CLASS 5 – BASIC SCIENCE – WATER AND LIFE NOTES

Questions and Answers

1. **What makes the river say this?**
    - The river says this because it plays a crucial role in enriching the land and supporting life by providing water for various purposes such as irrigation, drinking, and domestic use.
2. **What do we use river water for?**
    - River water is used for drinking, cooking, bathing, cleaning, irrigation, industrial processes, and generating hydroelectric power.
3. **Can river water be used directly for drinking and other domestic purposes?**
    - No, river water cannot be used directly for drinking and other domestic purposes because it may contain impurities, bacteria, and other harmful substances. It needs to be purified first.
4. **Analyse the illustration given below.**
    - The illustration shows the purification stages of river water and its distribution to houses. River water goes through several stages: filtering out large debris, allowing waste to settle, straining through multi-layered sieves, and disinfecting. After purification, it is stored in a tank and then distributed to houses.
5. **Do you get the water regularly in the same way?**
    - Answer varies depending on the student's personal experience.
6. **What are the other sources of water you depend on?**
    - Other sources of water include:
        - Well
        - Borewell
        - Rainwater
        - Pond
        - Lake
7. **How many litres of water do you need in a day?**
    - This answer will vary based on personal use, but on average, a person needs about 50-100 litres of water per day for drinking, cooking, bathing, and other domestic purposes.
8. **For what purpose do you use the water most?**
    - This answer will vary based on personal use, but common purposes include bathing, washing clothes, and cleaning.

9. **How many litres of water do you use approximately in your home per day? Find out and write it in your science diary.**
    - This is a personalized task that the student needs to complete by monitoring their household's water usage.
10. **What is the importance of water in our body?**
    - Water is essential for various bodily functions, including digestion, absorption, circulation, and temperature regulation. It is a major component of blood, muscles, organs, and bones.
11. **What is the benefit of testing water like this? Discuss.**
    - Testing water ensures that it is safe for consumption by checking for contaminants like bacteria, chemicals, and other impurities. It helps in preventing waterborne diseases and maintaining public health.
12. **Write the definition of pure water.**
    - Pure water is water that is free from impurities, contaminants, and harmful microorganisms. It is safe for drinking and other domestic purposes.
13. **To find out whether the water you are drinking is clean, take a sample of the water and send it to the quality testing labs in your locality to get a test report.**
    - This is a practical task that involves taking a water sample to a lab for testing.
14. **Take water in containers of various shapes. Is there a relationship between the shape of the water and the shape of the container?**
    - Yes, the shape of the water conforms to the shape of the container it is in. Water takes the shape of its container.
15. **Observe the shape of the water in each container and draw it in your science diary.**
    - This is a practical task that the student needs to complete by drawing the shapes of water in different containers.
16. **Did you see the paper boat floating in the water?**
    - This is an observation task for the student.
17. **Which of the following objects will float in water?**
    - Stone: X
    - Balloon: ✓
    - Coin: X
    - Wood piece: ✓
    - Camphor: ✓
    - Plastic: ✓
    - Iron nail: X

- Leaf: ✓
- Wax: ✓
- Ice: ✓

18. **We often utilize the ability of objects to float in water, don't we? Write some examples for such situations.**
    - Rafting
    - Boating
    - Swimming
    - Fishing
19. **Do all substances dissolve in water?**
    - No, not all substances dissolve in water.
20. **How do we find substances that do not dissolve in water?**
    - By adding the substance to water and observing if it dissolves or not.
21. **Brother, can you make some lemon juice for me?**
    - This is an example of dissolving a solid (sugar) in water to make a solution (lemon juice).
22. **Which of the above substances dissolve in water?**
    - Sugar: Dissolves
    - Salt: Dissolves
    - Vinegar: Dissolves
    - Baking soda: Dissolves
    - Detergent: Dissolves
    - Kerosene: Does not dissolve
    - Coconut oil: Does not dissolve
    - Wax: Does not dissolve
    - Camphor: Dissolves
    - Copper sulfate: Dissolves
    - Potassium permanganate: Dissolves

Notes for 5th Grade Students

Purification of River Water

1. **Filter out large debris**: Removes big particles like leaves and sticks.

2. **Allow waste to settle**: Lets heavier impurities settle at the bottom.
3. **Strain through multi-layered sieves**: Filters smaller particles.
4. **Disinfect**: Kills harmful bacteria and microorganisms.

