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VIPNET NEWS



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A monthly newsletter of Vigyan Prasar Network of Science Clubs - VIPNET

EDITORIAL

Dear VIPNETIANS,

Hopefully, the present issue will be the last combined issue of VIPNET. The present issue of October-November has only three articles that will help you learn and perform. Like every issue, there are fun filled learning activities and prizes to be won. You will also find the enclosed re-registration form which needs to be duly filled and sent to Vigyan Prasar in the provided envelope.

It brings me immense pleasure to share with you that we are receiving significant and encouraging response to our new initiative. I am thankful to club members for your engagement and considered response. Your support gives us the strength and motivation to bring out the best with every issue.

Since we are approaching winters, most of electrical appliances used in summers are used at minimum or are on hold. One such gadget is Air Conditioner. In the present issue, you will be familiarized with the working of the air conditioners. Your major concerns that have to be addressed while buying an AC are elaborated in this issue.

We all know that there are three types of matter on the earth viz. solid, liquid and gases, they have different properties and many properties are related to difference in their densities. In the present issue, you will come to know that density within the type of matter is also an important concern. The relevance of these aspects to our daily lives is highlighted appropriately.

It has been observed that, a few districts of Bihar, Jharkhand, West Bengal and Uttar Pradesh are experiencing the life threatening disease Kala Azar caused by sand fly bites. A special article on this aspect is part of the present issue.

Each article has some activity that can be performed by our club members. Therefore, I expect that each one of you will consider the issue that helps you with information on learn and earn opportunity. I am sure; you will enjoy the issue and will respond to the desired activities and keep the window of communication alive. I once again appeal to each of the existing club members to fill the form and send the re-registration form with the self addressed envelope provided and you do not have to pay for its postal charges.

Wishing all the club members luck in performing the activities and winning prizes.

Dr Arvind C. Ranade
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Right education should help the student, not only to develop his capacities, but to understand his own highest interest.

J. Krishnamurti

संपादकीय

प्रिय विपनेट सदस्यों,

उम्मीद है वर्तमान अंक विपनेट का आखिरी संयुक्त अंक होगा। अक्टूबर-नवम्बर के वर्तमान अंक में केवल तीन लेख हैं जोकि आपको सीखने और प्रदर्शन करने में मदद करेंगे। हर अंक की तरह इस बार भी मस्ती भरी शिक्षण गतिविधियां करके आप कई पुरस्कार जीत सकते हैं। इस पत्र के साथ पुनः पंजीकरण फार्म संलग्न किया गया है जिसको आप लोगों को भरके दिए गए लिफाफे में डाल के विज्ञान प्रसार के लिए पोस्ट करना है।

मुझे यह बताते हुए बहुत खुशी हो रही है कि हमारे द्वारा चलाई गई नई पहल के जवाब में हमें महत्वपूर्ण और उत्साहजनक प्रतिक्रिया प्राप्त हुई है। मैं सभी क्लब सदस्यों का उनके सम्मेलन और प्रतिक्रियाओं के लिए धन्यवाद करता हूँ। आपका समर्थन हमें हर अंक के साथ बेहतर करने के लिए ताकत और प्रेरणा देता है।

आजकल सर्दियां आ गई हैं, इसलिए गर्मियों में इस्तेमाल होने वाले बिजली के उपकरण का इस्तेमाल करना हमने कम कर दिया है या कहे कि रोक दिया है। ऐसा ही एक गैजेट है एयर कंडिशनर। वर्तमान अंक में आप एयर-कंडिशनर की कार्यप्रणाली से परिचित होंगे। एयर कंडिशनर खरीदते हुए आपकी मुख्य चिंताओं का इस अंक में ब्यौरा किया गया है।

हम सभी को ज्ञात है कि पृथ्वी पर तीन प्रकार के पदार्थ ठोस, तरल और गैस होते हैं, इन सभी के अपने-अपने गुण हैं और कई गुण इनके घनत्व में अन्तर से संबंधित हैं। वर्तमान अंक में आप जान पाएंगे कि किसी पदार्थ के अंदर का घनत्व भी एक महत्वपूर्ण चिंतन का विषय है। हमारे दैनिक जीवन पर इन पहलुओं की प्रासंगिकता का उचित रूप से प्रकाश डाला गया है। हाल के दिनों में यह देखा गया है कि बिहार, झारखंड, पश्चिम बंगाल और उत्तर प्रदेश के कुछ जिले काला अजार नामक एक घातक बीमारी से जूझ रहे हैं जोकि सैंड फ्लाय के काटने की वजह से होती है। इस पहलू पर एक विशेष लेख वर्तमान अंक का हिस्सा है।

