4. Animal Movements

TEACHING TASK (Page 43 – 44)

Multiple Choice Questions

1) What is the primary respiratory organ in fish? Answer: B) Gills Explanation: Fish primarily use gills to extract oxygen from water, unlike lungs (used by terrestrial animals), skin (used by some amphibians), or trachea (used by insects).

2) What is the function of fish gills? Answer: C) To absorb oxygen from the water Explanation: Gills extract dissolved oxygen from water and release carbon dioxide, enabling respiration. They do not filter food, regulate temperature, or control buoyancy.

3) What happens to the oxygen extracted from water in fish gills? Answer: B) It is transported to body tissues by the bloodstream Explanation: Oxygen absorbed by gills enters the bloodstream and is distributed to tissues for cellular respiration. It is not stored, converted, or released back into water.

4) How do fish reduce drag and move more efficiently through the water? Answer: C) By streamlining their body shape Explanation: A streamlined body reduces water resistance, allowing efficient movement. Larger fins or smaller body size are not primary drag-reducing mechanisms.

5) What is the function of fish scales? Answer: B) To protect their internal organs Explanation: Scales provide a protective barrier against physical damage and pathogens. They do not aid in breathing, communication, or vision.

6) What is camouflage in fish? Answer: B) A method of defense against predators Explanation: Camouflage helps fish blend into their environment to avoid detection by predators, not for communication, attracting prey, or temperature regulation.

7) How do shoals differ from schools? Answer: A) Shoals are smaller and less organized than schools Explanation: Shoals are loose, unorganized groups of fish, while schools are larger, coordinated groups swimming synchronously for protection or efficiency.

More Than One Answer Type

8) What are some adaptations of fish for living in water? Answer: A) Streamlined body shape, B) Fins for steering and propulsion, D) Gills for extracting oxygen from water Explanation: Fish have streamlined bodies to reduce drag, fins for movement and balance, and gills for respiration. Lungs are not a typical adaptation for most fish, as they are air-breathing organs found in some species like lungfish.

Fill in the Blanks

9) Fish have ***gills*** for extracting oxygen from water.

10) The streamlined body shape of fish helps reduce ***drag*** as they swim.

Matching Type

11) 1. Habitat → B. The natural environment where fish live and thrive

2. Schooling behavior → C. Fish swim together in coordinated groups

3. Camouflage → A. Allows fish to blend into their environment for protection from predators

4. Streamlined body shape → D. Physical adaptation that reduces drag as fish swim.

Answer the Following Questions

12) Explain the importance of gills in the life of a fish. How do they enable fish to extract oxygen from water? Solution: Gills are critical for fish survival as they serve as the primary respiratory organ, allowing fish to extract dissolved oxygen from water. Gills consist of thin, filament-like structures with a large surface area, rich in blood vessels. As water flows over the gills (via the fish's mouth or operculum movement), oxygen dissolved in the water diffuses across the gill membranes into the bloodstream due to a concentration gradient (higher oxygen in water, lower in blood). Simultaneously, carbon dioxide in the blood diffuses out into the water. This process, called counter current exchange, maximizes oxygen absorption efficiency. Without gills, fish could not respire effectively in their aquatic environment, making gills essential for survival.

13) Explain the concept of fish schooling. What are some advantages of schooling behaviour for fish, and how does it help them survive in the aquatic environment? Solution: Fish schooling refers to the behaviour where fish swim together in a highly coordinated, synchronized manner, often forming large groups. Unlike shoals (loose aggregations), schools involve fish moving in unison, maintaining consistent speed and direction. **Advantages** include:

Predator protection: Schooling confuses predators through the "confusion effect," making it hard to single out an individual fish. It also increases vigilance, as more eyes detect threats.

Hydrodynamic efficiency: Swimming in a school reduces water resistance, saving energy for individual fish.

Foraging benefits: Schools can locate food more efficiently as a group.

Reproductive success: Schooling increases the chance of finding mates. These benefits enhance survival in the aquatic environment by improving safety, energy conservation, and resource acquisition.

LEARNER'S TASK (Page 44 – 45)

Multiple Choice Questions

1) Which of the following is not a characteristic of fish? Answer: C) They have fur covering their bodies Explanation: Fish typically have fins, gills, and scales, but fur is a characteristic of mammals, not fish.

