Vision Empower & XRCVC

Teacher Instruction KIT

Transportation in Animals and Plants

Syllabus: NCERT
Subject: Science
Grade: 7
Textbook Name: NCERT- Science Textbook for class VII
Chapter Number & Name: 11.Transporation in animals and plants

1. OVERVIEW

1.1 OBJECTIVES AND PREREQUISITES

Objective

- To comprehend the function of the circulatory system in animals.
- To study the components of the circulatory system in human beings and their function.
- To understand the excretory system in animals.
- To learn the process of transportation of substances in plants.

Prerequisite Concept

- Respiratory system: Grade 7 chapter 10; Respiration in Organisms
- Excretion of undigested food: Grade 7 Chapter 2; Nutrition in Animals

Content Index

*Kindly Note: Activities marked with * are mandatory*

Pulse rate

Activity 4: Pulse rate

Structure of heart

Activity 5: Structure of heart

Stethoscope

Activity 6: Stethoscope- a device to measure heartbeats

Excretion in animals

Activity 7: Excretion in animals

Transportation of substances in plants

Activity 8: Transportation of substances in plants

Transportation and transpiration

Activity 9: Transportation and transpiration

3.3 LET'S DISCUSS: RELATE TO DAILY LIFE*

4. EXERCISES & REINFORCEMENT

4.1 EXERCISES & REINFORCEMENT

Reinforcement

Activity 10: Song- Cardiovascular system

4.2 IMPORTANT GUIDELINES*

Exercise Reading

Perform Textbook Activity

Provide Homework

2. LEARN

2.1 KEY POINTS

- All living things need a transportation system, which helps to deliver the essential substances like oxygen, food, water to the body parts. It also helps in the removal of waste products.
- Circulatory system: It consists of heart, blood and blood vessels.
- Blood is the red colour fluid made up of red blood cells, white blood cells, platelets and plasma.

Plasma is the clear, straw-colored liquid portion of blood constituting about 55%, and contains water, salts, enzymes, antibodies and other proteins.

1. **Red blood cells or corpuscles** (**Erythrocytes**) -It constitutes 40-45% of blood. It is made up of a pigment called **haemoglobin** which carries oxygen to all parts of the body.
2. **White blood cells (leukocytes)** help fight the germs in the body.

3. **Platelets** -Helps to clot the blood and prevent the loss of blood during injury

- Blood flows through tube-like vessels called arteries and veins.

ARTERIES	VEINS
1.They carry **oxygenated** blood from the heart to other parts of the body	1.They carry **deoxygenated** blood from body parts to the heart
2. They are thick walled as the blood pressure is high.	2.They are thin walled as the blood pressure is low
3. They do not have valves.	3. They have valves to prevent the blood from flowing in the opposite direction.

-Pulmonary artery carries **deoxygenated** blood from the heart to the body parts.
-Pulmonary vein carries **oxygenated** blood from the body parts to the heart.
-Arteries divide themselves into smaller blood vessels called capillaries.
-Pulse is the rhythmic throbbing caused by continuous pumping of blood through arteries. **Pulse rate** is the number of pulse beats per minute. It is about 70-80 beats per minute.

- **Heart** – It is the organ present in the chest cavity which pumps blood into blood vessels.
  -It is divided into **four** chambers- **Upper atria (singular-atrium)** and **lower ventricles**. The chambers are separated by muscles to prevent the mixing of oxygenated and deoxygenated blood.

-Aorta is the biggest artery which carries the oxygenated blood from the left ventricle to all parts of the body. Superior vena cava is the largest vein which brings in the deoxygenated blood from the parts of the body to the right atrium of the heart.
-The rhythmic contraction and relaxation of the heart is the heart beat. It can be detected with the help of a stethoscope. It magnifies the heartbeat so that the doctors can identify the condition of the heart.

