KMVPHY-SPECTRUM

A PHYSICS NEWS LINE

WE LEAD OTHERS FOLLOW

Vol. 2 (Issue 2): July-December-2016

We are publishing our second volume with second issue and the faculty is willing to pass a couple of notes to the regular readers. We particularly like to thank those readers who provide feedback on Facebook and by sending letters and e-mails to kmvphy@yahoo.co.in. Their initiatives help us to modify the quality of the newsletter and make us to bring one more issue in existence. We pledge to put the best of our efforts to the news letter.

Visionary Physicist

The team is trying its best to make the newsletter a success and hope that it will surely encourage you to put your best efforts to make your life a success. This time the team has tried to make you aware of the hardship of Honey Bajaj and the achievements of an reputed astronomer, who established the Inter University Centre for Astronomy and Astrophysics.

MEET SILIGURI GIRL HONEY BAJAJ: INNOVATOR OF THE YEAR

The story of Honey Bajaj is one that nearly all Indian children goes through but then hardly ever does anybody manage to shape out their way as well as the juvenile girl did. The journey has its highs and lows and Honey wants to memorize just the highs as that is how she has reach higher.

Being an innovator, a profession that's still finding its footing in India was not easy. But today after so many patents to her kitty, Honey couldn't care less.

From an average student at her hometown in Siliguri to quitting a bank job, Honey did face dilemmas in her career until she found the power of innovation, the one that took her places.

Bajaj is presently a researcher and student at Massachusetts Institute of Technology (MIT) pursuing a Masters in science and engineering and is a Legatum Fellow.

Honey has been an innovator for almost a decade and been involved in concepts, designs, and products including: Alexandria -an emergency response device for the deaf and hard of hearing (2016), a low-cost infant warmer developed in 2010 and available in 16 countries, Kisana-an application for farmers to boost agricultural productivity (2007), a manual and solar-powered water-filter for army jawans that converts snow into drinking water (2006), and a device to help autistic children learn to read and write better (2009). However the one to make her win the big award the Innovator of the Year Award at Freedom Conference in San Franciscio, California in September, is her latest imitative she's working upon in MIT. The project titled Udaan is a low cost diagnostic mobile kit that will help community health workers to screen maternal and infant health. This will help in pulling down the number of childbirth deaths that is common in India. India will definitely be helped a great deal with this one. The lady is happy on winning the Innovator of the Year award and says "The intent of innovation is not just creating something new, but also empowering communities."

Honey's is also a story of sheer determination and perseverance. After completing the first year of English Honours from Delhi University, she realized her heart was totally in design and enrolled for the Product Design at Srishti School of Art, Design and Technology, Bangalore. Her last year at English course (2006) ran parallel to her first year of design. She interned with a bank after completing her education, but soon realized that she was not cut for the job.

In her first designed product – Step Forward (2006) – she developed a water filter for Indian Army which converts snow into potable water by using manual and solar energy only. By this, Honey addressed a problem that had stayed with her since her early teens, when she accompanied her father to the army camps in Siliguri. She had seen how army men stationed at high altitudes faced a crisis of drinking water.

In the years since, she has been in the area of innovating products and improving quality of life for people from various segments of society. Nest (2010) – the infant warmer she co-invented as part of Embrace Innovations, is perhaps the best among her innovative designs so far. Nest is a low-cost infant warmer for at-home use in rural areas of developing countries where millions of premature babies suffer/die due to absence of the traditional costly incubators.

All her projects have had a humble starting in India and won her accolades across the globe. Nest, for one, is being manufactured and distributed through a non-profit programme across 16 countries. In 2009, she created a device that helps autistic children learn, read and write better and in 2008, when they were yet to be introduced to iPads, she worked on a project that created a digital tablet. While on a winter break in 2008, she reached out to Wikipedia and worked on a project that helps create linguistic data for the free Internet encyclopedia.

"The intent of innovation is not just creating something new but also empowering communities and bringing awareness and smiles on users' face," she says passionately.

After completing graduation, working with various organizations and doing innumerable design workshops for over 4000 students across India, she wanted to grow further. She aims to continue working for those at the bottom of the pyramid. "A lot is being done for those at the top of this pyramid. I wish to build a technology company that builds quality products for the bottom of the pyramid. More importantly, empowers women."