2) How do fish extract oxygen from water? Answer: C) Through their gills Explanation: Gills are specialized organs that extract dissolved oxygen from water, not the skin, fins, or mouth.

3) What is the process by which fish exchange gases through their gills? Answer: B) Diffusion Explanation: Oxygen and carbon dioxide move across gill membranes via diffusion, driven by concentration gradients, not osmosis, active transport, or filtration.

4) What is the primary organ that helps fish move? Answer: A) Fins Explanation: Fins are the primary structures for swimming, steering, and propulsion. Gills, scales, and tails (while important) are not the primary organs for movement.

5) What is the primary purpose of camouflage in fish? Answer: C) To avoid detection by predators or prey Explanation: Camouflage helps fish blend into their surroundings to evade predators or ambush prey, not for communication, mating, or temperature regulation.

6) What is a school of fish? Answer: A) A group of fish that swim together in a coordinated manner Explanation: Schools are groups of fish swimming synchronously, unlike resting groups, jumping groups, or solitary hunters.

More Than One Answer Type

7) Which of the following are characteristics of fish as aquatic animals? Answer: A) They have gills for breathing, B) They have fins for swimming, D) They have scales covering their bodies
Explanation: Gills, fins, and scales are key adaptations for aquatic life. Lungs are not typical for most fish, except in rare cases like lungfish.

Fill in the Blanks

8) Fish use their ***fins*** for balance, steering, and propulsion in the water.

9) Some fish species exhibit ***schooling*** behaviour, forming large groups for protection from predators.

Matching Type

10) 1. Gills → c. Organs used by fish to breathe underwater

2. Fins → a. Appendages used for steering and manoeuvring in water

3. Scales → b. Protective coverings on the skin of fish

Answer the Following Questions

11) Explain the importance of camouflage in fish. Solution:
Camouflage in fish is a critical adaptation that allows them to blend into their aquatic environment, reducing visibility to predators and prey. By mimicking the colours, patterns, or textures of their surroundings (e.g., coral reefs, seaweed, or the ocean floor), fish avoid detection, increasing their chances of survival. For predatory fish, camouflage aids in ambushing prey, while for prey species, it provides protection from being eaten. This adaptation enhances their ability to survive and reproduce in competitive and predator-rich environments.

12) Describe the role of fins in fish locomotion. Solution: Fins are essential for fish locomotion, serving multiple functions in movement. **Dorsal and anal fins** provide stability, preventing rolling or tipping. **Pectoral and pelvic fins** aid in steering, turning, and maintaining balance. The **caudal (tail) fin** is the primary source of propulsion, generating thrust through side-to-side movements. Together, these fins allow fish to navigate complex aquatic environments, evade predators, pursue prey, and maintain efficient swimming patterns, making them critical for survival.

TEACHING TASK (Page 48 – 49)

Multiple Choice Questions

1) How do earthworms breathe? Answer: C) Through skin Explanation: Earthworms lack gills or lungs and breathe through their moist skin via diffusion of oxygen, unlike insects (spiracles) or vertebrates (lungs).

2) What is the purpose of earthworm setae? Answer: C) Gripping soil Explanation: Setae are bristle-like structures that anchor earthworms in the soil, aiding movement. They do not function in reproduction, sensing, or digestion.

3) Which of the following is not a benefit of earthworms to soil health? Answer: B) Erosion Explanation: Earthworms improve soil health through aeration, nutrient cycling, and structure improvement. Erosion is a negative process, not a benefit.

4) What type of skeleton do earthworms have? Answer: C) Hydrostatic skeleton Explanation: Earthworms use a fluid-filled hydrostatic skeleton for movement, not an exoskeleton, endoskeleton, or cartilaginous skeleton.

More Than One Answer Type

5) How do earthworms contribute to soil health? Answer: A) By aerating the soil, B) By consuming organic matter, C) By releasing nutrients through their waste Explanation: Earthworms aerate soil through burrowing, consume organic matter, and produce nutrient-rich castings. They do not emit significant greenhouse gases.

Fill in the Blanks

6) Earthworms use ***setae*** to anchor themselves in the soil and prevent slipping backward as they move.

7) The bristle-like structures on earthworms' bodies are called ***setae.***

Matching Type

8) 1. Aeration of Soil → C. Earthworms create tunnels in the soil, allowing air and water to penetrate deeper and enhancing root growth.

