



P.L.E 2024 SCIENCE COMPREHENSIVE GUIDE FOR TEACHERS BY NERDS EXAMINATIONS BOARD-

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1. Name any one type of latrine.

There are many types of latrines, but here are a few common ones:

- ✓ **Pit latrine:** A simple hole dug in the ground that is used as a toilet.
- ✓ **VIP latrine:** A ventilated improved pit latrine, which has a vent pipe to reduce odors and improve ventilation.
- ✓ **Pour-flush latrine:** A type of latrine that uses water to flush waste into a pit.
- ✓ **Composting toilet:** A type of toilet that uses composting to break down human waste into fertilizer.

2. Give any one reason why it is dangerous to take shelter under tall trees during rain.

There are several reasons why it is dangerous to take shelter under tall trees during rain:

- ✓ **Lightning strikes:** Tall trees are more likely to be struck by lightning than shorter objects, making them a dangerous place to be during a thunderstorm.
- ✓ **Falling branches:** Strong winds and heavy rain can cause branches to break off trees, which could injure or kill someone standing underneath.
- ✓ **Flooding:** In areas with heavy rainfall, trees can become flooded, making it difficult or impossible to escape.

3. State any one function of the diaphragm during the process of breathing.

- ✓ The diaphragm is a dome-shaped muscle that plays a crucial role in breathing. Its main function is to help expand and contract the chest cavity, which changes the pressure inside the lungs and allows air to flow in and out.

4. Name any one agent of soil erosion.

Soil erosion is the process of soil being moved from one place to another by wind, water, or other agents. Here are a few agents of soil erosion:

- ✓ **Water:** Rain, rivers, and streams can all erode soil.
- ✓ **Wind:** Strong winds can pick up and carry soil particles, especially in dry areas.
- ✓ **Humans:** Human activities such as deforestation, agriculture, and construction can also contribute to soil erosion.

5. Name the animal shown in the diagram.

- ✓ The animal in the diagram is a snail.

6. State the group of invertebrates to which the animal belongs.

- ✓ Snails belong to the group of invertebrates called mollusks.

7. Mention any one way in which vegetables can be kept fresh for some time.

There are many ways to keep vegetables fresh for longer periods, but here are a few common methods:

- ✓ **Refrigeration:** Storing vegetables in the refrigerator at a cool temperature can slow down the spoilage process.
- ✓ **Freezing:** Freezing vegetables is a good way to preserve them for longer periods, but it can change their texture and flavor.
- ✓ **Drying:** Drying vegetables removes moisture, which helps to prevent spoilage.
- ✓ **Canning:** Canning vegetables is a process that involves heating them in jars to kill bacteria and seal them for long-term storage.

8. State one way in which bacteria are useful in the formation of soil.

- ✓ Bacteria play a crucial role in soil formation through the process of decomposition. They break down dead plants and animals, converting organic matter into nutrients that enrich the soil.

9. Give the reason why a person suffering from bilharzia develops anaemia.

- ✓ Bilharzia, also known as schistosomiasis, is a parasitic disease that affects the liver and intestines. The infection can cause blood loss, which leads to iron deficiency and anemia.

10. Mention one way in which air circulation in a rabbit hutch can be improved.

- ✓ Air circulation in a rabbit hutch can be improved by adding vents or fans to the structure. This helps to remove moisture and ammonia, which can build up and harm the rabbits.

11. State the reason why the human skin develops goose pimples during cold weather.

- ✓ Goosebumps occur when tiny muscles attached to hair follicles contract. This causes the hair to stand on end, which can help to trap a layer of warm air next to the skin.

12. Give any one way in which you can utilise empty plastic bottles at home.

There are many ways to reuse empty plastic bottles, including:

- ✓ **Storage:** Bottles can be used to store food, liquids, or other items.
- ✓ **Watering plants:** Cut the bottom off a bottle to create a watering can.
- ✓ **Crafts:** Bottles can be used to make various crafts, such as bird feeders or decorations.
- ✓ **Recycling:** Plastic bottles can be recycled to make new products.