Distribution of Fresh Water

1. **Store in tank**: Keeps the purified water in a storage tank.
2. **Distribute to houses**: Sends the water to homes for use.

Importance of Water in Our Body

- **Brain**: 73% water
- **Blood**: 94% water
- **Kidney**: 79% water
- **Muscles**: 75% water
- **Heart**: 75% water
- **Lungs**: 83% water
- **Bones**: 31% water

Water Quality Testing

- **Colour**: No
- **Odour**: No
- **Bacteria**: Yes

Experiment with Floating Objects

- **Objects that float**: Balloon, wood piece, camphor, plastic, leaf, wax, ice
- **Objects that sink**: Stone, coin, iron nail

Dissolving Substances in Water

- **Dissolve**: Sugar, salt, vinegar, baking soda, detergent, camphor, copper sulfate, potassium permanganate
- **Do not dissolve**: Kerosene, coconut oil, wax

1. **Do gases dissolve in water? Can you guess?**
    - Yes, some gases do dissolve in water. For example, oxygen and carbon dioxide are gases that can dissolve in water.
2. **Where do the fishes in the aquarium get oxygen to breathe?**
    - Fishes get oxygen from the dissolved oxygen in the water.
3. **What was dissolved when the lemon juice was prepared?**
    - Sugar and lemon juice were dissolved.

4. **Where did they dissolve in?**
    - They dissolved in water.
5. **A substance that dissolves is called a solute and the substance in which it dissolves is called a solvent. A solution is formed when the solute is dissolved in the solvent. List the solution, solute, and solvent in each of the previous activity.**
    - **Solution**: Sugar solution
        - **Solute**: Sugar
        - **Solvent**: Water
    - **Solution**: Soda
        - **Solute**: Carbon dioxide (CO_2)
        - **Solvent**: Water

Table of Substances that Dissolve in Water

Solution	Solute	Solvent
Sugar solution	Sugar	Water
Soda	CO_2	Water
Salt solution	Salt	Water
Vinegar solution	Acetic acid	Water
Baking soda solution	Baking soda	Water
Copper sulfate solution	Copper sulfate	Water
Camphor solution	Camphor	Water

Questions on Substances and Solubility

1. **How do you remove jackfruit gum and tar if they stick?**
    - These can be removed using oil or kerosene because they are not soluble in water.
2. **Why can't these be washed off with water?**
    - Because they are not soluble in water, so water alone cannot dissolve or break them down.
3. **What is the best way to remove ballpoint pen ink on clothes?**
    - Using alcohol or a commercial ink remover.
4. **Are the substances soluble in water, soluble in kerosene and coconut oil too?**
    - Let's perform an experiment to find out.

Solubility Experiment Table

Solvent	Solute	Dissolves (✓) / Does Not Dissolve (X)
Water	Sugar	✓
	Salt	✓
	Baking soda	✓
	Copper sulfate	✓
	Camphor	✓
Kerosene	Sugar	X
	Salt	X
	Baking soda	X
	Copper sulfate	X
	Camphor	✓
Coconut Oil	Sugar	X
	Salt	X
	Baking soda	X
	Copper sulfate	X
	Camphor	✓

Analysis of the Experiment

- **Findings**:
    - **Water**: Dissolves sugar, salt, baking soda, copper sulfate, camphor.
    - **Kerosene**: Dissolves camphor only.
    - **Coconut oil**: Dissolves camphor only.

Examples Utilizing Water's Dissolving Capacity

- To wash clothes
- To make beverages like tea and coffee
- In cooking, for dissolving salt and sugar
- In cleaning surfaces with soap or detergent

Experiment with Water, Sugar, and Ink

- **Situation 1**: Mixing sugar grains vs. powdered sugar

    - Powdered sugar dissolves faster than sugar grains due to the larger surface area.
- **Situation 2**: Dissolving sugar with and without stirring
    - Stirring increases the speed at which sugar dissolves because it distributes the sugar particles more evenly in the water.
- **Situation 3**: Dissolving ink in hot vs. cold water
    - Ink dissolves faster in hot water because higher temperature increases the movement of water molecules, helping the ink spread more quickly.

Factors Affecting Speed of Dissolution

- Temperature: Higher temperature increases dissolution speed.
- Surface area: Smaller particles dissolve faster due to a larger surface area.
- Stirring: Agitation helps distribute the solute particles more evenly, speeding up dissolution.