- Aquatic animals like **hydra** and **sponges do not** have circulatory systems. Water helps to bring oxygen and nutrients into their body and removes carbon dioxide and wastes.
- Excretory system in animals
  - The process of removal of waste products from the body is called **excretion**
  - The excretory system in the humans consists of–
    Kidneys which filter the waste from the blood in the form of **urine**.
    Ureters are the tubes which carry the urine from the kidneys to the **Urinary bladder**, where it is stored. The urine passes through the **urethra** and out of the body through **urinary opening.** An adult passes 1- 1.8L of urine in 24 hours
  - The urine consists of 95% water,2.5% urea and 2.5% other toxic wastes

- Fishes excrete ammonia into the water while birds, snakes and lizards excrete semi-solid white coloured uric acid.
- If the function of the kidney is affected, an artificial kidney is used to filter the waste through a process called dialysis.
- Sweat also helps to remove excess water and salt from the body. It also helps to keep the body cool during summers.

- **Transportation** in plants
  - The roots absorb water and minerals from the soil and send to the leaves and the leaves prepare the food and send it to all other parts of the plant. The root hair on the root has greater surface area hence they help in greater absorption of water.
  - Transportation takes place with vascular tissues-xylem and phloem

  Xylem transports water and minerals from the root to the leaf while **phloem** transports food from the leaves to all other parts of the plant.
- **Transpiration**

  The excess water in the plant evaporates into the atmosphere through tiny pores called **stomata** on the surface of the leaves.

  This generates a suction pull through which plants /trees can pull water to great heights. This process also helps to cool the plant.

2.2 LEARN MORE
None

3. ENGAGE

3.1 INTEREST GENERATION ACTIVITY

Circulatory System

Activity 1: Circulatory System

Materials Required: Tactile diagram showing the circulatory system with heart and blood vessels.

Prerequisites: None

Activity Flow

- Tell the students to imagine their body as a city of cells. The cells are like a house. The house requires fuel, raw materials and water. It also requires a sewer system and garbage pick up to get rid of wastes.
- Now lead the discussion to bring out the materials required by the cell -oxygen, water, nutrients and waste generated by the cells- carbon dioxide and other toxic wastes. How are they transported?

- With the help of tactile diagrams, tell them the position of the heart and blood vessels. Tell them that they will learn about the roles they play in the circulatory system.

3.2 CONCEPT INTRODUCTION ACTIVITIES

Blood and its composition

Activity 2: Blood and its composition

Materials Required: Red beads, small LEGOs, or candies (for red blood cells)
-White beads, small LEGOs, or candies (for white blood cells)
-Uncooked rice, tiny paper scraps, or sprinkles (for platelets)
-Water with one drop of yellow food colouring added, or light corn syrup or oil (for plasma)
-Mixing bowl, mixing spoon, Measuring cups or spoons

Prerequisites: None

Activity Flow

- Divide the students in groups. Each group will make the model of blood. Help the students to add the following in the mixing bowl .-2 1/3 c. of water ,1 1/3 cups of red beads, 1 tsp. of white beads, 1 tsp. of tiny paper scraps .
- Explain that our blood consists of 4 important components -red blood cells (Erythrocytes), white blood cells (leukocytes), platelets and plasma. These are represented by the red beads, white beads, paper scraping, and water in our model.
- Explain that red blood cells carry oxygen to all parts of the body, white blood cells fight the germs and platelets help in clotting. While explaining the functions of the components, ask the students why different amounts of materials were added. The proportion of red blood cells is large compared to that of white blood cells.
- Lead the discussion to list the other functions of blood -regulate body temperature etc.

Types of blood vessels

Activity 3: Types of blood vessels

Materials Required: Red and blue coloured balls of two different sizes /red and blue cards with different textures. (The colours are optional)
Prerequisites: None

Activity Flow

- Make a group of five. Name them as Heart-1, lungs-2, veins-3 arteries-4 and Body part -5
- The heart, lungs and body part will have both the coloured balls/ cards

- The first student (heart) will pass the red ball to the arteries with his left hand and the ball will be passed on to the body part.
- The body part will keep the red ball and pass the blue ball to the vein. The vein will give the blue ball back to the heart in his right hand.
- The heart will pass the blue ball to the lungs with his right hand and the lungs will give back a red ball to the heart.
- This cycle is repeated for a few more times.
- Tell the students that red ball represents oxygenated blood and blue ball represent deoxygenated balls.
- Ask questions to bring out the difference between the arteries and veins and state the path of flow of blood. Discuss other points like why the arteries are thick walled and have no valves unlike veins.