JAYANT V. NARLIKAR: FOUNDER-DIRECTOR OF INTER-UNIVERSITY CENTRE FOR ASTRONOMY AND ASTROPHYSICS (IUCAA)

Dr. Jayant Vishnu Narlikar needs no introduction. He is one of those very few scientists in India who have contributed to the field of Astrophysics throughout their life. Born on July 19, 1938, in Kolhapur, Maharashtra to a family of scholars, Narlikar – a Senior Wrangler or mathematics topper at Cambridge. Former President of the Cosmology Commission of the International Astronomical Union (IAU), Prof. Narlikar, who has also served as the Chairperson of the Advisory Group for Textbooks in Science and Mathematics published by NCERT, is globally known for his work in cosmology, specifically championing models alternative to the popular Big Bang Model. Narlikar received his Bachelor of Science degree from Banaras Hindu University in 1957. He then began his studies at Fitzwilliam House, Cambridge University in England, where he received a B.A. in mathematics in 1959.

In 1960, he won the Tyson Medal for astronomy. During his doctoral studies at Cambridge, he won the Smith's Prize in 1962. After receiving his PhD in 1963 under the guidance of Fred Hoyle, he served as a Berry Ramsey Fellow at King's College in Cambridge and earned an M.A. in astronomy and astrophysics in 1964. In 1966, Fred Hoyle established the Institute of Theoretical Astronomy in Cambridge, and Narlikar served as the founder staff member of the institute during 1966–72. In 1972, Narlikar took up Professorship at the Tata Institute of Fundamental Research (TIFR) in Mumbai, India. In 1988, the Indian University Grants Commission set up the Inter-University Centre for Astronomy and Astrophysics (IUCAA) in Pune, and Narlikar became the Founder-Director of IUCAA. In 1981, Narlikar became a founding member of the World Cultural Council.

During 1994–1997, he was the President of the Cosmology Commission of the International Astronomical Union. Narlikar was part of a study which cultured microorganisms from stratospheric air samples obtained at 41 km. The first works done by J.V. Narlikars with F. Hoyle concerned the theory of the steady state universe under a new format, the "Quasi-Steady State Cosmology" in which the universe is subjected to short-term oscillations superimposed on a long-term steady expansion. . This work gave at first a reliable theory describing the continuous creation of matter within the framework of the "General Relativity Theory" of Einstein. Hoyle and Narlikar also gave a complete description of the quantic electrodynamics. Their work on electrodynamics led them to a new theory of gravitation that now is known as the "conformal theory of gravity".

Praises, titles and rewards that J.V. Narlikar received in India and in other countries are innumerable. J.V. Narlikar is member of the Indian National Sciences Academy (INSA), associated member of the Philosophical Society (Cambridge). The Golden Medal of the Golden Jubilee has been granted him by the Science Institute of Bombay in 1973. He received in 1978 the Shanti Swarup Bhatnagar, a reward reserved for the Physical Sciences. The FIE Foundation conferred him its highest reward, the Golden Medal of the Asian Society,. May 4th, 2004, the Société Astronomique de France awarded the 2004 Janssen Price to J.V. Narlikar..

Beside of his scientific research, Narlikar has written non-technical books, science fictions and articles in order to popularize science as well in Indian language as well as in English. His book on astronomy has been published by the "Maharashtra State Board Literature of and Culture". He has also written several science-fiction stories and three novels. He participated in radio and television programs exactly sciences of the universe in Hindi and in English in 1995 which were censored by Doordarshan (national public television). Since 1997 he appears regularly on the television program "Surabhi" in which he answers scientific questions from the public. For these services of science popularization he received several national rewards including the "INSA's Indira Gandhi Award" of INSA, the "UNESCO's Kalinga Award" and the "Godavari Gaurav Puraskar" of the "Kusumagraj Pratishthan". He received the Sahitya Academy award in 2014 for his Marathi autobiography Chaar Nagarantale Maze Vishwa.

A globally renowned scientific personality, Narlikar once appeared in Carl Sagan's television series "Cosmos: A Personal Voyage" in the 1980s. He is currently associated with the Inter University Center for Astronomy and Astrophysics (IUCAA), Pune as a professor emeritus.