Water as a Universal Solvent

- **Reason**: Water can dissolve a wide variety of substances, which is why it is called the universal solvent.

Water in Different Forms

- **Ice Formation**: Ice is formed when water freezes.
- **Uses of Ice**:
    - To preserve food items from spoiling
    - To cool drinks
    - To reduce swelling in injuries

Observing Changes in Ice

- **When ice is kept in a vessel**: It melts into water.
- **When ice is heated**: It turns into water and eventually boils.
- **When water in the vessel boils**: It turns into steam.
- **Observation at the bottom of the lid after boiling water**: Condensation forms droplets of water.

Using Water to Conduct Heat

- **Examples**:
    - Cooking rice
    - Boiling vegetables
    - Making tea or coffee
    - Heating water for bathing

Vapourisation

- **Definition**: The spreading of small particles of liquid from its surface to the surroundings.
- **Factors affecting vapourisation**: Temperature, surface area, air movement.

Water Level Measurement

- **Observation**: A level tube filled with water is used by builders to measure the level.

Experiment Note: Observing Changes in Ice

Aim:

To observe and record the changes that occur to ice under different conditions.

Materials:

- Ice cubes
- Vessel
- Heat source (stove or heater)
- Thermometer (optional)
- Timer
- Water

Procedure:

1. **When ice is kept in a vessel at room temperature:**
    - Place a few ice cubes in a vessel and leave it at room temperature.
    - Observe the changes over time.
2. **When ice is heated:**
    - Place a few ice cubes in a vessel and heat it using a stove or heater.
    - Observe the changes as the ice heats up.
3. **When the water in the vessel boils:**
    - Continue heating the vessel until the ice melts completely and the water starts to boil.
    - Observe the changes during boiling.
4. **When looking at the bottom of the lid of the vessel, after boiling the water:**
    - Place a lid on the vessel while the water is boiling.
    - After a few minutes, remove the lid and observe the underside of the lid.

Observations:

1. **When ice is kept in a vessel at room temperature:**
    - **Observation**: The ice slowly melts into water.
2. **When ice is heated:**
    - **Observation**: The ice melts more quickly into water as it absorbs heat.
3. **When the water in the vessel boils:**
    - **Observation**: The water starts to form bubbles and eventually turns into steam (water vapor).
4. **When looking at the bottom of the lid of the vessel, after boiling the water:**
    - **Observation**: Droplets of water form on the underside of the lid due to condensation of steam.

Inference:

1. **Melting**: Ice melts into water when exposed to temperatures above 0°C (32°F). The rate of melting increases with temperature.
2. **Heating**: Applying heat to ice causes it to melt faster. Continued heating turns the water into steam.
3. **Boiling**: Boiling water forms steam, which is water in its gaseous state. The temperature at which water boils is 100°C (212°F) at standard atmospheric pressure.
4. **Condensation**: Steam condenses back into water droplets when it comes in contact with a cooler surface, like the underside of the lid.

Analysis of Observations

1. **Solid to Liquid Transition**: Ice transitions to water (melting) as it absorbs heat.
2. **Liquid to Gas Transition**: Water transitions to steam (vaporization) when heated to its boiling point.
3. **Gas to Liquid Transition**: Steam transitions back to water (condensation) when it cools down.

Understanding Water Levels and Conservation

Water Level Measurement

- **Activity:**
    - **Materials Needed:**
        - Level tube
        - Water
        - 3 different shaped glasses
        - String

- **Procedure:**

1. Fill the level tube with water.

2. Check the level of different places in your classroom using the level tube.

3. Set up the apparatus as shown in the picture: connect the three different shaped glasses with a string and fill them to the same water level.

4. Pour water into any of the glasses and observe what happens.

Observations:

- **Findings in the classroom:**
  - The water level remains consistent in all parts of the classroom when measured with the level tube. This demonstrates that water seeks its own level.
- **Experiment with different shaped glasses:**
  - When water is poured into any one of the glasses, the water level in all the glasses connected by the string adjusts to remain at the same height. This demonstrates the principle that water seeks its own level regardless of the shape of the container.

Effects of Water Bodies Drying Up

- **Impact on Nearby Wells:**
  - When water bodies dry up, the water level in nearby wells decreases.
  - This happens because wells are often connected to the same underground water sources as surface water bodies.

