

Structural Organisation in Animals — Assignment 2

Class 11 Biology · Higher-difficulty challenge set + integrated problems · Answer key included · Narayan Gurukul Academy

Instructions: (1) Attempt all questions; start with the topic-wise challenge set, then attempt the integrated (multi-topic) problems.
(2) Give all answers with correct SI units. $g = 10 \text{ m/s}^2$ unless stated.
(3) A final answer key is provided at the end — try the full set before checking it.

Part A — Topic-wise challenge questions

Animal Tissues — Overview

1. State two differences between plant and animal tissues.
2. Why is a tissue said to be a level of organisation?
3. Describe the levels of organisation in animals.

Epithelial Tissue

1. Distinguish between simple and compound epithelium.
2. State two functions of epithelial tissue.
3. Describe the types of simple epithelium with their locations.

Connective Tissue

1. Distinguish between tendon and ligament.
2. Distinguish between bone and cartilage.
3. Describe the types of connective tissue with examples.

Muscular Tissue

1. Distinguish between striated and non-striated muscle.
2. Why is cardiac muscle said to be involuntary and striated?
3. Describe the three types of muscle tissue with their locations.

Neural Tissue

1. Distinguish between a neuron and neuroglia.
2. State two functions of neural tissue.
3. Describe the structure of a neuron.

The Frog — Morphology and Organ Systems

1. State two features of *Rana tigrina*.
2. Describe the excretory organs of the frog.
3. Describe the digestive and respiratory systems of a frog.

Part B — Integrated problems (multi-topic)

1. Describe the four types of animal tissues and give one location and one function of each.
2. Compare simple and compound epithelium with respect to structure, location and function.
3. Distinguish between tendon and ligament, and between bone and cartilage.
4. Compare the three types of muscle tissue on the basis of striations, control and location.
5. Draw and describe the structure of a neuron, naming its parts.
6. Describe the morphology and the digestive system of the frog (*Rana tigrina*).

Answer Key

Animal Tissues — Overview

Plant tissues have a cell wall and are mainly for support, growth and transport; animal tissues lack a cell wall and include contractile and conducting tissues. A tissue is a level of organisation because similar cells group together to perform a specific function. Levels of organisation in animals: cells → tissues → organs → organ systems → organism.

Epithelial Tissue

Simple epithelium is a single layer of cells (lining, absorption, secretion); compound epithelium has many layers (protection, e.g. skin). Two functions: protection and secretion/absorption. Simple epithelium types: squamous (alveoli, blood-vessel lining), cuboidal (ducts of glands, kidney tubules), columnar (stomach lining) and ciliated columnar (respiratory tract, fallopian tube).

Connective Tissue

A tendon connects muscle to bone; a ligament connects bone to bone. Bone has a hard, calcium-rich matrix; cartilage has a flexible matrix of chondroitin. Connective tissue types: loose (areolar, adipose), dense (tendon, ligament), supporting (bone, cartilage) and fluid (blood, lymph).

Muscular Tissue

Striated muscle is voluntary with light/dark bands (skeletal); non-striated (smooth) muscle is involuntary without bands (gut, blood vessels). Cardiac muscle is striated but involuntary and occurs only in the heart wall. The three types: skeletal (striated, voluntary), smooth (unstriated, involuntary) and cardiac (striated, involuntary).

Neural Tissue

A neuron is the conducting cell that receives and transmits impulses; neuroglia are the supporting, non-conducting cells. Two functions: conduction of impulses and control/coordination. A neuron has a cell body (cyton) with dendrites and a long axon ending in nerve terminals.

The Frog — Morphology and Organ Systems

Rana tigrina is an amphibian with moist, glandular skin, webbed feet and a greenish body; it has a three-chambered heart and haemoglobin as its respiratory pigment. Excretory organs: a pair of mesonephric kidneys, ureters, a cloaca and a urinary bladder. Digestive system: mouth → buccal cavity → oesophagus → stomach → small intestine → large intestine → cloaca, with a liver and pancreas as glands; respiration occurs through skin (cutaneous) and lungs (pulmonary).

Integrated problems

1: Epithelial (skin lining — protection), connective (blood — transport), muscular (heart — contraction), neural (brain — conduction). 2: Simple — single layer, lining/absorption; compound — many layers, protection. 3: Tendon muscle–bone vs ligament bone–bone; bone hard/calcified vs cartilage flexible. 4: Skeletal — striated, voluntary; smooth — unstriated,

involuntary; cardiac — striated, involuntary. 5: Cyton with dendrites and a long axon ending in nerve terminals. 6: Morphology — moist glandular skin, webbed feet; digestive system — mouth, buccal cavity, oesophagus, stomach, small intestine, large intestine, cloaca with liver and pancreas.