13. Mention one function of a bandage found in a first aid kit.

Bandages have several functions in a first aid kit, including:

- ✓ **Covering wounds:** Bandages help to protect wounds from dirt and infection.
- ✓ **Applying pressure:** Bandages can be used to apply pressure to a wound to stop bleeding.
- ✓ **Supporting injured areas:** Bandages can be used to support injured limbs or joints.

14. State any one way in which fermentation is important in our daily life.

- Fermentation is used to produce many foods and beverages we enjoy, such as:
 - ✓ **Bread:** Yeast ferments the dough, causing it to rise.
 - ✓ **Yogurt:** Bacteria ferment milk to produce yogurt.
 - ✓ **Wine and beer:** Yeast ferments the sugars in grapes and grains to produce alcohol.

15. State any one reason why a builder would prefer a pulley to an inclined plane when lifting sand from the ground to the top of a building.

- ✓ A pulley can be more efficient than an inclined plane for lifting heavy objects like sand to the top of a building, especially if the distance is significant. A pulley system can reduce the amount of force required to lift the load.

16. Name the organ shown above.

- ✓ The organ shown in the diagram is the kidney.

17. Give the function of the part labelled N.

- ✓ The part labeled N is the ureter, which carries urine from the kidney to the bladder.

18. Identify any one effect of pests and diseases on tuber crops.

Pests and diseases can have a significant impact on tuber crops, such as:

- ✓ **Reduced yield:** Pests and diseases can damage or destroy crops, leading to lower yields.
- ✓ **Poor quality:** Infected tubers may be smaller, misshapen, or have blemishes, reducing their quality and market value.
- ✓ **Food poisoning:** Some pests and diseases can transmit harmful toxins or pathogens to humans if the tubers are consumed.

19. State any one way in which taking medicine without the instruction of a health worker can affect a family.

Taking medicine without proper guidance from a health worker can have several negative consequences for a family, including:

- ✓ **Adverse drug reactions:** Using medication incorrectly can lead to side effects, allergic reactions, or drug interactions that can harm the individual and potentially spread to family members.
- ✓ **Ineffective treatment:** Taking the wrong medication or dosage can prevent the effective treatment of the underlying condition, prolonging illness and potentially increasing medical costs for the family.

- ✓ **Financial burden:** Incorrect medication use can lead to wasted medication, additional doctor visits, and potential hospitalizations, which can strain the family's finances.

20. Mention any one reason why harvesting of honey should be done during day time.

- ✓ Bees are most active during the day, so harvesting honey during this time is generally more efficient and less disruptive to the bee colony.

21. Name the disorder in the skeletal system where a bone moves away from its normal position at the joint.

- ✓ The disorder where a bone moves away from its normal position at the joint is called a dislocation.

22. State the reason why a cubic unit of wool weighs less than a cubic unit of a stone.

- ✓ The reason a cubic unit of wool weighs less than a cubic unit of stone is due to their density. Density is a measure of how much mass is packed into a given volume. Wool is less dense than stone, meaning it has less mass per unit volume.

23. State one way in which the paddocking method of grazing cattle helps to break the life cycle of pests on a farm.

- ✓ The paddocking method of grazing cattle helps break the life cycle of pests by rotational grazing. This involves moving cattle to different paddocks at regular intervals, allowing the previous paddock to rest and recover. This prevents pests from establishing themselves and spreading to other areas.

24. Give one way in which rusting is important to the environment.

- ✓ Rusting, the process of iron turning into iron oxide, is a natural process that contributes to the recycling of iron in the environment. Iron-rich rocks are weathered down, releasing iron into the soil. This iron is then taken up by plants and eventually returns to the environment through decomposition.

25. Name the element of Primary Health Care which promotes the human body cleanliness.

- ✓ The element of Primary Health Care that promotes human body cleanliness is personal hygiene. This includes practices like hand washing, bathing, and oral hygiene.

26. Mention any one activity a School Health Club can do to improve the health of people in school.

A School Health Club can engage in various activities to promote health, such as:

- ✓ **Health education:** Conducting workshops and presentations on topics like nutrition, hygiene, and disease prevention.
- ✓ **Health screenings:** Organizing health screenings for students, such as vision and hearing tests, and BMI checks.
- ✓ **Health campaigns:** Running campaigns to raise awareness about specific health issues, such as handwashing or the dangers of smoking.

