Max Planck
(Who introduced quantum theory)

As a metal rod is heated it progressively becomes warm, hot and red hot. As its temperature rises, it begins to emit light, red in the beginning, then yellow, and then blue. All this is common knowledge. However, there is a conceptual difficulty. If the temperature is doubled, emission of radiation for each colour is not doubled. The spectrum simply shifts emitting energy of lower wavelength. That means, the most prominent colour now emitted by the object is of a higher frequency or lower wavelength. The reverse happens when the temperature is decreased. This was just not understandable. Planck solved the problem by introducing the revolutionary idea of quanta of energy. Imagine molecules in the object to be some kind of oscillators. Planck postulated that only some frequencies were available, and that the radiation emitted was in the nature of packets of quanta.

Max Karl Ernst Ludwig Plank is ranked with Einstein as one of the two founders of 20th century physics. Plank’s discovery of a world of discrete, discontinuous “quanta” of energy ushered in the era of modern physics. It was Plank’s discovery, which directly led to the formulation of quantum mechanics 20 years later. In fact Plank was the first prominent physicist to endorse Einstein’s special theory of relativity. Plank’s quantum theory provides the basis for understanding the photoelectric effect and Raman Effect.

- Born on April 23, 1858, at Danish Seaport, Kiel, Germany.
- Attended University at Berlin & Munich. Awarded Ph.D in 1879 for his work on second law of thermodynamics.
- Appointed as Associate Professor at the University of Kiel in 1885.
- He was appointed in 1889 as successor to Kirchhoff at University of Berlin, where he remained until his retirement in 1926. Afterwards he became President of the Kaiser Wilhelm Society for the Promotion of Science, a post he held until 1937.
- His radiation formula, announced on December 14, 1900, introduced the concept of quanta of energy.
- Awarded Nobel prize in 1918 “for advancement of Physics by his discovery of energy quanta.”
- He was elected to Foreign Membership of the Royal Society in 1926 and awarded the Society’s Copley Medal in 1928.
- Died on October 04, 1947, at Gottingen, Germany.
I'm the mother of all mothers, at my middle age of 4600 million years; I'm your own small planet: the Earth. Do you know me enough? Your moment of Earth has come. Come on I tell you my story. My Landmarks are (My stands for million years ago):

- **4600 My**: earth, moon, planets born; I acquired magnetic field; I often shift my magnetic poles;
- **3500 My**: my crust (your continents & oceans!) formed; atmosphere with some carbon dioxide & sea water formed too;
- **3300 My to 2500 My**: layered rocks formed in water bodies on this crust; algae flourished & with its long consumption of carbon dioxide came oxygen rich atmosphere, iron deposits; thank this algae did you?
- **2300 My**: my first ice age;
- **2000-1000 My**: rapidly the continents grew; southern ones combined into super one; you call it Gondwanaland now; you were not around then;
- **700-600 My**: 2nd major ice age & first appearance of bodied organisms;
- **550 My**: the explosion of life (Cambrian explosion); volcanic explosions;
- **440 My**: giant sea scorpions (twice your size!);
- **420 My**: first land plants;
- **400 My**: came age of fishes;
- **270 My**: super continent Pangaea from 60 degree N to South pole;
- **250 My**: Pangaea started moving north; life nearly died;
- **220 My**: dinosaurs came to lord over;
- **210-145 My**: dinosaurs had a hey day; birds spread; Africa and South America began to split; central Atlantic began opening;
- **145-65 My**: massive lava flows in what you call India; flowering plants merged; at **120 My**: India split from Africa & Antarctica & began moving north; **100 My**: South America & Africa began to split;
- **65 My**: another extinction of marine & land life; dinosaurs gone!
- **50 My**: grasses emerge;
- **40 My**: Rockies uplifted;
- **35 My**: apes came; **25 My to 15 My**: Alps formed; **20 My**: India began colliding with Asia; Himalayas started getting born at a very slow speed;
- **11-10 My**: Great Apes & Hominid (like you!) separated;
- **3 My**: Antarctica isolated; first hominids appeared; **1 My**: erect moving man appeared all over by 0.25 My & after sustaining last ice age which just finished at 18000 years, man has reached every where.

