1. Answer in one word or one line.

(i) Give the common name of Periplanata americana.

(ii) How many spermathecae are found in earthworms?

(iii) What is the position of ovaries in cockroaches?

(iv) How many segments are present in the abdomen of cockroaches?

(v) Where do you find Malpighian tubules?

Solution:

i) American cockroach

ii) 4 pairs of spermathecae are found in earthworms.

iii) Two ovaries are found lying laterally around the 2nd to the 6th abdominal segments.

iv) 10 segments

v) Malpighian tubules are found at the junction of the midgut and the hindgut of the alimentary canals of insects.

2. Answer the following.

(i) What is the function of nephridia?

(ii) How many types of nephridia are found in earthworms based on their location?

Solution:

i) Nephridia perform the function of excretion and osmoregulation in earthworms.

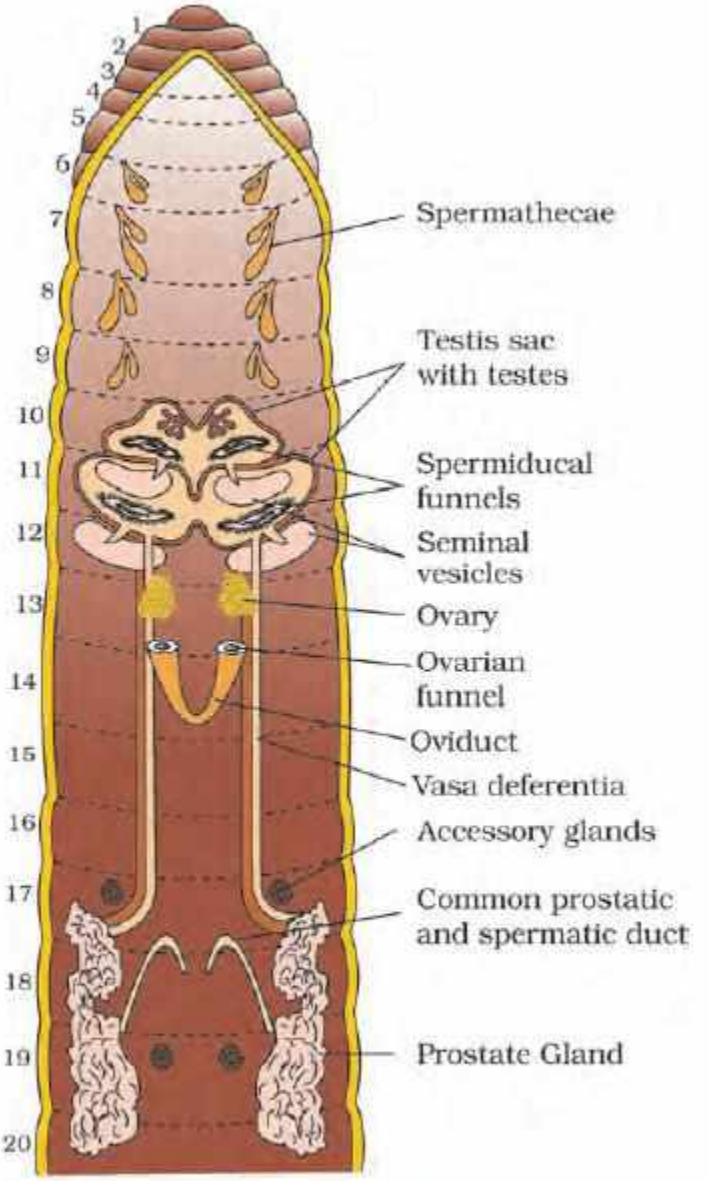
ii) Three types of nephridia are found in the earthworm based on their location, and they are

- Septal nephridia are present on both sides of the intersegmental septa of segment 15 to the last that opens into the intestine.
- Integumentary nephridia are attached to the lining of the body wall of segment 3 to the last that opens on the body surface.
- Pharyngeal nephridia are present as three paired tufts in the 4th, 5th and 6th segments.