प्रत्येक लेख में कुछ गतिविधियां दी गई हैं जो कि हमारे क्लब सदस्यों द्वारा की जा सकती है। इसलिए मैं उम्मीद करता हूँ हर कोई इस अंक पर विचार करेगा जो कि उन्हें जानकारी के साथ सीखने और कमाने का अवसर देगा। मुझे यकीन है; आप इस अंक को पसंद करेंगे और इच्छित गतिविधियों का जवाब हमें भेजेंगे और हमारे बीच के संचार की खिडकी को खोले रखेंगे। मैं एक बार फिर सभी मौजूदा क्लबों को अपील करता हूँ कि वह पुनः पंजीकरण फार्म भरें और उसे स्वयं संबोधित लिफाफे में डाल के हमें भेजे और आपको इसके लिए डाक खर्च का भुगतान करने की आवश्यकता नहीं है।

सभी क्लबों को गतिविधियों में बेहतर प्रदर्शन और पुरस्कार जीतने के लिए शुभकामना और बधाई।

■(अनुवाद: विपिन सिंह रावत)



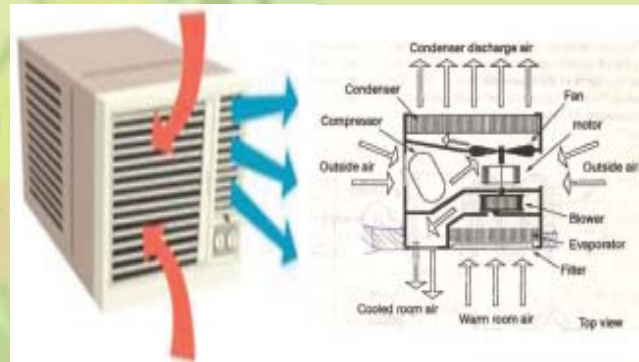
AIR CONDITIONERS

Kapil Tripathi

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Friends, I am sure you are experiencing a change in weather especially in the northern part of India. In days to come, weather will be cool but till August it was very hot and humid! No doubt our fans, coolers and AC will be on hold till next season, but have you ever wondered how the expensive gadget named Air Conditioner works? Let us try to learn about it.

The first modern air conditioning system was developed in 1902 by a young electrical engineer named Willis Haviland Carrier. Air conditioner and Refrigerator works the same way. Refrigerator cools the small insulated area where the AC cools the room. An air conditioning system has four parts **an evaporator**- for receiving the liquid refrigerant, **a compressor**- a pump that pressurizes refrigerant, **a condenser**- to facilitate heat transfer and **an expansion valve**- that regulates refrigerant flow into the evaporator. Air conditioners use hydro chlorofluorocarbons, or HCFCs in gas form which convert gas to liquid and back again. It helps to transfer hot air inside room outside.



When you start an AC, the blower starts immediately while compressor starts after a few seconds. The evaporator coil cools as soon as the compressor starts. The blower behind the cooling coil (or evaporator coil) starts sucking the room air, which is at high temperature. On its path towards the blower, the room air first passes through the filter where the dirt and dust particles from it get removed. The air then passes over the cooling coil where two processes occur. First, the refrigerant inside the cooling coil absorbs the heat from the air which makes air cooler and second due to decrease in the temperature of the air, some dew is formed on the surface of the cooling coil in the form of moisture which gets removed. This is why you see the AC always releases water.

This air which is at low temperature and has low humidity is sucked by the blower. It blows at high pressure through small duct inside the air conditioner and passes through small opening in the front panel or the grill. This is how room is made cool.

The temperature inside the room can be set by using the thermostat knob or the remote control. When the desired temperature is attained inside the room, the thermostat stops the compressor of the AC. After some time when the temperature of the air becomes higher

again, the thermostat restarts the compressor to produce the cooling effect.

How to select an AC?

If you are planning to purchase an AC then you should have following points in your mind. These will definitely help you in selecting appropriate device.

Capacity of AC: AC capacity is measured in **Ton**. It means its cooling capacity or heat removal capacity. One **Ton** means the cooling effect equivalent to cooling caused by conversion of 1 ton (910 kg) of water into ice at the same temperature.