I’ll live another 5 billion years my kids; you won’t! Understand me while you live. My mysteries are only partially known to you. I’m not only your mother I’m mother to all life forms. Live in peace & harmony for your sake if not my sake! May the Sun bless you!

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Weather Projects

Do-it-Yourself

More heat

Things you require

- Small box with measurements at least 25x25x25 cm (a shoe box will also do).
- Two paper cups.
- Light coloured soil.
- Tap water.
- Two thermometers.
- Ruler/Meter scale.
- Adhesive tape.
- Paper.
- Pencil.
- A lamp.
- Adult helper.

Procedure:

1. Ask an adult to cut the top off and cut out one side of the box.
2. Fill one cup with soil and the other with water.
3. Place the cups together at the back of the box.
4. Put a thermometer in each cup. The bulb of each thermometer should be about half a centimetre below the surface of the water or the soil in the cup.
5. Stick the top of the each thermometer to the back of the box with the tape.
6. Prepare a chart to record the experimental results.
7. After the thermometers have been in the cups for at least 5 minutes, record the temperature of each material. These are starting temperatures.
8. Place the box under the lamp so that the light bulb is about 25 cm from the top of the cups. Make sure that the light bulb does not touch the box.
9. After 10 minutes, turn the lamp off and immediately record the temperature in each cup. These are the final temperatures.
10. Calculate and record the changes between the starting temperatures and the final temperatures.

Results:

What will you observe? The temperature of the soil has increased more than has the temperature of the water.

Why does it happen?

Heat is the total energy of all particles in an object. When heat energy from the light added to the object, its total energy increases. While the addition of heat usually causes the temperature of the object to increase, the same amount of heat does not cause the same change in the temperature in all substances. The amount of heat needed to raise the temperature of one gram of substance one degree Celsius, is called specific heat.

Although the same amount of heat is added to both cups, the temperature change is not is not the same for the two materials.

To explore:

1. Do the materials cool at the same rate?
2. Repeat the experiment, but record the temperature as soon as the lamp has been timed off as the starting temperature. After the lamp has been off for 10 min, record the temperature has been off as the starting temperature. After the lamp has been off for 10 min, record the temperature as the final temperature. Calculate the temperature change for each temperature.
3. Find out more surface temperatures like shade of a tree, building, ground or any other. Place one thermometer on the above place and second in direct sunlight.

Water does not heat up as quickly as soil does; thus water has a higher specific heat than does the soil. This experiment indicates that the earth’s land surfaces with the type of soil used in the experiment heat up more rapidly than do its water surface.

<table>
<thead>
<tr>
<th>Material</th>
<th>Temperature starting</th>
<th>Temperature final</th>
<th>Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Light coloured soil</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tap water</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Dr. T.V. Venkateswaran, Smita Nair, Chetna Yadav

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क्या लेना है?
- कांच का गिलास (तीन), फनल (तीन), पानी, अलग-अलग प्रकार की मिट्टी, कार्ड बोर्ड के दुकान (मध्य में छेद)

क्या करना है?
- कांच के गिलास पर छेद युक्त कार्ड ड्राइवा है।
- फनल को प्रशंसक गिलास पर रखना है।
- फनल में रेतीली मिट्टी, दुमट-मिटटी, चिकनी-मिटटी भरना है।
- फनल में रखी मिट्टी पर बसाबर मात्रा में पानी डालना है।
- धीरे-धीरे फनल से पानी कांच के गिलास में इकट्ठा हो जाता है।

क्या तय है?
- किस मिट्टी ने पानी को क्यों ज्यादा रोका?

करें और जानें

अंकुर यादव
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Do-it-Yourself
Among the latest from Mars is that there are clouds, frost and weather changes there. A portion of Mars’ water vapor is also found to be moving from the north pole toward the south pole during the current northern-summer and southern-winter period. Also, contrary to what people believed, the volcanoes there may have been active as late as 20 to 40 lac years ago. In fact, some of the 5 volcanoes studied may be just dormant and not dead. These are opinions of scientists at Free University at Berlin and Brown University. Photographs of Solar System’s biggest, about 25 kilometers high, volcano Olympus Mons on Mars, taken by the orbiting Mars Express of European Space Agency with its High Resolution Stereo Camera reveal detailed features of this volcano. The volcanoes not only provide the required heat and water but also essential nutrients for nurturing life. The Mars Express is orbiting over Mars and exploring and scanning its surface for water and other features.