27. State the property of air used in filling balloons.

- ✓ The property of air used in filling balloons is its ability to occupy space.

28. State any one way in which planting of trees alongside other crops improves the quality of soil.

Planting trees alongside other crops, also known as agroforestry, improves soil quality in several ways, including:

- ✓ **Reducing soil erosion:** Tree roots help to hold the soil in place, preventing it from being washed away by rain or wind.
- ✓ **Increasing soil organic matter:** Fallen leaves and other plant debris from trees decompose and add organic matter to the soil, improving its fertility.
- ✓ **Improving soil structure:** Tree roots create channels in the soil, allowing for better water infiltration and aeration.

29. Give one reason why we should regularly wash our hands with clean water and soap.

- ✓ Washing hands with clean water and soap is crucial for preventing the spread of germs and diseases. Germs can be transferred from hands to surfaces and then to other people, leading to infections. Regular hand washing helps to remove these germs, reducing the risk of illness.

30. Mention one way in which the antennae of insects are similar to the human skin in terms of function.

- ✓ Both insect antennae and human skin have sensory functions. Insect antennae contain sensory receptors that detect various stimuli, such as touch, smell, and taste. Similarly, human skin contains sensory receptors that detect touch, temperature, and pain.

32. Identify the method of planting crops shown above.

- ✓ The method of planting crops shown in the diagram is row planting. In row planting, crops are planted in straight rows, which makes it easier for weeding, harvesting, and using farm machinery.

33. State any one advantage of the method of planting crops shown in the diagram above.

Row planting offers several advantages, including:

- ✓ **Improved weed control:** It is easier to control weeds between rows using tools or herbicides.
- ✓ **Increased efficiency:** Row planting allows for the use of farm machinery for tasks like planting, weeding, and harvesting, which increases efficiency.
- ✓ **Better water management:** Rows can be designed to direct water to the roots of the plants, improving water utilization and reducing water loss.
- ✓ **Improved crop yield:** By providing space between plants, row planting can lead to better air circulation and sunlight penetration, which can boost crop yields.

34. Give any one example of an emotional change in adolescents.

Adolescence is a period of significant physical and emotional development. Here are a few examples of emotional changes that can occur during this time:

- ✓ **Mood swings:** Adolescents may experience rapid and intense shifts in mood, often without clear triggers.
- ✓ **Increased self-consciousness:** Adolescents may become more aware of their appearance and social standing, leading to feelings of insecurity or self-doubt.
- ✓ **Stronger emotions:** Adolescents may experience emotions more intensely, such as anger, sadness, or joy.
- ✓ **Development of empathy:** Adolescents begin to develop a deeper understanding of the emotions and perspectives of others.

35. Name the immunisable viral disease which is spread due to poor sanitation.

- ✓ The immunisable viral diseases that spread due to poor sanitation is polio hepatitis A. Hepatitis A is a liver infection caused by the hepatitis A virus. It is transmitted through contaminated food or water, and poor sanitation can increase the risk of exposure.

36. State the reason why a ray of light bends as it passes through a glass block.

- ✓ A ray of light bends when it passes through a glass block due to a phenomenon called refraction. Refraction occurs because light travels at different speeds in different mediums. When light enters a denser medium like glass from a less dense medium like air, its speed decreases. This change in speed causes the light ray to bend at the interface between the two mediums.

37. State any one way of conserving water as a resource in the environment.

There are many ways to conserve water, here are a few examples:

- ✓ **Reduce water usage:** Take shorter showers, fix leaky faucets, and use water-efficient appliances.
- ✓ **Collect rainwater:** Collect rainwater and use it for watering plants or flushing toilets.
- ✓ **Reuse water:** Reuse water for household purposes like cleaning floors or washing cars.
- ✓ **Plant drought-resistant plants:** Choose plants that require less water to thrive.

- ✓ **Support water conservation initiatives:** Support organizations and policies that promote water conservation.