Uncontrolled Industrial Water Use

- **Impact on Water Availability:**
  - The uncontrolled use of water by industries can significantly affect the availability of water in the area.
  - Over-extraction of water by industries can lower the groundwater level, making it difficult for nearby residents to access water from wells.
  - It can also lead to the drying up of local water bodies, further affecting the water supply for agriculture and domestic use.

Discussion and Findings

- **Water Conservation:**
  - It is important to manage water resources carefully to ensure sustainable availability.
  - Both individuals and industries must use water responsibly and avoid wasteful practices.
  - Implementing water-saving measures and technologies can help conserve water and maintain adequate supply for all users.

- **Science Diary Entry:**
    - Record the observations and findings from the water level experiments.
    - Discuss the impact of drying water bodies and industrial water use on local water availability.
    - Reflect on the importance of water conservation and list measures that can be taken to save water.

Methods for Water Storage

1. **Rainwater Harvesting:**
    - Collecting and storing rainwater from rooftops, land surfaces, or rock catchments using various techniques.
    - **Advantages:** Reduces dependency on groundwater, provides water for irrigation, and helps in recharging aquifers.
2. **Water Tanks:**
    - Storing water in large containers made of plastic, concrete, or metal.
    - **Types:** Overhead tanks, underground tanks, and ground-level tanks.
    - **Advantages:** Easily accessible for domestic use, can store large quantities of water, and protects water from contamination.
3. **Reservoirs and Dams:**
    - Creating artificial lakes by constructing dams on rivers.
    - **Advantages:** Stores large volumes of water for agricultural, industrial, and domestic use; also used for hydroelectric power generation and flood control.
4. **Underground Storage:**
    - Using natural aquifers or artificially created underground reservoirs to store water.
    - **Techniques:** Aquifer recharge and subsurface dams.
    - **Advantages:** Reduces evaporation losses, protects water from contamination, and helps in groundwater recharge.
5. **Ponds and Lakes:**
    - Constructing small to large water bodies to store water.
    - **Advantages:** Provides water for agriculture, livestock, and recreation; helps in maintaining the local ecosystem.
6. **Water Cisterns:**
    - Using large containers, usually underground, to collect and store rainwater or water from other sources.

- **Advantages:** Reduces water runoff, stores large volumes of water, and can be used in areas with limited space.

7. **Check Dams:**
    - Constructing small barriers across streams or small rivers to slow down water flow and store it in upstream areas.
    - **Advantages:** Helps in recharging groundwater, reduces soil erosion, and provides water for agriculture.
8. **Water Silo:**
    - Using tall, cylindrical structures to store large quantities of water, commonly used in agricultural settings.
    - **Advantages:** Stores large volumes of water, protects water from contamination, and can be easily distributed to fields.
9. **Sand Dams:**
    - Building a dam in a seasonal riverbed, where sand accumulates and stores water within it.
    - **Advantages:** Reduces evaporation losses, provides water during dry seasons, and helps in groundwater recharge.
10. **Water Bladders:**
    - Using flexible, collapsible containers to store and transport water.
    - **Advantages:** Portable, easy to install, and suitable for temporary water storage in emergencies or remote locations.
11. **Well Recharging:**
    - Directing surface runoff or rainwater into wells to replenish the groundwater.
    - **Advantages:** Helps maintain the water table, ensures a consistent water supply from wells, and reduces the chances of wells running dry.
12. **Percolation Pits:**
    - Small pits filled with gravel or sand to enhance groundwater recharge.
    - **Advantages:** Inexpensive and easy to construct, helps in groundwater recharge, and reduces surface runoff.

ACTIVITIES

Assessing the Change in State of Water

Flowchart on Change in State of Water

1. **Solid** (Ice)
2. **Melts**
3. **Liquid** (Water)
4. **Evaporates**
5. **Gas** (Steam/Vapor)
6. **Condenses**
7. **Liquid** (Water)
8. **Freezes**
9. **Solid** (Ice)

Flowchart:

Ice

|

Melts

|

Water

|

Heated

|

Vapor

|

Cooled

|

Water

|

Freezes

|

Ice

Idea Chart on Water

Source:

- Rain
- Rivers
- Lakes
- Groundwater
- Oceans

Properties:

- Colorless
- Odorless
- Tasteless
- Universal solvent
- Exists in three states (solid, liquid, gas)

Use:

- Drinking
- Cooking
- Cleaning
- Agriculture
- Industry

States:

- Solid (Ice)
- Liquid (Water)
- Gas (Steam/Vapor)

Pollution:

- Industrial waste
- Agricultural runoff
- Domestic sewage
- Plastic waste
- Oil spills

Analysis of Water Quality Test Report

Water Quality Test Report

Property	**River**	**Pond**	**Well**
Colour	Muddy	Muddy	Clear
Odour	Foul odour	Foul odour	No odour
Organic waste	Yes	Yes	No
Chemical waste	Yes	Yes	No

Findings

a) **Which source of water is the safest to drink?**

- The well water is the safest to drink as it is clear, has no odour, and does not contain organic or chemical waste.

b) **Can we make river and pond water potable? How?**

- Yes, we can make river and pond water potable through various purification processes:
    - **Filtration:** Remove large debris and sediments.
    - **Sedimentation:** Allow waste to settle.
    - **Disinfection:** Use chlorine, UV light, or boiling to kill harmful microorganisms.
    - **Chemical Treatment:** Add coagulants to remove impurities.
    - **Reverse Osmosis:** Use to remove dissolved salts and other impurities.

c) **What can we do to prevent pollution of water sources?**

- **Proper Waste Disposal:** Ensure industrial and household waste is treated before disposal.
- **Reduce Chemical Use:** Minimize the use of pesticides and fertilizers.
- **Sewage Treatment:** Ensure sewage is treated before being released into water bodies.
- **Public Awareness:** Educate communities about the importance of keeping water sources clean.
- **Regular Monitoring:** Conduct regular checks on water quality to detect and address pollution early.

Properties of Water in Daily Life

Properties of Water and Situations

Property	**Situation**
Conducts heat	Used in cooking, such as boiling water for rice or vegetables.
Maintains level	Water levels remain the same in connected vessels (used in spirit levels).
Universal solvent	Dissolves sugar and salt in cooking, cleaning with soap and detergent.
Ability to vaporise	Drying clothes, evaporation from lakes and rivers, cooling effect when sweat evaporates.

Drinking Water Source Survey

Survey Data from Kerala

Neighbourhood House	**Drinking Water Source**	**Other Sources**
My House	Well	Public water supply system
House 1	Public water supply system	Rain water storage tank
House 2	Borewell	Well
House 3	Rain water storage tank	Borewell

Consolidated Information

- **Well:** 2 houses (My House, House 2)
- **Public Water Supply System:** 2 houses (My House, House 1)
- **Borewell:** 2 houses (House 2, House 3)
- **Rain Water Storage Tank:** 2 houses (House 1, House 3)

Findings

- The most common sources of drinking water are wells and public water supply systems.
- Borewells and rainwater storage tanks are also significant sources.

Note on School's Water Usage

Information Collected

1. **Water Sources at School:**
    - Public water supply system
    - Borewell

    - Rainwater harvesting system
2. **Daily Water Usage:**
    - Approximately 500 liters per day
3. **Water Needs:**
    - Drinking
    - Cooking (school canteen)
    - Cleaning (classrooms, restrooms, and school premises)
    - Gardening
4. **Purpose of Water Use:**
    - Most water is used for drinking and cleaning purposes.
5. **Practical Suggestions for Reducing Water Use:**
    - Install water-saving faucets and fixtures.
    - Encourage students and staff to turn off taps when not in use.
    - Use a broom instead of a hose to clean outdoor areas.
    - Collect and use rainwater for gardening and cleaning.
    - Regularly check for and repair any leaks.

Demonstrating Water Level Maintenance

Apparatus Design

Materials Needed:

- Three transparent glasses or containers of different shapes
- A long piece of clear plastic tubing (level tube)
- Water

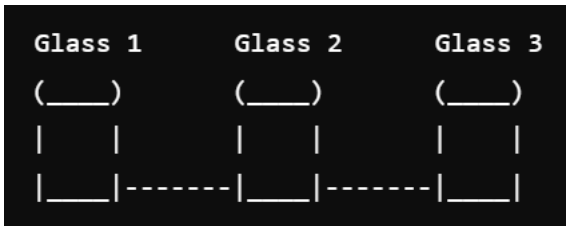
Procedure:

1. Fill the three glasses with water to the same level.
2. Connect the glasses with the plastic tubing, ensuring that the ends of the tubing are submerged in the water.
3. Observe the water levels in each glass.

Observation:

- The water level in all three glasses should be the same, demonstrating that water maintains its level in connected containers regardless of their shape.

Illustration:



Inference:

- The experiment shows that water in connected containers maintains the same level due to the principle of communicating vessels.