On the surface of Mars, Spirit’s right rear wheel got entangled with a potato-sized rock but on 22nd of December, it got itself more or less out of trouble. In the other half of the planet, the other rover Opportunity (landed 24th January, 2004) found its way out of Endurance crater on its 315th day on Mars and after 6 months in Endurance crater. Once out, it studied its own tracks to find weathering effects, if any, by comparing the old and the new tracks. By first week of January, Opportunity rover had reached the heat-shield located about 200 metres from the Endurance crater it had exited and started the study. The shield, used to protect this rover during atmospheric entry of the rover, had fallen about 2 kms away from the landing site, making a crater. The job on hand for the rover now was to examine this, probably the freshest, crater and the shield. Gradually, the implications of the rovers’ findings are beginning to fall in place. After about an year on Mars surface, the two rovers have answered in affirmative to the question of water on Mars in the past and all are listening.

Spirit which had landed in Gusev crater on January 4 (UT) early the same year, later moved to northeast of a ridge called ‘Machu Picchu’, crossing a 200-meter-wide flat saddle area. Spirit had found several evidences for past water on Mars. This involved chemical analyses. The evidence of water in Gusev crater had been in the form of coatings on rocks, some alteration materials as well as in the form of material carried and filled in rock-crevices. Its identifications included ferric oxides and silicate minerals like olivine and pyroxene. The low chlorine to bromine ratio was also suggestive of aqueous activity in Gusev crater which was inferred to be more at the lower layers of sediments. The rocks to be chemically analysed were first cleaned with rover’s rock abrasion tool and then bombarded using a radio active curium-244 source present in the alpha Particle X-ray Spectrometer. The back-scattered alpha and X-rays told about the compositional nature of target material.

But the latest and strongest finding with implication for water on Mars is deduction of iron-bearing mineral goethite by a group of German, Russian, Brazilian and American scientists. The mineral was found in a rock among Columbia hills, termed ‘Clovis’ which was analysed by the equipment on Spirit. Goethite is a hydrated iron ferric oxide and forms only if water is present whether as solid, liquid or vapour. Detected using Mossbauer effect, also called nuclear gamma resonance spectroscopy, it involved the emission of gamma ray by a radiogenic excited Iron nucleus of atomic weight 57 (Fe-57*) resulting from decay of cobolt-57. The absorption of gamma rays is also by similar iron nucleus in surrounding. The determination of the total energy of source nuclei, which can be varied by moving them so as to fine-tune frequency, helps in identifying the surrounding of the absorber nucleus leading to structure, oxidation state etc.

Work of Opportunity, which followed Spirit on Mars, in the other hemisphere, after 3 weeks, also involved photographing rocks such as ‘stone mountain’ and also drilling holes in rocks with its rock abrasive tool and examining internal minerals. So far Opportunity had detected jarosite, a hydrated iron sulphate. However, according to a research paper in research journal nature, its presence with residual basalt at Meridiani Planum suggests that an arid phase followed the wet conditions so that alteration was not complete. The ripple marks had also been seen in the sedimentary rocks indicative of water’s presence. Presence of gray hematite (oxide of iron) was another indication of water having been present as it requires prolonged exposure to water to convert hematite to this form though there are other ways to form it too. In fact, the spherules termed ‘blueberries’ (though they are not blue) seen may be result of iron-rich minerals being leached out of the rocks’ interiors by water and solidifying as balls.

Even as scientists may be preparing themselves to part with the twins, they continue to ponder over many questions. Is there water on Mars other than at poles? Could it be locked up in water-bearing minerals like Epsom salt? May be there is sub surface water. Can some of the methane being released be organic in origin? Life has been found in sub-zero conditions at lake bottoms on earth as well as near boiling water at ocean bottoms where none expected them to be. So is it not possible that there is some forms of life present below the Mars-surface? No one has an answer as of yet. Robots are no substitute for human beings and possibly future manned missions with sophisticated equipments aboard will allow better testing.

Contd. on page 7
showing that magnesium can be used as fuel in Mars-like atmosphere using iodine as catalyst, fuel-carrying problem may also be circumvented. Using Moon as intermediate station or using magnetized beam plasma propulsion system to carry, as conceived by some workers of Washington University, may make the round trip a 3 month pleasure!