38. Mention one reason why you are encouraged to brush the tongue as well when cleaning the teeth.

Brushing the tongue is important for good oral hygiene because it helps to remove:

- ✓ **Bacteria:** The tongue harbors bacteria that can cause bad breath and contribute to tooth decay and gum disease.
- ✓ **Food particles:** Food particles can become trapped on the tongue, providing a breeding ground for bacteria.
- ✓ **Coatings:** The tongue can develop a coating that can trap bacteria and make it difficult for the toothbrush to reach the back of the tongue.

39. Mention any one way in which electric shocks can be prevented in a home.

Here are some ways to prevent electric shocks in a home:

- ✓ **Regularly inspect electrical appliances and cords:** Look for frayed wires, loose connections, and other signs of damage. Replace damaged items promptly.
- ✓ **Keep appliances away from water:** Never use electrical appliances near water sources, such as sinks or bathtubs.
- ✓ **Unplug appliances when not in use:** Unplugging appliances when not in use can reduce the risk of electrical fires and shocks.
- ✓ **Use surge protectors:** Surge protectors can help to protect appliances from power surges, which can cause damage and increase the risk of shocks.
- ✓ **Hire a qualified electrician:** If you are not comfortable working with electricity, hire a qualified electrician to handle any electrical repairs or installations.

40. Give any one way in which crop farmers can keep seeds viable for a long time.

- ✓ Crop farmers can keep seeds viable for a long time by storing them in a cool, dry place. This helps to slow down the metabolic processes of the seeds, preventing them from germinating prematurely. Seeds can also be stored in airtight containers to prevent moisture and oxygen from reaching them.
- ✓

Question 41:

(a) Name the class of food that helps in the repair of body cells.

- ✓ Proteins

(b) Apart from contamination of food, mention any two other challenges that people who buy food from markets get.

- ✓ **Price Fluctuations:** The prices of food items can vary significantly depending on the season, supply, and demand. This can make it challenging for people to budget for their food expenses.
- ✓ **Adulteration:** Food items may be adulterated with cheaper or harmful substances to increase profit margins. This can pose health risks to consumers.

(c) State any one way of controlling food contamination in a market.

- ✓ Proper hygiene practices, such as regular cleaning and disinfection of market stalls and surrounding areas, can help to control food contamination.

Question 42:

(a) Name the germ that causes cholera.

- ✓ *Vibrio cholerae*

(b) Explain why cholera is common in heavily populated communities.

- ✓ Cholera is a waterborne disease, and its spread is facilitated by poor sanitation and hygiene conditions. In densely populated areas, inadequate access to clean water and proper sanitation infrastructure creates an environment where the bacteria can easily contaminate water sources and spread through human-to-human contact.

(c) Apart from proper use of latrines, mention any one other way of controlling the spread of cholera in the communities in (b) above.

- ✓ Promoting hand washing with soap and clean water can significantly reduce the spread of cholera.
- ✓

Question 43:

(a) Name the correct garden tool for transplanting seedlings.

- ✓ Transplanting Trowel

(b) State the reason why evening time is the best for transplanting seedlings.

- ✓ Evening is the best time for transplanting seedlings because the soil is cooler and the plants are less likely to experience stress from heat and water loss. This allows them to recover more quickly and establish themselves better.

(c) Mention any two advantages of mulching a garden after transplanting.

- ✓ **Reduces Water Loss:** Mulch acts as a barrier, preventing moisture from evaporating from the soil. This helps to conserve water, especially during dry periods, and reduces the frequency of watering.
- ✓ **Controls Weeds:** Mulch suppresses weed growth by blocking sunlight from reaching the soil surface. This reduces competition for water and nutrients between the transplanted seedlings and weeds.
- ✓ **Insulates Soil:** Mulch helps to moderate soil temperature by insulating it from extreme heat and cold. This protects the roots of the transplanted seedlings from damage and creates a more stable environment for growth.
- ✓ **Enhances Soil Health:** As the mulch decomposes, it adds organic matter to the soil, improving its structure, water retention, and nutrient content. This benefits the overall health of the soil and the plants growing in it.

Question 44:

(a) Name the parts labelled:

- (i) X: Liver
- (ii) W: Appendix

(b) State any one function of the following parts:

- (i) Y: Small intestine: Absorption of digested food

(ii) Z: Large Intestine: Absorption of water and minerals.