2. Nutrient Cycling → A. Earthworms feed on organic matter, breaking it down into nutrient-rich castings that enrich the soil.

3. Pest Control → B. Earthworms consume and break down organic material, reducing the population of pests and pathogens.

Answer the Following Questions

9) Describe the role of earthworms in soil health and agricultural productivity. Solution: Earthworms play a vital role in soil health and agricultural productivity. They aerate the soil by creating tunnels, which improve air and water penetration, benefiting root growth and soil structure. By consuming organic matter (e.g., decaying plants), earthworms break it down and excrete nutrient-rich castings, enhancing soil fertility through nutrient cycling. These castings provide essential nutrients like nitrogen and phosphorus, promoting plant growth.

Additionally, their burrowing reduces soil compaction, improving drainage and root penetration. By reducing organic debris, earthworms also help control pests and pathogens, contributing to healthier crops and higher agricultural yields.

10) Explain how earthworms move through the soil and the mechanisms they use for locomotion. Solution: Earthworms move through soil using a combination of muscular contractions and their hydrostatic skeleton. Their body is segmented, with circular and longitudinal muscles. **Peristalsis**, a wave-like contraction, alternates between contracting circular muscles (to elongate and thin the body, pushing it forward) and longitudinal muscles (to shorten and widen the body, anchoring it). Setae, tiny bristle-like structures on each segment, grip the soil, preventing backward slipping. The hydrostatic skeleton, a fluid-filled cavity, provides structural support, allowing muscles to push against it for movement. This coordinated process enables earthworms to burrow efficiently through soil.

LEARNER'S TASK (page 49 – 50)

Multiple Choice Questions

1) What is the primary habitat preference of earthworms? Answer: C) Underground Explanation: Earthworms live in soil, burrowing underground, not in water, trees, or air.

2) Where do earthworms primarily live? Answer: B) Underground Explanation: Earthworms inhabit soil environments, creating burrows, not living in water, trees, or on rocks.

3) What is the primary role of earthworms in soil health? Answer: C) Nutrient recycling Explanation: Earthworms primarily contribute to soil health by recycling nutrients through their castings, not by producing pesticides, eroding soil, or filtering water.

4) Which of the following is not a benefit of earthworms in agriculture? Answer: B) Pest control Explanation: While earthworms indirectly reduce pests by consuming organic matter, pest control is not a primary benefit compared to aeration, nutrient cycling, or soil structure improvement.

5) Where are the setae of an earthworm located? Answer: B) Along the segments Explanation: Setae are bristle-like structures found along the body segments, not just on the head, tail, or inside the body.

More Than One Answer Type

6) What are the primary ways in which earthworms move? Answer: A) Crawling, C) Burrowing Explanation: Earthworms move by crawling on surfaces and burrowing through soil using peristalsis and setae. They do not swim or fly.

Fill in the Blanks

7) Earthworms breathe through their ***skin.***

8) The wave-like motion used by earthworms to move forward is called ***peristalsis.***

Matching Type

9)1. Peristalsis → B. Wave-like muscular contraction aiding in movement

2. Hydrostatic Skeleton → C. The type of skeleton found in earthworms

3. Setae → A. Tiny bristle-like structures aiding in movement

Answer the Following Questions

10) Explain how earthworms breathe and why their skin needs to stay moist. Solution: Earthworms breathe through their skin via a process called cutaneous respiration. Oxygen from the air diffuses through their moist skin into the bloodstream, while carbon dioxide diffuses out. The skin must remain moist because oxygen can only dissolve and pass through a wet surface. A dry skin forms a barrier, preventing gas exchange and potentially causing suffocation. Earthworms produce mucus to keep their skin moist, and they thrive in damp environments to support this respiratory process.

11) Explain how earthworms contribute to soil fertility and health. Solution: Earthworms enhance soil fertility and health in several ways. They consume organic matter (e.g., dead leaves, plant debris) and excrete nutrient-rich castings, which enrich the soil with nitrogen, phosphorus, and other nutrients essential for plant growth. Their burrowing aerates the soil, improving air and water infiltration, which supports root development and reduces compaction. This activity also enhances soil structure, creating a loose, crumbly texture that promotes drainage and root penetration. By breaking down organic matter, earthworms also reduce pest and pathogen populations, contributing to overall soil health and fertility.