Matching the room size and AC capacity is important in order to save energy. It is important to install an AC with the right capacity. A unit with low power will be insufficient to cool the room, while the one with more cooling capacity than your requirement will switch on and off too often. Lower capacity AC will have to run its compressor almost continuously, thus utilizing more power and increasing chances of breakdown. Required cooling capacity will depend on many factors-volume of the room, its heat insulation, number of persons in the room etc. For general home use, a rough guide can be 0.75 Ton AC for rooms less than 100 sq. ft., 1.0 T for room of 100-120 Sq. Ft., 1.5 T for rooms of 120-150 sq. ft., but these are approximate calculations. Rough measure is that a 100 sq ft area will need one ton of cooling capacity.

Window AC or Split AC : When you enter in any electronics store you will be asked about the type of AC you are looking for? Window AC or Split AC? Window ACs will have all its components packed together in one unit, while in Split AC's, hot-end unit need to placed somewhere outside the room. Split AC's are less noisy and a little more efficient, but substantially more expensive than window AC's..

Cooling Capacity of AC: Cooling capacity of AC is the ability to extract certain amount of heat in an hour and is measured in BTU/hr. When choosing an AC, you can also compare the ratio of heat removal capacity (generally given in BTU/hr: British Thermal Unit per hour.) and power consumption (given in watt). The higher the ratio, the more energy efficient is the AC. So buy an AC with the highest BTU/hr per kilowatt, for maximum energy saving with greatest cooling. The higher the BTU, the more powerful the AC, which means it will be able to cool a larger area. The BTU for an AC usually ranges from 5,000 to 24,000, with 12,000 BTU being equivalent to one ton.

Star Rating: Checking of Star Rating is important while buying an AC. The Bureau of Energy Efficiency (BEE) has rated the energy efficiency of electrical appliances by awarding one to five stars based on its power consumption. The AC with fewer stars will be less efficient and less expensive than the one with higher stars. For an AC to be more energy efficient, we need more heat removal capacity at less power consumption.

Compressor: There are two types of compressors generally used – reciprocating piston type and rotary compressor. Reciprocating (forward-backward) type compressors will have higher friction and resultant heating and power loss. So, rotary compressors are preferable, not only for less frictional loss, but also for lesser wear and tear. The mechanical parts in rotator compressors do not have to

withstand high thrust of reversing direction of movement, as in reciprocating ones.

Heat Exchange Coil: There are heat exchange coils on both cooler and hotter sides of the AC and these are also important for energy efficiency. Copper tube coils are generally used, but over time their heat transfer efficiency reduces because of oxidation with oxygen present in the ambient air, forming a less heat conducting thin surface. So, look for an AC which has heat exchanger coils coated with an inert noble metal, preventing formation of less heat conducting oxide layer.

Thermostat sensor: Remember to clean the Thermostat sensor, which is generally located behind the front grill of the AC. A dust covered thermostat sensor will not sense the set temperature quickly, as the dust covering reduces the heat transfer. As a result, the compressor will run for a longer time resulting in more power consumption and more cooling than desired/set.

Filter: Many AC's are available with filters to remove even microscopic dust particles and bacteria. If the cost is not much higher than those with simple dust filter, they are worth the extra money. Most air-conditioning units also have a dehumidifier, which reduces humidity in the air, making it cooler and more comfortable. Also remember to check the noise level of the model, which usually ranges from 30-60 decibel.

Grab a Book

चमत्कार का रहस्य

ACTIVITY-1

- Switch on fan while AC is ON. Observe the cooling result. Find out the time to reach desired room temperature with or without fan switched ON. Calculate the amount you saved by using fan with AC to reach up to desired temperature. The idea is that ceiling fan helps in circulating cool air more efficiently. Fans are much cheaper to run than AC. The fan will cost 30-50 paisa per hour while AC will mean an expense of Rs 10-15 per hour.
- Clean the filter regularly as it can help in lower the power consumption by 10 %. Find out the reasons.
- Always keep your thermostat setting 24-25°C because for every degree below 22°C the air conditioner will use 3-5% more energy. Find out reasons.

Complete the activity and send us the result to vipnet@vigyanprasar.gov.in with subject title 'Activity-1' (Month) OR Send the answer with envelop entitled 'Activity-1' (Month) to Vigyan Prasar, A-50, Institutional Area, Sector-62, Noida-201 309 (U.P.).



DOMINEERING KALA - AZAR!!!