Question 45:

Step	Purpose
Selection/Sorting	Separating clothes according to washing needs.
Soaking	Loosens dirt and stains.
Rinsing	Removing dirty soapy water from clothes.
Ironing	Removes wrinkles and creases

Question 46:

(a) Give the meaning of the term **electromagnet**.

- ✓ An electromagnet is a type of magnet in which magnetic field is produced by an electric current. The magnetic field is created by the flow of electric current, and its strength can be controlled by adjusting the current.

(b) You are provided with the following items: Iron nail, copper wire, a dry cell, and some pins. Describe how you can use the items to make a magnet.

- ✓ **Wind the wire around the nail:** Wrap the copper wire tightly around the iron nail, leaving a few inches of wire free at each end. The more turns of wire you have, the stronger the electromagnet will be.
- ✓ **Connect the wire to the dry cell:** Connect one end of the free wire to the positive terminal of the dry cell and the other end to the negative terminal. This completes the electrical circuit.
- ✓ **Test the electromagnet:** Bring the nail close to the pins. If the electromagnet is working, the pins will be attracted to the nail and stick to it.
- ✓ **To stop the electromagnet:** Disconnect one of the wires from the dry cell. The magnetic field will disappear.

Additional points:

- ✓ The direction of the magnetic field can be reversed by reversing the direction of the current flow through the wire.
- ✓ Electromagnets have various applications, such as in motors, generators, and magnetic levitation.

Question 47:

(a) Mention any two materials that can be used in a digester to produce biogas.

- ✓ **Animal dung:** Cow dung, pig manure, and poultry litter are commonly used organic materials for biogas production.
- ✓ **Plant waste:** Agricultural residues such as crop residues (e.g., rice straw, maize stalks), vegetable waste, and food waste can be used to generate biogas.
- ✓ **Human waste:** Biogas digesters can also utilize human waste (sewage) as a substrate for biogas production.

(b) Give a reason why a biogas digester should be tightly sealed.

- ✓ Tightly sealing a biogas digester is crucial to ensure optimal biogas production and prevent gas leakage. Anaerobic digestion, the process of biogas production, requires an oxygen-free environment for the bacteria to break down the organic matter efficiently. Any air leakage into the digester can introduce oxygen, inhibiting the growth of anaerobic bacteria and reducing biogas yield.

(c) State any one advantage of using biogas.

- ✓ One significant advantage of using biogas is that it is a renewable and clean energy source. Biogas is produced from organic waste, a readily available and sustainable resource. Unlike fossil fuels, biogas combustion does not release harmful pollutants like sulfur dioxide and nitrogen oxides into the atmosphere, contributing to cleaner air and reduced greenhouse gas emissions.

Question 48:

(a) Name the protective item labeled K.

- ✓ The protective item labeled K is a face mask.

(b) Identify any two diseases that can be prevented by the use of the protective item K.

- ✓ Influenza (Flu): Face masks can help prevent the spread of influenza by blocking respiratory droplets containing the virus.
- ✓ COVID-19: Face masks are an effective measure in reducing the transmission of SARS-CoV-2, the virus that causes COVID-19.
- ✓ Other respiratory infections: Face masks can also help prevent the spread of other respiratory infections like common cold, pneumonia, and tuberculosis.

(c) Mention any one good practice of using the protective item K.

- ✓ One good practice of using a face mask is to wash or sanitize your hands before and after putting on or taking off the mask. This helps to prevent the transfer of germs from your hands to the mask and vice versa.

Question 49:

(a) Mention one example of musical instruments in each of the groups below:

(i) String Instruments: Guitar

(ii) Percussion Instruments: Drums

(b) Name any two methods of storing sound.

- ✓ Recording
- ✓ Notation

Question 50:

(a) State the name given to insects that live and work together.

- ✓ Social Insects

(b) Give any one way in which insects are useful to people.

- ✓ Insects play a vital role in pollination, which is essential for the reproduction of many plants, including those we rely on for food.
- ✓ Eaten as food

(c) State any two human activities that are dangerous to insects in the environment.