Science News Section

Physicists discover quantum-mechanical monopoles

Researchers at Aalto University (Finland) and Amherst College have observed a point-like monopole in a quantum field itself for the first time. This discovery connects to important characteristics of the elusive monopole magnet. The results were just published in *Science* magazine. The researchers performed an experiment in which they manipulated a gas of rubidium atoms prepared in a nonmagnetic state near absolute zero temperature. Under these extreme conditions they were able to create a monopole in the quantum-mechanical field that describes the gas. 'In this nonmagnetic state, a structure was created in the field describing the gas, resembling the magnetic monopole particle as described in grand unified theories of particle Physics.

'Ghost imaging' with atoms demonstrated

A team of physicists at The Australian National University (ANU) has used a technique known as 'ghost imaging' to create an image of an object from atoms that never interact with it. This is the first time that ghost imaging has been achieved using atoms, although it has previously been demonstrated with light, leading to applications being developed for imaging and remote sensing through turbulent environments. The atom-based result may lead to a new method for quality control of nanoscale manufacturing, including atomic scale 3D printing. Lead researcher Associate Professor Andrew Truscott from the ANU Research School of Physics and Engineering (RSPE) said the experiment relied on correlated pairs of atoms.

Answers to previous issue questions and puzzles

The ship in the Tub Problem

Using the formula "$h = V/(\pi r^2)$" The level of the water will go up by 1.28 centimeters

The chicken and the egg problem

1 hen × 3/2 days × *RATE* = 1 egg

H hens × 6 days × 2/3 eggs per hen·day = 12 eggs

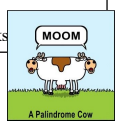
Therefore, the farmer needs 3 hens to produce 12 eggs in 6 days.

Science Crossword Puzzles

1. Nucleus 2. Protons 3. Electrons 4. Neutrons 5. Up 6. Down 7. Quarks

Palindrome Puzzle

What word becomes a Palindrome when viewed upside down and Backwards.



KMVPHY-SPECTRUM

Vol. 2(2): January-May 2016

A workshop on "Electronic Design & Testing"

Department of Electronics organized an experimental workshop on **"Electronic Design & Testing"** under DBT Star College Scheme for B.Sc. students on 19th august 2016. It was conducted by Er. Robin. In this workshop students learnt about working of various electronic components and measurement instruments and testing of these components. He demonstrated some simple basic experiments of electronics using CRO & multimeter & students learned the designing of various electronic circuits. Main aim of the activity was to clarify the basic concepts of students and create interest in innovative experiments in field of electronics & this workshop proved as an enjoyable, interesting & knowledgeable activity which was totally different from regular classes.

KMV Girls hosted Fresher's Welcome Party

Students of M.Sc. Physics Sem III organized a Fresher's party for students of M.Sc. Physics Sem I. The celebration started with welcome speech address by senior students of the department. The cool juniors put up various performances like dancing and singing to entertain the gathering. There were 3 rounds of modeling for the newcomers. Out of which, 3 students were selected for the tag Ms. Fresher: Ms. Deepshikha, Ms. Elegant: Ms. Manisha & Ms. Charming: Ms. Anmol.

Carrier counseling organized for M.Sc. students

Students of M.Sc. Physics attended a carrier counseling lecture delivered by Dr. gopi Sharma on 6th Sept 2016. Dr. Gopi Sharma sharpened the knowledge of students about research work and other fields in which they can pursue their career after post graduation. She explores all the fields including teaching, research etc in private as well as in government institutes. Students cleared their doubt about various competitive and entrance exams.

KMV students visited radio station at Goraya

On 9th sept , 2016, a group of 18 students of M.Sc. physics(sem- 3) visited the radio station at Goraya. The students were hosted by Mr. Rampal, the head of Goraya, radio station. The staff members explained the working of transmitters of frequency 702KHz and then of 893KHz. The students also visited Antenna Tuning Unit, the most important part of transmission of radio waves. A short visit at All India Radio (AIR) station, near BMC chowk has also been incorporated in the trip.

Quiz competition is organized

A "Physics Quiz" hosted by Mr. Harleen Singh is organized for science students. For this four teams were selected with four participants in each team on the basis of screening test after testing each aspect of the Physics knowledge. Four different rounds were set up for the quiz. The quiz had a rapid fire round which made it more exciting for the participants & audience both. The competition was aimed at developing the knowledge and excellence base among the students through healthy & highly motivating meet.