Garima Tewari
garimatewari.2009@gmail.com

Government of India launched one-shot treatment for kala-azar or black fever recently. This is another important step treaded towards eradicating the disease after a new non invasive rapid diagnostic kit was launched for detecting kala-azar cases. This kit launched few months back, replaced the earlier clinical tests that required blood samples. The introduction of a single shot injection named liposomal Amphotericin B (Am Bisome) is considered a milestone in treatment of the disease.



As per WHO (World Health Organisation) reports, kala-azar the second largest parasitic killer in India after malaria, is concentrated in 52 districts of Eastern India viz. Bihar, Uttar Pradesh, Jharkhand and West Bengal. Indian kala-azar has a unique epidemiological feature of being Anthroponotic i.e. human is the only known reservoir of infection. Government of India had already declared its aim to eradicate Kala – Azar by 2015

What is Kala-azar?



Kala-azar is a life threatening disease caused by the bite of female sand fly – the vector or carrier of leishmania parasite with an incubation period varying from 2 to 6 months. The sandfly feeds on the animal and human blood, which it needs for developing its eggs. If blood containing

leishmania parasite is drawn from an animal or human, the next person to receive a bite will then become infected and develop leishmaniasis. These flies normally breed in forest areas, caves, cracks in the mud walls or the burrows of the rodents. The vector gets suitable condition for its multiplication in the villages; this is the reason for the spread of the disease majorly in villages. Moreover, a mosquito net is not safe against a sandfly. The size of the sandfly is small enough (3mm) to pass through the mosquito net. The bite of the sandfly is not always felt but it leaves a small round red bump which starts itching hour or days after infection.

How to identify Kala Azar?

The people who get Kala-azar suffer from fever, fatigue, weakness, loss of appetite, weight loss, and enlarged lymph nodes/glands, liver and spleen. If the disease

progresses it attacks the immune system and weakens it leading to pneumonia or other secondary infections. Patients can die due to these co-infections, massive bleeding or severe anaemia.



Precautions

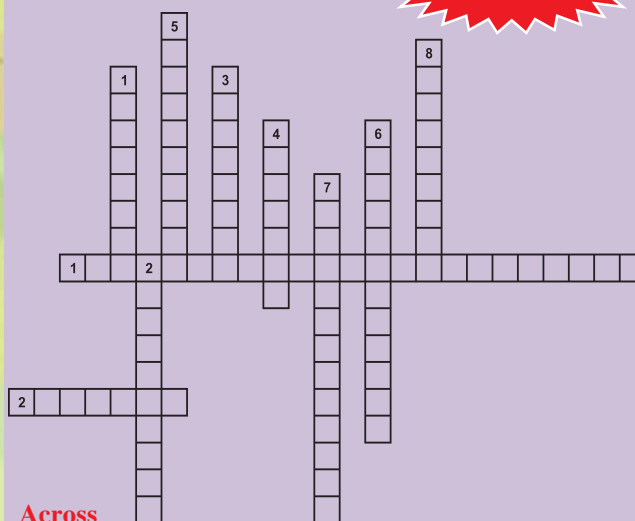
Sandflies are susceptible to insect repellents. Residual insecticides spraying of houses and animal shelters will not allow the growth of the vector. Government has also decided to substitute DDT spraying with Synthetic Pyrethroid to eradicate sandflies. DDT spraying was found ineffective against sandflies effective in some districts. Another control is environmental component, such as plastering the cracks in the house wall, particularly mud houses and changing the proximity with animal shelter. Additionally exposure of body parts and accumulation of stagnant water near the surroundings should be avoided.

Keep your surroundings clean to keep sandflies and killer kala azar away!

ACTIVITY-2

In relation with the article given:

Grab a Book
भौतिकी की कहानी



Across

1. A specialized agency of United Nations
2. Fly bite

Down

1. The disease
2. Protozoa,
3. One Shot Treatment
4. Carrier
5. DDT substituent
6. Affected areas,
7. Human Reservoir
8. Effect

Complete the activity and send us the result to vipnet@vigyanprasar.gov.in with subject title 'Activity-2' (Month) OR Send the answer with envelop entitled 'Activity-2' (Month) to Vigyan Prasar, A-50, Institutional Area, Sector-62, Noida-201 309 (U.P.).



