

SCIENCE CENTRE NEWS LETTER

May 2020
Issue 61



Published by
Banchhanidhi Pani

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Commissioner

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SCIENCE CENTRE

Volume 6, Issue 1

WHAT'S NEW IN SCIENCE?

Anti-Solar Cells: A photo voltaic cell that works at night.

According to Jeremy Munday, Professor in the Department of Electrical and Computer Engineering at UC Davis, University of California, United States, Solar Cell can work at night. In fact, a specially designed photo voltaic cell could generate up to 50 watts of power per square meter under ideal conditions at night, about a quarter of what a conventional solar panel can generate in daylight, according to a concept paper by Munday and graduate student Tristan Deppe. The article was published in, and featured on the cover of ACS (American Chemical Society) photonics on January 2020.

Prof. Munday is developing prototypes of these nighttime solar cells that can generate small amount of power. The researchers hope to improve the power output and efficiency of the devices. Prof. Munday said that the process is similar to the way a normal solar cell works, but in reverse. An object that is hot compared to its surroundings will radiate heat as infrared light. A conventional solar cell is cool compared to the sun, so it absorbs light. Space is really, really cold, so if you have a warm object and point it at the sky, it will radiate heat towards sky. People have been using this phenomenon for nighttime cooling for

hundreds of years. In the last five years, Munday said, there has been a lot of interest in devices that can do this during the daytime (by filtering out sunlight or pointing away from the sun).

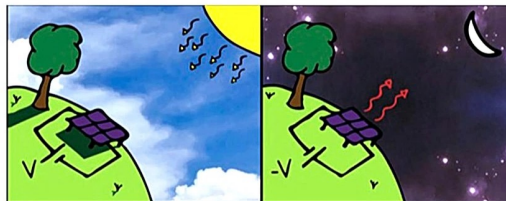
Generating power by radiating heat:

There's another kind of device called a thermoradiative cell that generates power by radiating heat to its surroundings. Researchers have explored using them to capture waste heat from engines. This thermoradiative cell pointed at the night sky would emit infrared light because it is

warmer than outer space. "A regular solar cell generates power by absorbing sunlight, which causes a voltage to appear across the device and for current to flow. In these new device, light is instead emitted and the

current and voltage go in the opposite direction, but you still generate power". Munday said, "You have to use different materials, but the physics is the same." The device would work during the day as well if you have taken steps to either block direct sunlight or pointed it away from the sun. Because this new type of solar cell could potentially operate round the clock, it is an intriguing option to balance the power grid over the day-night cycle.

Courtesy: M.T. Jariwala Madhyamik Shala



SCIENTIST OF THE MONTH

Dr. Hariom Srivastava

Dr. Hariom Srivastava was born on 23 May, 1947. He did Master of Science in Physics from Deendayal Upadhyay Gorakhpur University, Uttar Pradesh (1965 - 67), Doctor of Philosophy in Chemistry from Veer Bahadur Singh Purvanchal University, Jaunpur, Uttar Pradesh in 1997.

Dr. Srivastava joined Ministry of Information and Broadcasting through the Indian Broadcast Engineering service exam held in 1972. During his 37 years of service in All India Radio and Doordarshan, he undertook the expansion of broadcast system in the country. Further, he established IT division of All India Radio. He was pivotal in expansion of broadcasting in private sector. This included educational channel known as Gyan Vani for Indira Gandhi National Open

University. He extended All India Radio (AIR) FM services to Mauritius and around the world using satellite channels. He used community Radio for agriculture extension and piloted the project "Community Radio for Livelihood Generation" in different part of India. He also conceived, designed and piloted the project "Agriculture Knowledge Dissemination System" for farmers in Bihar. He was awarded the Prof. S. N. Mitra Memorial Award for outstanding contribution and leadership role in radio broadcast science and technology during the last 10 years by Institution of Electronics and Telecommunication Engineers (India) and International Telecommunication Union Expert in Malaysia in 1991.