A Science power point Presentation competition is hosted

A Power point presentation competition was conducted on the burning issues such as 'Dark energy & Dark Matter', 'Latest achievements of ISRO', ' Gravitational waves', 'Biofuels' , 'Zika Virus' & 'Medicinal Plants' etc. under DBT Star College Scheme for undergraduate science students. There were 35 power point presentations presented by about 60 students. Students were awarded prizes subject wise for the wonderful and informative presentations presented by them. *Ms. Ambika and Ms. Shweta of B.Sc 3rd sem electronics got first position in physics ppt.*

Students Outreached Society to celebrate Green Diwali

Science graduate students put their best efforts with the collaboration of Teachers to learn the people that crackers not only create noise pollution but also pollute the air. They stick bills on their outer house walls to make aware people of the hazards of cracking fireworks. They also pledge to make the surroundings clean and environmental friendly.

Extension Lecture on "Superconductivity"

P.G. Department of Physics organized an extension lecture on the topic "Superconductivity" on 12 august 2016. The resource person was **Dr. Aman Mahajan,** Guru Nanak Dev University, Amritsar. He acquainted the students with the classification criterion of materials & their conduction properties . He also explained the thermo dynamical properties of superconductors and BCS theory.

Extension Lecture on "Nuclear Medicine"

Dr. A. Pandey from INMAS-National Heart Institute, New Delhi, delivered an expertise talk on "Nuclear Medicine". He started his lecture with an introduction to the destructive mind of humans. In his interaction with students he explained why Nuclear Medicines are considered as Gateway to Cardiologist & explained the importance of Biophysics in our daily life. He encouraged students to strengthen their mind along with good health & give importance to air & water in our life .He explained the various applications of nuclear medicine & also guided the students about carrier in Nuclear Medicine. He acquainted the students with the future prospectus of career in Nuclear medicines.

A Visit to Science City

One day trip to Science City , Kapurthala was organised for undergraduate science students. About 64 students along with 4 teachers visited to various educational galleries consist of Earthquake Simulator, Flight simulator, Dome theatre, 3-D show & Climate change theatre etc. Students visited to a Space & Aviation Gallery where they watched models on aircraft & satellites, space shuttles. There was also Fun Science exhibits where around 100 assorted interactive exhibits designed, fabricated & clustered together on the basis of basic science themes. Students visited to Energy education & Awareness Park where there were various demonstrations uses of various forms of non- conventional energy sources such as Solae energy, wind energy, bio energy & nuclear energy.

KMV Girl tops again in university exams

Guru Nanak Dev University declared the result of various classes and as usual Kanya Maha Vidyalaya maintained its glory in the list of toppers in Science. Ms. Manpreet Kaur of M.Sc. Physics Sem II stood 1st in Guru Nanak Dev University Exams. Ms. Mandeep Kaur grabbed 6th position in university. Girls of B.Sc. (Comp. Sc.) Sem-IV, Ms. Daljeet Kaur grabbed 3rd position by scoring 335 marks out of 400 & Ms. Amrita Singh got 18th position (313/400). Out of combined merit list of Medical , Non medical & Comp. Sc., Ms. Amanjot Kaur of B.Sc. VI Sem(Non medical with Electronics) topped in university exams. Principal Dr. Mrs. Atima Sharma congratulated the students and Science Department& motivated them to work hard to achieve greater heights and improve their overall personality too.

'Fun With Physics' Experimental Workshop

Dr. Neetu Chopra & Ms. Ekta, from Department of Physics KMV Jalandhar conducted an experimental workshop in physics. Main aim of the activity was to clarify the basic concepts of students and to create interest of students in physics. In this workshop different daily human activities were related with physics phenomenon. Some simple experiments like types of waves, eddy currents, Archimedes principle, working of airplane, magnetic brakes etc. were demonstrated. Students got opportunity to learn physics principles and had fun with these experiments. The mentors also demonstrated plasma globe, experiments with candles & number of physics experiments related to centre of mass, standing waves, electromagnetic induction. There were also some magic tricks performed in workshop and science behind these tricks was explained.