With Cassini doing fly-byes of Saturn and Titan, there is considerable excitement in the air for those interested in planetary science. Exciting times for the curious, indeed.

VIPNET NEWS APRIL 2005

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Dr. C.M. Nautiyal
Dear Friends,

A monthly Astronomy Crossword is being started from this issue of VIPNET News. Solve the Crossword and send it to VIPNET News within 30 days. The three winners will be selected from received correct entries. The names of winners will be announced and an Astronomy Kit will be sent to their respective postal addresses. Please send your entries to:

Astronomy Crossword-1, VIPNET News, Vigyan Prasar, C-24, Qutab Institutional Area, New Delhi-10016.

Astronomy Crossword-1

You can win an Astronomy Kit

Vertical Words
1. This spacecraft on its way to mercury
2. Part of solar system which has a tail like structure
4. Saturn has special structure around it
6. An Astronomer who discovered Planet Uranus
8. Earth is divided into two hemisphere from this line

Horizontal Words
1. First planet in the solar system from sun
3. One of the Galilean satellite of Jupiter
5. Our home planet
7. Number of satellites that mercury has
9. When Sun, Moon and Earth come in a straight line with moon in between, this eclipse occurs

Astronomy Corner

 Priya Pahakho,

Aap samhi se vipnet - nyujit me prakasanabhi visaana rc cultivae, javankaarishad, visaana kahita abadh aamgata hai. Vipnet - nyujit ek asa monh hai, jaah aap abh visaana kult ke vibharta hr maha aadh kahibh bhuk takh pahoon sakti hai. Visaana kultae ke prabavd abhshakti gatiishya se hai, jitske madham se visaana de sasthara de hamare lohii me risaav ho sakhe.

Is sambhar me aap samhi se visaana gatiishyaa pr abadhati rcnaa aamgatai hai, jisne hamare abhikahd kult labhandhayi ho sakhe.

Arvind C. Ranade
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Climbing down the terraces of Pinjore Garden or going up the steps of Mansa Devi Temple, no one may know that he has crossed an active fault caused escarpment. When Kangra quake is in international focus Chandigarhians should also know today that in Pinjore Gardens and between Chandimandir and Mansa Devi Temple we have tell tale evidences in active faults laterally extending over 200 km long. These have been established by experts from Japan and IIT Kanpur. The faults caused an up &/or down movement of 3.5 metres hardly 600 years back. Stresses have piled up so much that the experts are definite another violent vibration repeat is round the corner. Quaky clocks tick silently but steadily. These active faults are nothing short of time bombs. Opportune time it is indeed to focus on these wonders of nature and keep awake in order to sleep well. The Mughals who built the Pinjore Garden surely were oblivious of the seismic history of the area.

The Kangra Quake of 1905 came much later but the region must have also shaken up when Pinjore shook. Most faults are intertwined or behave sympathetically more so in a young and vibrant mountain chain like Himalayas. Kangra quake then characterized “Great” (Richter scale 8.6) now downgraded to 7.8 (very strong, not “Great”) shook the region to hell. Far away Quetta to Roorkie too trembled. The Pinjore - Chandimandir may have been really a Great earthquake. Its repeat is also nearby. Quakes seem to come bundled!

Atleast in last century renowned geologist C.S. Middlemiss was there to pen down the details of Kangra-Dharamsala devastation that happened at 06:19 am I.S.T. on April 4th, 1905. Lady Curzon (God bless her soul!) was spared during her sleep by a falling chimney at Shimla. However, 19727 killed in the region included the colonial administrators. No one was left alive to supervise relief. Epicenter was 156 kilometers NNW of Chandimandir, city beautiful came 55 years later.

Massive landslides, rock falls and avalanches following Kangra quake caused more deaths and misery. Undivided Punjab too saw varying degrees of damage. Sand vents and earthquake fountains were noticed near Bijnor, Khanki, Haridwar and Roorkee. Strong tremors were felt at New Delhi, Gujranwala, Poonch and Rohtak. Light to moderate tremors were felt as far as Ahmedabad, Surat, Quetta, Jalalabad (Afghanistan), Lucknow and East Bengal (present day Bangladesh). Aftershocks were also felt in the plains of northern India.