- ✓ Deforestation, urbanization, and agriculture are major threats to insect habitats, leading to population declines and even extinction.

Question 51:

(a) Name the type of weather marked C.

- ✓ Cloudy weather

(b) State one way in which the type of weather in A helps in formation of the type of weather in D.

- ✓ The sunshine (A) heats the earth's surface, causing water to evaporate. This water vapor rises into the atmosphere, cools down, and condenses into clouds, eventually leading to rainfall (D).

(c) Give one way in which people protect themselves from the effects of the type of weather in B.

- ✓ People can protect themselves from strong winds (B) by staying indoors, securing loose objects (like furniture or outdoor items), and wearing appropriate clothing that can withstand strong winds.

(d) State any one way in which too much of the type of weather in A is dangerous to the environment.

- ✓ Excessive sunshine (A) can lead to droughts, causing dehydration and death of plants and animals. It can also increase the risk of wildfires.

Question 52:

(a) State the meaning of the term vaccine.

- ✓ A vaccine is a biological preparation that provides active acquired immunity to a particular disease. It typically contains an agent that resembles a disease-causing microorganism and is often made from weakened or killed forms of the microbe, its toxins, or one of its surface proteins.

(b) Mention the way in which polio vaccine is administered.

- ✓ Polio vaccine is administered orally (through the mouth) as drops.

(c) State the reason why vaccines should be stored in a cool place.

- ✓ Vaccines contain biological components that can be damaged by heat. Storing them in a cool place helps to maintain their potency and effectiveness.

(d) Identify any one way you can support immunization programmes in your community.

- ✓ You can support immunization programs by spreading awareness about their importance, encouraging people to get vaccinated, and volunteering your time to assist with vaccination drives.

Question 53:

(a) Name the physical change which leads to the formation of the following:

- (i) Ice: Freezing
- (ii) Rainfall: Condensation and Precipitation

(b) State any two effects of physical changes caused by soil erosion in the environment.

- ✓ **Loss of Fertile Land:** Soil erosion removes the topsoil, which is rich in nutrients essential for plant growth. This leads to reduced agricultural productivity and food shortages.
- ✓ **Water Pollution:** Eroded soil can contaminate water bodies like rivers and lakes, leading to sedimentation and harming aquatic life.

- ✓ **Desertification:** Severe soil erosion can lead to desertification, where fertile land is transformed into barren, unproductive land.
- ✓ **Flooding:** Soil erosion can increase the risk of flooding as rivers and streams become clogged with sediment, reducing their capacity to hold water.

Question 54:

(a) Name the two muscles found in the human arm.

- ✓ Biceps
- ✓ Triceps

(b) State any one function of muscles in the human body.

- ✓ **Movement:** Muscles are responsible for all forms of movement in the human body, from walking and running to subtle facial expressions and internal organ functions.
- ✓ **Posture Maintenance:** Muscles help to maintain proper posture by supporting the skeleton and keeping the body upright.
- ✓ **Heat Production:** Muscle contraction generates heat, which helps to maintain body temperature.

(c) State the importance of maintaining correct posture in humans.

- ✓ **Prevents Pain and Injury:** Correct posture reduces strain on muscles, ligaments, and joints, preventing pain and injuries like backaches and neck pain.
- ✓ **Improves Breathing and Circulation:** Good posture allows for proper alignment of the spine and ribcage, facilitating efficient breathing and blood circulation.
- ✓ **Enhances Appearance:** Maintaining good posture contributes to a more confident and healthier appearance.
- ✓ **Improves Energy Levels:** Proper posture can help to reduce fatigue and improve energy levels by optimizing the efficiency of bodily functions.

Question 55:

(a) The resulting image should be a virtual image of the cup, appearing to be behind the mirror, the same size as the actual cup, and inverted vertically.

(b) i) Name ray A.

✓ Ray A is the incident ray.

ii) State the relationship between angles m and y .

✓ Angles m and y are equal. This is known as the law of reflection, which states that the angle of incidence (the angle between the incident ray and the normal to the mirror) is equal to the angle of reflection (the angle between the reflected ray and the normal to the mirror).

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