Courtesy: M.T. Jariwala Madhyamik Shala



Timings

Tuesday to Friday
9.30 am to 4.30 pm

Saturday - Sunday
& Public Holidays
11.00 am to 6.30 pm

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SCIENCE FACTS MAY 2020

1st May	International Worker's Day.
3rd May	World Press Freedom Day. (By U.N.)
3rd May	International Energy Day.
5th May 1961	"Freedom 7" the first piloted Mercury space craft launched by America.
8th May	World Redcross Day.
11th May	National Technological Day.
11th May 1998	India conducted nuclear tests at the Pokhran range in Rajasthan Desert.
12th May	International Nurses Day
13th May 1857	Sir Ronald Ross (Inventor of medicine for Malaria) was born.
14th May 1686	Daniel Gabriel Fahrenheit (inventor of Thermometer) was born.
14th May 1796	Dr. Edward Jenner tested his hypothesis first time on a eight years old boy.
16th May 1831	David Edward Hughes (inventor of carbon microphone & teleprinter) was born.
17th May 1749	Sir Edward Anthony Jenner (Inventor of smallpox vaccine) was born.
18th May	World AIDS Vaccine Day.
18th May	International Museum Day.
19th May 1910	Halley's Comet brushes the Earth with its tail.
19th May 1971	Soviet Union had sent "Mars-2" for journey to Planet Mars which was crashed land of the Mars.
24th May 1844	First telegraphic message was sent by well-known Scientist Samuel Morse.
30h May 1971	America launched space craft "Mariner -9" to Planet Mars.
31t May	World No Tobacco Day (by U.N.).
U. N. : United Nations	

SCIENTIFIC QUESTION

What is the basic of aviation?

Aviation or air transport is the activities surrounding mechanical flight and the aircraft industry. Aircraft includes fixed-wing and rotary-wing types, morphable wings, wing-less lifting bodies, as well as lighter than aircraft such as hot air balloons and airships.

Aviation began in the 18th century with the development of the hot air balloon. Some of the most significant advancements in aviation technology came with the controlled gliding flying of Otto Lilienthal in 1819; then a large step in significance came with the construction of the first powered airplane by the Wright brothers in early 1900s.

The word aviation was coined by the French writer and former naval officer Gabriel La Landelle in 1863. He derived the neologism from the "to fly", itself derived from the Latin word avis (bird) and the suffixation.

The miracle of flight exists because man has the technology to oppose natural forces that keep all objects on the ground. Four forces affect an aircraft—two assist flight (thrust and lift), and two resist flight (gravity and drag).

Thrust:

Thrust is created by the engines. As propeller blades push air through the engine (or as jet fuel is combusted to accomplish the same end), the aircraft move forward. As the wings cut through the air in front of the aircraft, lift is created. This is the force that pushes an aircraft up into the air.

Lift:

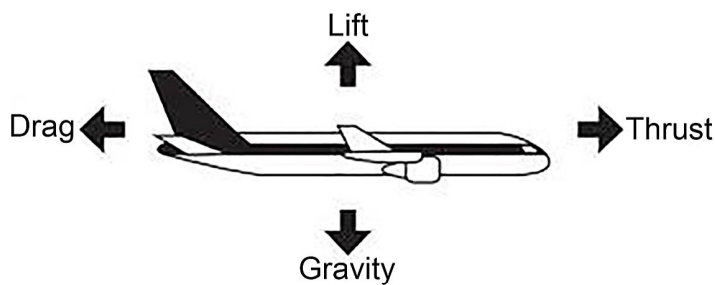
Lift occurs because air flows both over and under the surface of the wing. The wing is designed so that the top surface is "longer" than the bottom surface in any given cross section; therefore, the air is moving faster along the top of the wing. This creates a difference in air pressure above and below—a phenomenon called the Bernolli effect. The pressure pushing up is greater than the downward pressure, and the lift is created.

Drag:

Drag opposes thrust, although it mainly occurs because of air resistance as air flows around the wing. Drag is mainly created by simple skin friction as air molecules "stick" to the wing's surface. Smoother surface incurless drag, while bulky structures create additional drag.