Earthquakes similar to Pinjore-Chandimandir and Kangra- Dharamsala areas are due in view of tremendous stresses building up in the region. Estimates by experts of populations in risk zone are around 50 million. Engineering Geologists were associated with designing of major dams like Bhakra, Pong, Naphtha Jhakri and Chamera. One of them Prem Kumar (a PU alumnus) died last year of silicosis of lungs he suffered logging for five year the unventilated tunnels during execution of Naphtha Jhakri. The sweat and hard work/sacrifices of geologists would be in vain if even these mammoth structures would tumble or crack causing a reverse tsunami. Kangra Quake II and Pinjore Quake II are definitely in the womb of Himalayas and foothills. Not being seismosavvy in the development of Chandigarh and nearby areas would be a blunder. Concrete towers built in the lovely hills and plains are over or very close to major faults and thrust zones crisscrossing Himalayas and these could drop like a pack of cards here and there.

It is time to focus on quakes for Chandigarh, Delhi, Panjab, Haryana ,Himachal and Uttaranchal governments. Quakes do not kill, apathy to geosciences would. There is need to have a geologist focusing on every district who should personally co-ordinate with MP &/MLAs from the region on all geohazards. It is time to restore the position to geologists if geohazards are to be managed systematically. Geological Survey of India and geology teaching across the country needs a massive expansion. Geologically managing Indian subcontinent, its interiors and its continental shelves is almost a job of continental proportions. There are resources as well as hazards everywhere. Without invigorating human resources we are never going to be like the rest of major powers. Even Pakistan offers us an example to emulate in international geological collaborations. Our standards have to get at par with the best.

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PINJORE-CHANDIMANDIR-KANGRA QUAKES

There are resources as well as hazards everywhere. Without invigorating human resources we are never going to be like the rest of major powers.

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विपनेट न्युज के नवम्बर ’04 अंक में हमने आपके लोग पुरा पढ़ा थे।
(1) कूदने से पहले हम दौड़ते क्यों हैं?
(2) सेवा काटे जाने पर मूर्ति रंग कब तो लहर सकती है?
(3) कैसे बनाये जाएं ये तीन ताजा कार्पोजेंटियल?

**प्रशंसक श्रंखला 105 के विज्ञान निम्नलिखित हैं:**
1. हिमानु संगीत फार्सिस, इरास्पुल, उड़ीसा
2. मालिका प्रसाद के, एच., बिहार, बिहार
3. परमेश कुमार चतुरसिंह, अदापुर, बिहार

**प्रशंसक श्रंखला 106 के विज्ञान निम्नलिखित हैं:**
1. तनवी, कोलकाता, प.ब.
2. कनेला लाल कनानी, रामपुर, चंडीगढ़
3. अंकित मेहरेनज, बरेली, उ.प.

**कूदने से पहले हम दौड़ते क्यों हैं?**

कूदने से पहले दौड़ने का कारण न्यूटन के गति के नियमों पर आधारित है।

सभी जीवाश्वासों और निर्देश खुलने में एक जड़ता होती है, यानि अपनी व्यायाम सीमा में बने रहने का गुरु होता है। अतः यदि एक रूटिया स्थिति में है, तो उसमें भविष्य में भी स्थिर रहने की प्रवृत्ति होगी।

**सेवा काट जाने पर मूर्ति रंग कब तो लहर सकती हैं?**

सेवा में लाये जुटने एजेंशी ‘पालिटिनोन ऑफिसियल’ पाना जाता है। जब फल को चार जाता है, तो यह एजेंशी बाद के समय में आने पर संकेत हो जाता है। इस एजेंशी फल में उस्तरित शक्तिसृष्टि से क्रिया करके सेवा के कटे हुए भाग में मूर्ति रंग उत्पन्न करता है। यदि कटे हुए सेवा का एक्सट्रेमिटी अन्त के चोल में दुर जाता तो पूरा रंग से बचा जा सकता है, क्योंकि अन्त एनजाइम की क्रिया को दब देता है।