EXPLORING SCIENCE DENSITY

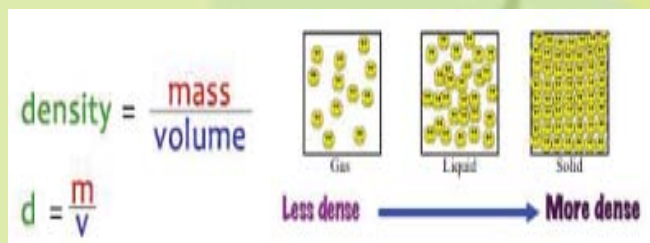
Puneeta Malhotra
malhotrasp25@gmail.com

You might have observed your mother soak rice in water, the rice husk floats on water and can be separated before cooking rice. Why does husk float on water? If dal is soaked in water the spoilt grains of dal float on water, how does this happen?



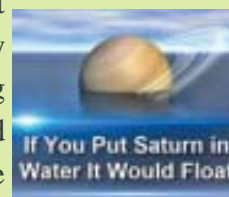
The picture shows the place where two oceans meet. The waters of the oceans do not mix rather you can observe a boundary, a border that separates the waters from each other. Why do the waters not mix?

When we mix water (mixed with red food colour), vegetable oil, dish (utensil washing) soap solution, corn syrup and honey and let it stand for some time, we get a coloured liquid layer in the glass. Can you suggest why this happens?



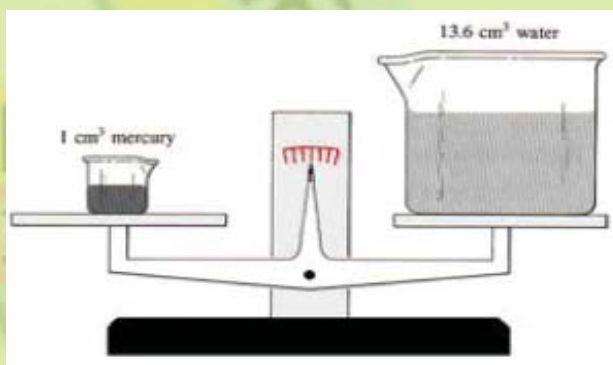
Density is the answer to all the above questions. Substances which are less dense float on more dense substances. What is density? Density is the degree of compactness of a substance. Density is a physical quantity which is a measure of mass per unit volume.

Saturn is the second largest planet in the Solar System but its density is least. If we have a bath tub big enough to hold Saturn, it would float in water. This is because **Saturn** is mainly composed of hydrogen and helium and does not have a solid surface.



Place 1 ml of mercury and 13.6 ml of water on the weighing machine. The two balance each other. Yes, the mass of the two is the same. Mercury is denser than water. Iron sinks in water but will float on mercury.

You do not know swimming, still want to float in water. Take a dip in the Dead sea. Anyone can easily float in the Dead Sea. The salinity is very high so you float on the waters of Dead Sea.



Background

Density refers to how closely packed or crowded the material is. Compare a styrofoam (Thermocol) cup and a bone china cup. Which is lighter? Why?



Density is defined in a qualitative manner as the measure of the relative “heaviness” of objects with a constant volume.

A rock is denser than a crumpled piece of paper of the same size.

In this project you’ll investigate how density of liquids affects the floating and sinking of materials in the liquid.

ACTIVITY-3



Aim : To investigate how added salt and added sugar affects the density of the liquid, thereby helping materials to float.

Material and Equipment required:-

To do this experiment you will need the following materials and equipment:

- Table salt
- Three raw eggs
- Sugar
- Three corn pieces
- Tablespoon
- Three pop corn pieces
- Tap water
- Black Marker/ Sketch pen

Experimental Procedure

1. Fill the three containers/ glasses with tap water.
2. Mark the container/ glass containing tap water A
3. Add about 6 tablespoons of salt in one container (Mark it B) and stir it well with a tablespoon until the salt has completely dissolved in the water.
4. Add about 6 tablespoons of sugar in one container (Mark it C) and stir it well with a tablespoon until the salt has completely dissolved in the water.
5. Place one egg in each of the containers and observe which one of the eggs float in the container and which one sinks.
6. Remove the egg from the container.
7. Repeat the same with corn and pop corn.

Observation Table:

Put a (✓) or (X) in the observation table according to what you observe.

Material in container	Material added	Floats	Sink
Tap Water (A)	Egg		
Salty Water (B)	Egg		
Sugar Solution (C)	Egg		
Tap Water (A)	Corn		
Salty Water (B)	Corn		
Sugar Solution (C)	Corn		
Tap Water (A)	Popcorn		
Salty Water (B)	Popcorn		
Sugar Solution (C)	Popcorn		

Conclusion and Explanation:

Answer the following questions:

How does difference in density help in cleaning water in case of oil spill?