3. Draw a labelled diagram of the reproductive organs of an earthworm.

Solution:

The diagram of the reproductive organs of an earthworm is as follows:

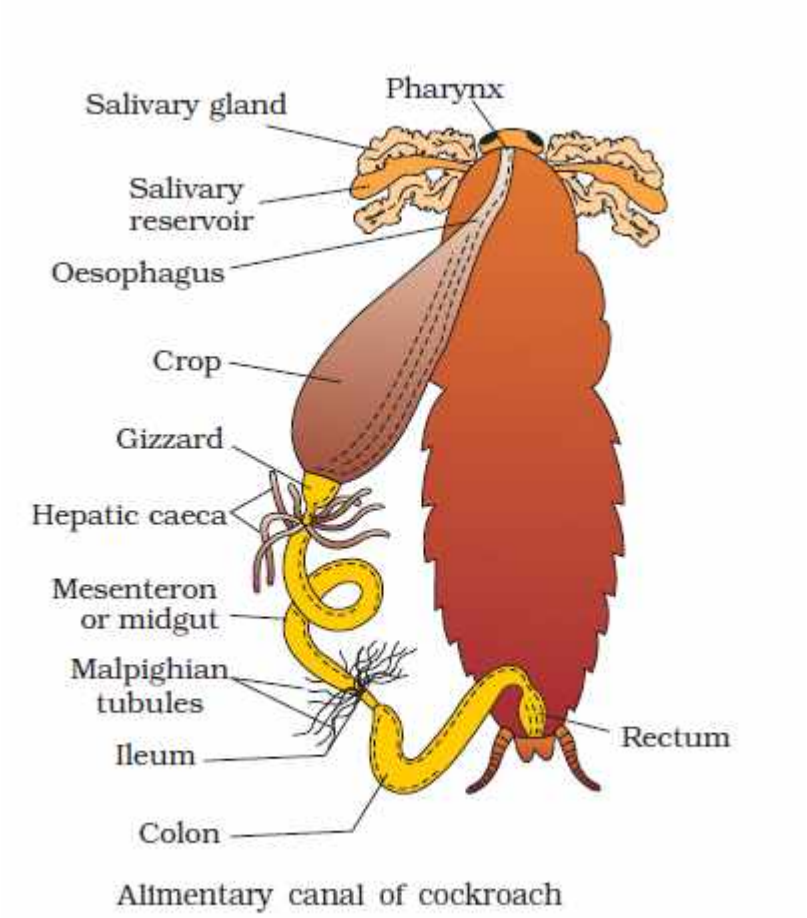


Reproductive system of earthworm

4. Draw a labelled diagram of the alimentary canal of a cockroach.

Solution:

The diagram of the alimentary canal of a cockroach is as follows:



Alimentary canal of cockroach

5. Distinguish between the following.

(a) Prostomium and peristomium

(b) Septal nephridium and pharyngeal nephridium

Solution:

a) Prostomium and peristomium

The differences are as follows:

Prostomium	**Peristomium**
The small, fleshy lobe serves as a covering for the mouth and as a wedge to force open cracks in the soil in the earthworm crawls.	It is the crescentic aperture at the anterior end of the first segment of the earthworm comprising the mouth

b) Septal nephridium and pharyngeal nephridium

Septal nephridium	Pharyngeal nephridium
Found at the anterior and posterior surface of septa occurring after segment 15 in earthworm	Found in three pairs in the 4th, 5th and 6th segments located on either side of the alimentary canal
The excretory matter is discharged into the lumen of the alimentary canal	The excretory matter is discharged into the gut, in the pharynx or buccal cavity

6. What are the cellular components of blood?

Solution:

The cellular components of blood are Red blood cells (RBC), white blood cells (WBC) and platelets.