**सॉप टेंडे ने/सर्पिल उगने से कैसे चलते हैं?**

सॉप अपेक्षाकृत खुराक का समय पर ही सर्पिल उगने से चलते हैं। सॉप अकेले ऐसे करेक्शन प्राप्त हैं, जिसमें उगाड़ किए होते हैं। सॉप को सर्पिल उगने से चलने की आवश्यकता इसलिए होती है क्योंकि क्योंकि बाँध, बुध और अक्षरा भूमि से बनी खुराक साथ पर, यह सर्पिल गति, एक अधिकतम गति ग्रोथ का कारण है।

**विपनेट न्यूज़**

VIPNET NEWS APRIL 2005
World Year of Physics 2005

Member of Students Science Club, Tarkinere are organizing Popular Lecture Series on Physics, in order to celebrate World Year of Physics 2005. Every Sunday, one lecture is being organized. Lectures on Newton’s Laws of motion, Einstein’s theory of Relativity, Nuclear Physics, Electromagnetic spectrum, and evolution of Universe have been delivered by experts. Club also informed about a Newsletter “FASCINATIONS WORLD’ which is being published by the club.

Puppet and low cost Model making

Dilli Vigyan Manch, (DVM), Surya Nagar, Gaziabad organized a series of workshops on Puppet and low cost model making activities during the year 2004. DVM covered the areas of Daman, Jalgaon, Gaziabad, Calcutta, Jammu & Kashmir and Orissa with these workshops. DVM also focused on optical illusion activities and Eco Clubs’ formation.
VIPNET Activities

Igniting Young Minds-Igniting Many Minds
Vision of India 2020

Salwan Public School (SPS); Gurgaon conducted a symposium on January 22, 05 ‘Igniting Yong Minds-Igniting Many Minds’ Vision of India 2020. Based upon President Dr. A.P.J. Abdul Kalam’s book, it was a step towards realizing his vision for India 2020, a dream to manifest India as a ‘developed’ country from a developing one.

The discussion was held on five themes viz IT-Mobile Phones of 2020, Space Tourism, High Speed Tech.-Air travel, under-sea trains (8000 km/hr.), Biotech-‘Human-made’ plants (for pest resistant, higher quality), Futuristic Medicine-Stem Cells.

It was a ‘first of its Kind’ event where the student got an opportunity to discuss their dreams and ways to realize theme. The event was presided over by many eminent Scientists like Dr. Vinay B. Kamble, Director, Vigyan Prasar, Dr. Reema Velayudhan, Scientist, National Brain Research Centre, Educationists Prof. K.G. Virmani, Former Head of NIEPA, Mr. P. Mani, Education Officer, CBSE; Dr. Rita Talwar, Principal, Cambridge School, New Delhi; Mr. Kuleep Rai, MC Member and Mr. Kailash Chand, Education Officer, National Science Centre. Dr. Rajinder Prakash, Director, SPS, Dr. Indu Khetarpal, Principal, SPS were present on the occasion.

VIPNET Questionnaire Series

प्रश्न साधियाँ

यहां हम नौ प्रश्न दे रहे हैं, जिनके अंतर्गत आपको 30 विवाद के अंदर देखने हैं। तीन शहरी प्रविष्टि्घों के विज्ञानकारों के नाम के साथ साथ साहि

प्रश्न 1: कार्बन, हैरे में कैसे परिवर्तित होता है?

Question 1 : How does carbon change into diamond?

प्रश्न 2: वस्तु की परछॉई उससे बड़ी क्यों होती है?

Question 2 : Why is the shadow bigger than the object?

अपने जवाब इस पते पर भेजें:-

VIPNET प्रश्नावली शृंखला-110

विज्ञान प्रसार

सी-24, कुटुब इंटरनैशनल एरिया, नई दिल्ली 110016

VIPNET Questionnaire Series-110

VIGYAN PRASAR

C-24, Qutab Institutional Area, New Delhi 110 016

Arts and Science Exhibition

Nava Bharath Matriculation School, Rajapalayam, TN organized Arts and Science Exhibition on January 29, 2005, provided a good opportunity for students to exhibit their interest and knowledge in various subjects. A large number of students from Pre.k.g. to Std X displayed exhibits and models. Models explaining Light House, Rocket, Burglers alarm, Electronic walking stick for the blind, Fascinating collection of antiques, Stamps, Coins, Collage works, Paintings, Origami and Toys.