$
length of Diagonal = $\sqrt{a^2 + b^2 + c^2}$

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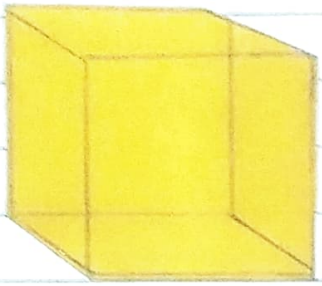
Serial No. Notes Date

CUBE

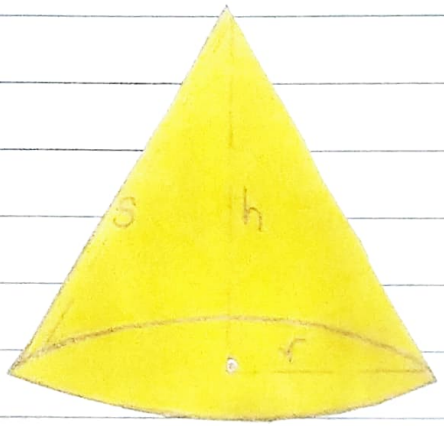


This is a three Dimensional figure containing width, depth and height In cube all the side are similar.

Lateral surface Area	$4a^2$
Total surface Area	$6a^2$
Volume	a^3
length of Diagonal	$a\sqrt{3}$

Serial No. Notes Date

CONE



This is a 3-D version of triangle
This shape looks like a Pyramid
This has radius, height, length.

Slant height (l) = $\sqrt{r^2+h^2}$

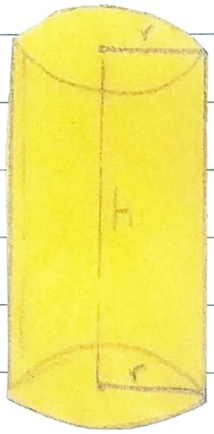
Curve surface Area = $\pi r l$

Total surface Area = $\pi r (r+1)$

Volume = $\frac{1}{3} \pi r^2 h$

Serial No. [ ] Notes Date [ ]

CYLINDER



This is formed with 2 circle and one rectangle

This is also a 3-D figure.

As this is 2 circle then radius is used.

This might be open or closed.

1.) Curve surface area = $2\pi rh$

2.) Total surface Area = $2\pi r(r+h)$

3.) Volume = $\pi r^2 h$.

Arsh™ Always Ahead...

Mathematics

MAY NOT TEACH US HOW TO ADD LOVE OR MINUS HATE. BUT IT GIVES US EVERY REASON TO HOPE THAT EVERY PROBLEM HAS A SOLUTION.

NEVR GIVE UP!

Maths is one of the subjects which can make dreams come true. Maths and success go hand in hand.

"Every Sentence that has an X in it is a problem. However, there is no problem that maths can't solve"

"MAthematics is the art of giving the same name to different things."

SONA - Roll No.

Math Symbols

+ → Plus/add

− → Minus/take

× → Multiply/times

÷ → Divide

= → Equals

< → Less than

> → More than

≤ → Less than/equals to

≥ → Greater than/equals to

Harpreet, Roll No - 452


Sh. Lal Bahadur Shastri Arya Mahila College, Barnala
PUNJABI -HINDI-
Barnala
1st Prize


|A| = 2(5(0)-7(3)) - 3(0-7) + 4(-3-5)
= 2(-14) - 3(-7) + 4(-3)
|A| = -28 + 21 - 12
|A| = -7 - 12
|A| = -19


BIRSA MUNDA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