Pulse rate

Activity 4: Pulse rate

Materials Required: stop watch (braille or talking)
Prerequisites: None

Activity Flow

- Help the students place their middle and index finger on the inner side of their left wrist.
- They can feel the throbbing movements. It is the pulse due to the blood flowing through the arteries.
- Count the pulse and note the time.
- Calculate the number of pulse beats per minute. It is your pulse rate.
- A resting man has an average pulse rate of 72 to 80
- Repeat this activity with one of your classmates and compare the pulse rate.

Structure of heart

Activity 5: Structure of heart

Materials Required: Tactile model of a heart, a bulb syringe, balloon and a large jar of water
Prerequisites: None

Activity Flow

- Divide students into pairs. One student fills the bulb with water. The other student secures a balloon over the tip.
- The first student gently squeezes and releases the bulb so that the balloon repeatedly fills with water.
- The partner holds the balloon between the fingers to feel the expansion and contraction.
- The students reverse the roles and perform the activity once again.

Or
Materials Required: Balloon, red food colour, scissor, 2 straws, tape, and a large jar of water
Prerequisites: None

Activity Flow

- Fill the jar halfway with water and add a few drops of red colour.
- Cut the neck of the balloon and stretch the other part over the top of the jar till it is flat.
- With scissors carefully snip two small holes into the balloon. Fix the straws in the two holes tightly with the help of the tape.
- Tape the end of one of the straws.
- Place the heart pump in a tray and one of the students can press the balloon.
- Others can feel the water splashing out from one of the straws.

After the activity the students comprehend the pumping action of the heart. Inform them that the pumping of the heart is not as simple as the pump made by them.

- With the help of tactile diagram explain the four chambers of the heart -upper chambers called atria and lower chambers called ventricles. Emphasise that the wall and the valves between the chambers prevent the mixing of the oxygenated and deoxygenated blood. The size of the heart is approximately equal to the fist of one's fist.
- Aorta is the biggest artery and vena cava is the biggest vein
- Discuss about the path of flow of blood by recalling the activity 3.

Stethoscope

Activity 6: Stethoscope- a device to measure heartbeats

Materials Required: Balloon/a piece of rubber sheet, 6-7 cm funnel, 50 cm rubber tube, rubber band.
Prerequisites: None

Activity Flow

- Ask the students to place their hand on their chest to the left. Do they feel any movement? It is the heartbeat.
- Inform them that they are going to make an instrument to count the heartbeats.
- Take a small funnel and cover its mouth tightly with a stretched rubber sheet or balloon**.**
- Connect the rubber tube to the stem of the funnel.
- Put the open end on one of your ears.
- Place the mouth of the funnel on the chest near the heart and count the heartbeat.

- Ask the student to jump for a few minutes and test the heart beat again.
- Students can compare their heartbeat with those of their friends.
- Explain that such an instrument made with a sensitive diaphragm and ear pieces is called a stethoscope. The doctors use this to amplify the heart beats and understand the condition of patients.
- The heartbeat is the rhythmic contraction and relaxation of the muscles of the heart. This helps to maintain the circulation of the blood and transport of materials to different parts of the body.
- Do all organisms have circulatory systems with blood? With the help of tactile diagrams of hydra and sponges, explain that such organisms do not possess circulatory fluid like blood. Water brings in oxygen and nutrients and removes the waste from their body.

Excretion in animals

Activity 7: Excretion in animals

Materials Required: Tactile model of excretory system, 2 beakers, water, chalk powder, yellow colour, funnel with filter paper.
Prerequisites: None

Activity Flow

- With the help of questions, help the students recall that carbon dioxide is removed from our body through lungs during exhalation and undigested food during egestion.
- How are the other wastes removed from the body? It is done by the excretory system.
- With the help of tactile diagram explains the different organs of the excretory system -kidneys, ureters, urinary bladder, urethra
- Explain the role of each organ and how the urine is stored in the bladder and pass out through urinary opening.
- An adult passes 1- 1.8L of urine in 24 hours
- Demonstrate the activity to show filtration-Set up a funnel with the filter paper on one of the beakers (A). Mix the chalk powder, yellow colour in water in the second beaker (B). Ask the students to feel the liquid in beaker B. Now tell them that you are pouring the liquid through the filter paper in the funnel.
- Ask the student to now touch the liquid in beaker A
- Ask them if they find any difference. Explain that the kidney functions in a similar way. The nephrons, the functional unit in kidneys, help in the filtration of the blood and removes the waste in the form of urine which is 95% water, 2.5% urea and 2.5% other wastes.