KMV students participated in "Physpark" held at LPU

Students of Kanya Maha Vidyalaya participated in "Physpark" Organised by Lovely professional University on 22nd Oct, 2016. 8 students of M.Sc Physics under the guidance of Mr. Harleen Singh participated in various competitive activities like moving magnet without touching, magnetic levitation, inertia tower etc. students bagged consolation prize under these activities

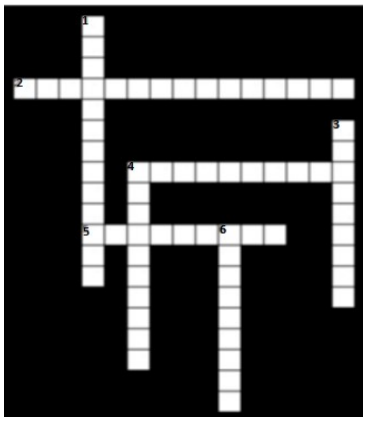
These students also interacted with Dean of Sciences and Faculty of Physics and visited various physics labs of LPU.

Inspire 2016

Department of Physics organized INSPIRE – 2016 internship camp for the students of +1 class who are pursuing sciences. 204 students from 15 schools attended this camp. To inspire the interns, various mentors from reputed institutions from all over India were invited and they interact with the participants during the camp. Interns enhanced their knowledge about the subjects by watching workshops based on physics, chemistry, biology and mathematics. Students participated in various innovative competitions like Physics Quiz and Essay Writing competitions. So so, overall this camp proved to be a step towards the scientific and innovative minds.

Fun Times with Physics

Science Crossword Puzzles

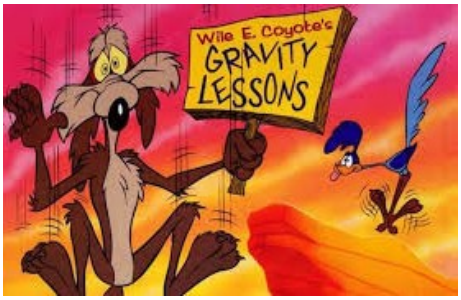


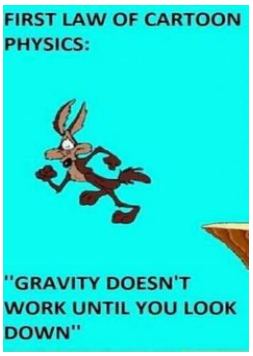
Across

2. Stored Energy. Examples of this type of energy are gravitational and chemical.
4. The transfer of heat from one place to another by the movement of gas or a liquid
5. The transfer of heat by means of rays.

Down

1. The energy of motion
3. Heat can easily move through a_____
4. The transfer of heat through two or more materials that are touching
6. Heat does not move easily through an _____





Story time

The Comet

A British scientist writes a paper based on Duttada's discovery. He and the Defense Science Advisor have a tete-a-tete over an impending calamity. A conference of international experts might yield a clue to the cosmic puzzle.

In the spacious dining hall of King's College, Cambridge, the butler whispered deferentially in the Provost's ear and handed him an envelope on a silver tray. The Provost beckoned James and passed on the envelope saying, "It seems you are wanted urgently inyour room." As he made his way towards the beautiful building, James opened the envelope. It contained a brief note:

Dear Dr Forsyth,

The bearer of this note has been instructed to bring you to my office in London tonight. Please come without delay. I am making arrangements for your overnight stay in London. I regret the inconvenience caused to you and request you to keep your visit strictly confidential. *Believe me, it is absolutely essential.*

Yours sincerely,

John Macpherson

The signature carried the designation underneath: Defense Science Advisor, Her Majesty's Government. A bowler-hatted man near the mantle piece greeted him as James entered his sitting room. "I am Johnson, sir, Security officer at Whitehall." He showed his identity card and continued, "I presume, you know why I am here, sir."

"To the extent that is conveyed in this note," replied James. He knew that it would be useless to ask Johnson for further details. "I won't take long." Johnson's Ford Cortina brought them to Whitehall in less than ninety minutes. It took them another ten minutes to reach the chambers of Sir John Macpherson. Having introduced James to Sir John, the quiet but efficient Johnson slipped out. "Dr Forsyth, my apologies for this imposition on your time!" Sir John advanced with outstretched hands. "To avoid any further delay,

I will come to the point right away." Sir John handed him a typescript.