Why does ice float on water? How does this help aquatic species?

Ships require ballast to stay upright in the water and airplanes use counterweights to ensure they fly correctly. How will knowledge of density be useful in these two cases?



Complete the activity and send us the result to vipnet@vigyanprasar.gov.in with subject title Activity-3' (Month) OR Send the answer with envelop entitled 'Activity-3' (Month) to Vigyan Prasar, A-50, Institutional Area, Sector-62, Noida-201 309 (U.P.).

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VIPNET
(Vigyan Prasar Network of Science Clubs)
Re-registration Form



Vigyan Prasar is in the process of re-registering each science club. Therefore you are requested to fill the form presented below. A fresh affiliation certificate with a new Unique Authorization Number will be re-issued from December 2014. Please note: This new certificate will prevail once you received it and the early one may be disregarded.

- 1- Existing VIPNET Unique Authorization Number.
- 2- Year of Registration:
- 3- Name of the Club:
- 4- Name of the Coordinator:
- 5- Name of the Institution/School/Organization/Others the club is located in:
- 6- Designation:
- 7- Type of Club (Put check ✓ mark):
 (a) In-School (b) Out-of-School
- 8- Address for Correspondence (**Block Letters**):

 District-
 State- Pin code-
- 9- Contact No.:
 Mobile- Landline-
- 10- E-mail:
- 11- Fax:

(It has been observed that VIPNET club working under the authority of school or similar administration needs the approval/permission from authorities to attend training /workshop/ other organized by us. To minimize the problem/procedure, it is requested to submit following details, so that request can be made to concerned authority for allowing the coordinator to attend the programme.)

- 12- Does your club work under any authority? YES/NO
- 13- Authority to be Approached (complete address):
-
- E-mail:..... Phone No.:.....
- Date :..... Signature :
- Place :.....

Fill it Place it in the envelope given and post - No postage required.



विपनेट

(विज्ञान प्रसार के विज्ञान क्लबों का नेटवर्क)

पुनः पंजीकरण फार्म



विज्ञान प्रसार प्रत्येक क्लब को फिर से पंजीकरण दर्ज करने की प्रक्रिया में है। इसलिए नीचे दिए गये फॉर्म को भरने के लिए अनुरोध है। नए अद्वितीय प्राधिकरण संख्या के साथ नए संबद्धता प्रमाण पत्र दिसंबर 2014 से फिर जारी किए जाएंगे। कृपया ध्यान दे : आपके द्वारा प्रमाण पत्र प्राप्त करने के बाद ये लागू कर दिये जायेंगे और पूर्णता प्राप्त प्रमाण पत्र रद्द कर दिये जाएंगे।

1. विपनेट अद्वितीय प्राधिकरण संख्या
2. पंजीकरण का वर्ष
3. क्लब का नाम
4. समन्वयक का नाम
5. कार्यरत संस्था / स्कूल / संगठन / अन्य जहां यह स्थित है का नाम
6. पद का नाम
7. क्लब का प्रकार (✓का निशान लगाये)
- (क) स्कूल के अंदर (ख) स्कूल के बाहर
8. पत्राचार का पता (स्पष्ट अक्षरों में)

जिला: पिन कोड:
राज्य

9. दूरभाष नं.
- मोबाईल नं. लैंडलाइन:
10. ई-मेल:
11. फैक्स :

(कई बार ये देखा गया है कि विपनेट क्लब जो कि किसी स्कूल या इसी तरह के प्रशासन के अधिकार के तहत काम कर रहे हैं उसे हमारे द्वारा आयोजित प्रशिक्षण/कार्यशाला/अन्य में भाग लेने के लिए अधिकारियों से अनुमोदन/अनुमति की जरूरत होती है इस प्रक्रिया को सरल बनाने के लिए यह अनुरोध किया जाता है कि निम्नलिखित विवरण को प्रस्तुत करें ताकि संबंधित अधिकारी को समन्वयक के कार्यक्रम में भाग लेने के लिए अनुरोध किया जा सके।)

12. क्या आपका क्लब किसी भी प्राधिकरण के तहत काम करता है। हाँ /नहीं
13. प्राधिकरण से संपर्क करने हेतू (पूरा पता)

ई-मेल फोन नं.:

दिनांक : हस्ताक्षर:
स्थान :

इसे भरे दिए गए लिफाफे में डाले और पोस्ट करें-डाक शुल्क की आवश्यकता नहीं।