- Also discuss the role of skin in removing excess water and salts through sweat. Sweating helps to maintain our body temperature.

Transportation of substances in plants

Activity 8: Transportation of substances in plants

Materials Required: Tactile diagram of a tree with arrows showing the transportation, 4-inch 3-4rinking straws, 4-inch 15 coffee stirrers, rubber band and 4-inch chart paper /paper towel roll tube.
Prerequisites: photosynthesis

Activity Flow

- Ask the students to explain the process of photosynthesis. How does minerals and water reach the leaves? And what happens to the food prepared by the plants?
- Lead the discussion to bring out the facts that the roots absorb water and minerals and send to the leaves through the stem. Also, that food from leaves also reach all the other parts of the plants. The root hair increases the surface area and hence helps in better absorption of water from soil.
- Ask the students to hold the stirrers and put a rubber band around it. A 4-inch pencil can be kept at the centre. Cover the stirrers on the sides with the chart paper and tape it lightly to keep it in place.
- Insert this into the paper towel tube and insert the straws between the tube and chart paper.
- This represents the vascular tissues of the tree which help to transport materials. The stirrers represent the xylem-tissue which carries water and minerals from the roots to the leaves while straws represent the phloem tissue which carries food made by leaves to different parts of the trees.
- With the help of the tactile diagram, explain the path of the materials from the root to leaves and leaves to other parts.

Transportation and transpiration

Activity 9: Transportation and transpiration

Materials Required: A beaker with red coloured water (water with red ink or food colour), A stem of a herb or a flower with stalk
Prerequisites: transpiration

Activity Flow

- Inform the students about the procedure. Tell them that a stem of a herb / a flower with stalk is placed in a beaker with coloured water.

- Observe it the next day. Teacher can observe and tell students.
- List the observation. Ask questions as to why some parts of the herb became red?
- Lead the discussion to bring out the fact that water moved up the stem. Similarly, in plants, water and minerals move to leaves through narrow tubes called xylem. (as in a drinking straws)
- Ask them what happens to the excess water in the plants? How do plants excrete them? Help the students recall the process of transpiration in which plants give out excess water through stomata present on the surface of the leaves.
- Lead the discussion to make the students list the effects of transpiration-generate suction pull, cool the plant.

3.3 LET'S DISCUSS: RELATE TO DAILY LIFE*

- Start a discussion with the question -If a person loses a lot of blood during an accident or surgery, what can be done? Can the person be given blood?
- Lead the discussion to the blood donation, its importance, the role of blood banks and different blood groups.
- Ask the student to find out their blood groups.

4. EXERCISES & REINFORCEMENT

4.1 EXERCISES & REINFORCEMENT

Reinforcement

Activity 10: Song- Cardiovascular system

Materials Required: None

Prerequisites: None

Activity Flow

Let's sing a song - The cardiovascular system song

https://www.youtube.com/watch?v=WyK9XplI-6g

4.2 IMPORTANT GUIDELINES*

Exercise Reading

It is very important that the children practice their learnings as well as their reading. Hence have the children read out the newly learned concepts from their textbooks or other available resources.

Perform Textbook Activity

It is good practice to have the children perform the textbook activities. Your textbook activities might not be accessible hence go through this resource to learn how to make textbook content accessible

Provide Homework

To evaluate their understanding and to help the student revise and implement the new learnt concept ensure to provide them with homework. Students should perform one or two of the questions mentioned above or from the textbook exercises with the teacher in Class and the remaining may be given for homework. Also, ensure that the student knows their special skills linked to independently using their accessible books as it will be critical to doing homework independently

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