"Why! It is my paper to *Nature*. How did you get this original manuscript?" James was surprised and somewhat uneasy. Sir John saw his anxiety and continued, "Taylor, the editor of *Nature* is a friend of mine." "I had asked *Nature* to publish it without delay since it is very important," James looked puzzled. "I agree that it is important. So important in fact that it must never be published — that is, if what you say is correct." Sir John lit his pipe. James would never have tolerated aspersions on the accuracy of his work, or the implied order that it must be suppressed. But he knew Sir John to be a respected scientist and was willing to hear him out. "Please do not misunderstand me, Dr Forsyth. I met Taylor today at lunch in the club where he showed me your paper — I still retain enough interest in astronomy, you know — and he asked for my opinion before sending it to a professional referee. I immediately realized that your result has profound implications, if it is correct." "Let me assure you, Sir John, that it is correct. I stake my reputation on it," James could not contain himself any more. "Do you realize what will happen if Comet Dutta collides with the Earth, as you predict it will?" "The effects will be catastrophic! That is why I have taken extra care to verify my calculations. Barring rare circumstances, the collision is inevitable." James was confident. But Sir John picked out the one qualifying phrase: "What are those rare circumstances?" "Well, it might collide with some asteroid before reaching here. Or it might just split up when near the Sun, or it might evaporate..." "But one can't count on these fortuitous circumstances. We have to proceed on the assumption that Comet Dutta will collide with the Earth. Cometary collisions are expected to occur once in ten million years. But now we know that the next one will occur in a year..."

"Ten months, to be precise," interjected James.

"Thank you for the correction! Do you realize that we have only ten months of survival left for the entire living species on the Earth? Don't you think we have to do something to stop all this?" A fleeting smile crossed James' face. 'Just like a civil servant! As if we are facing here a minor breakdown of law and order,' he thought to himself. Aloud, he said, "How, may I ask, can we prevent this natural catastrophe?' "I don't know; but we have no option but to try. I think we need more than two brains to handle this situation. It is essential to call an urgent meeting of experts from all over the world to think of a counter-measure and of course in total secrecy. Think of the panic in the world if this dreadful news leaks out." Sir John glanced at the manuscript in James' hand.

"My suppressing this paper will not hide the truth, Sir John!"

James said. "There are others who will arrive at the same conclusion, sooner or later." "No. Do not suppress it but tone it down. Add many ifs and buts to make your conclusion appear not so certain... I will exert all my influence with friends in other countries to make them exercise a similar restraint for a while." "For how long?"

"Until this wretched comet is safely out of the way. Let us spend some time now to plan the details of this international conference. Shall we call it in a week's time, here?"

A week to plan such an important secret conference of international experts! James thought it an impossible task, but Sir John disagreed, and began to spell out details.

Continue…

Think funny

1. There are six apples in a basket and six girls in the room. Each girl took one apple, yet one apple remained in the basket. How is it possible?
2. The 22nd and 24th presidents of the united states had the same mother and the same father, but were not brothers. How could this be so?
3. A man who was not wearing parachute jumped out of a plane. He landed on hard ground yet he was unhurt. Why?
4. At the end of a long hard boxing match one boxer was knocked out by the other. The judges agreed that it was an easy victory. Yet during the course of the match no man blow a punch. How is it possible?
5. Kiran was 20 years old in 1980 but only 15 years old in 1985. explain?
6. A man woke up one day in the morning and found one of the wheel of his car completely flattened. Despite of this he travelled 100km and back home. He did not repaired the flat tyre. How did he manage it?

Best Creativity for Wall Magazine "Quantum Dots"

Mind-Bending Discoveries In Physics that Seems to be Simple Now

Time Stops at the Speed of Light
Our Universe is Rapidly Expanding
Light is Affected by Gravity
All Matter is Just Energy

Accidental Discoveries in Physics

Sometimes one accidental discovery can lead to another. Henri Becquerel was intrigued by Roentgen's discovery of x-rays and wanted to know if minerals that fluoresced produced x-rays. Becquerel needed sun for his experiments, but unfortunately for him it was the middle of winter. Fed up, Becquerel left his materials in a drawer and waited for a sunny day. When he returned to the equipment, Becquerel discovered something strange. A lump of uranium that Becquerel had been testing had imprinted itself on a photographic plate, just as if it had been exposed to light. But how could this be? The equipment had been in a draw for several days. Becquerel had just discovered radioactivity.

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Pocket Physics is easy to use, free education app that covers most of the vital concepts, equations, and formulas of physics. This education application is a must-have guide, whether you want to refresh your knowledge, prepare for an exam, or just refresh the core concepts of physics. Pocket Physics provides discrete explanations of critical concepts taught in an introductory physics course from linear motion to astronomy. It is also a perfect reference, full of formulas, equations, and images for students who need help with physics homework assignments.