Gravity:

Gravity is actually a force of acceleration on an object. The Earth exerts this natural force on all objects. Being constant force, it always acts in the same direction: downward. Thrust creates lift to counteract gravity. In order for an aircraft to take off, enough lift must be creating to overcome the force of gravity pushing down on the aircraft.



Courtesy: M.T. Jariwala Madhyamik Shala

KNOW THE PARK EXHIBIT

Pinhole camera

Look into the tube through the large circular opening at one end. You will see the image of the objects that are on the other side of the tube.

Turn the tube slowly and notice the changing images which are always inverted. Light from the object gets focused on a frosted screen inside the tube by a lens and forms an inverted image of the object.



SCIENCE PROJECT

Surat Municipal Corporation had organized Science Fair at Art Gallery, Science Centre, Surat on 30st and 31st August 2019. M.T. Jariwala Madhyamik Shala had presented their project to find the length of the longest side of the right angle triangle with the help of Pythagoras's theorem.

Aim: To find the length of the longest side hypotenuse of the right angle triangle with the help of Pythagoras' theorem.

It is applicable only on a right angle triangle.

$$H = \sqrt{A^2 + B^2}$$

It is used to find the measures of hypotenuse base & altitude.

In this project, take

$$A = 24\text{cm and } B = 25\text{cm}$$

$$\begin{aligned} H &= \sqrt{24^2 + 25^2} \\ &= \sqrt{576 + 625} \\ &= \sqrt{1201} \end{aligned}$$

$$H = 34.6\text{cm}$$

Only some pairs make a right angle triangle. Some of the pairs are 3, 4, 5 and 5, 12, 13 which are known as Pythagorean triplets.

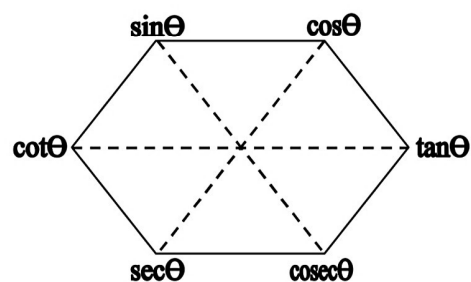
Different methods to solve Pythagorean triplets:

- $M^2 - 1 ; 2M ; M^2 + 1$ $M > 1$
 $M = 2$ $2 > 1$
 $2^2 - 1 ; 2(2) ; 2^2 + 1$
 $4 - 1 ; 4 ; 4 + 1$
 $3, 4, 5$
- $a^2 - b^2 ; 2ab ; a^2 + b^2$ $a > b$
 $\text{let } a = 3 \text{ and } b = 2$ $3 > 2$
 $3^2 - 2^2 ; 2(3)(2) ; 3^2 + 2^2$
 $9 - 4 ; 12 ; 9 + 4$
 $5, 12, 13$

The Pythagoras' statement states that, "In a right angle triangle, the squares of hypotenuse are equal to the sum of the squares of other two sides".

Different and easy methods to remember reciprocal and identities of trigonometry with help of hexagon:

RECIPROCAL:



$$\sin\theta = \frac{1}{\text{cosec}\theta}$$

$$\text{cosec}\theta = \frac{1}{\sin\theta}$$

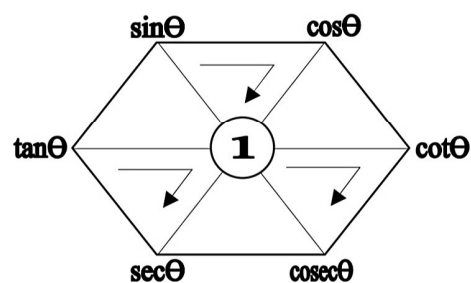
$$\cos\theta = \frac{1}{\text{Sec}\theta}$$

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

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

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

IDENTITIES:



$$\sin^2\theta + \cos^2\theta = 1$$

$$1 + \cot^2\theta = \text{cosec}^2\theta$$

$$\tan^2\theta + 1 = \text{sec}^2\theta$$