7. What are the following, and where do you find them in an animal body?

(a) Chondrocytes

(b) Axons

(c) Ciliated epithelium

Solution:

a) Chondrocytes are the cells of cartilage. Cartilage is present in the tip of the nose, outer ear joints, and between adjacent bones of the vertebral column, limbs and hands in adults. They are rounded, large and mature cells that are found occurring in clusters in the matrix of the cartilage.

b) An axon is a long slender projection of a neuron or nerve cell. They are present throughout the body. They emerge from the cyton and are responsible for conducting nerve impulses away from the cell body. They terminate in a group of branches known as terminal arborisations.

c) If the columnar or cuboidal cells bear cilia on their free surface, they are called the ciliated epithelium. They are present in the inner surface of hollow organs like bronchioles and fallopian tubes. It comprises fine vibratile cytoplasmic processes that are termed cilia, found on its free surface. This cilium is functional in trapping foreign substances and dust.

8. Describe various types of epithelial tissues with the help of labelled diagrams.

Solution:

Epithelial tissues are found lining the body surface forming a protective surface. These cells are densely packed with a very little intercellular matrix.

Various types of epithelial tissues are

i) Simple epithelium:

It is a single layer of cells which functions as a lining for body cavities, ducts, and tubes.

Based on the structural modifications of the cells, Simple epithelial cells are further divided into 4 types.

- Squamous epithelium

Simple epithelium is made of a single layer of a flattened cell having irregular boundaries. Since their cells represent tiles of a floor, they are also referred to as pavement epithelium. They are found in the walls of blood vessels and air sacs of the lungs. They are involved in excretion, protection, exchange of gases, secretion of coelomic fluid, etc.

- Cuboidal epithelium

Cuboidal epithelium is made up of a single layer of cube-like cells. They are commonly found in ducts of glands and tubular parts of nephrons in kidneys, and their primary functions are secretion and absorption of gamete formation.

- Columnar epithelium

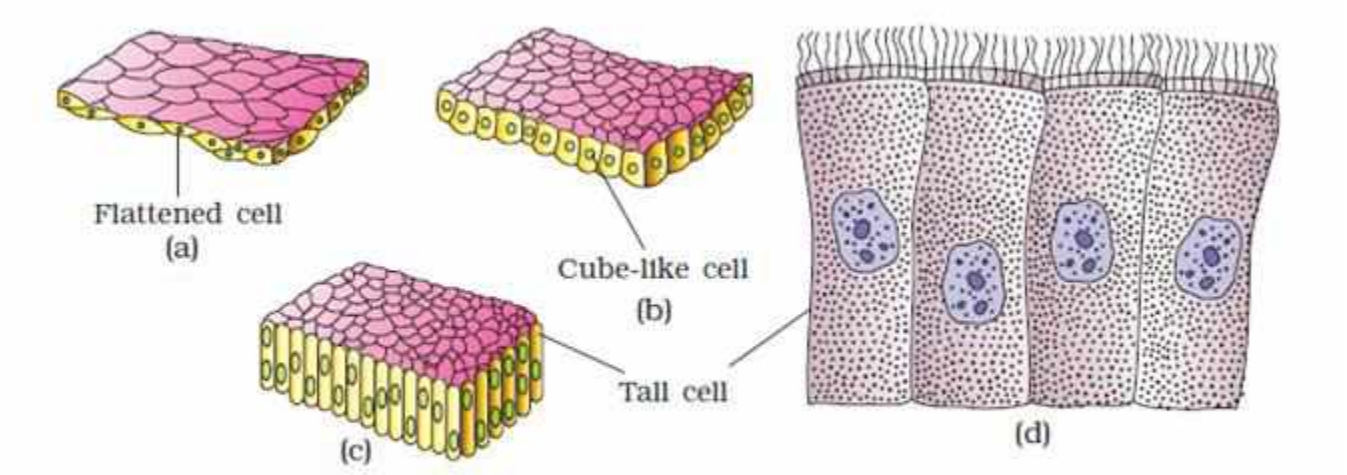
The columnar epithelium is made of a single layer of tall and slender cells. They are found in the lining of the stomach and intestine and help in secretion and absorption. The nuclei of these cells are elongated and found at different positions. It aids in absorption and secretion.

- Ciliated epithelium

If cuboidal or columnar epithelium has cilia, they are called ciliated epithelium. They are present in the inner surface of hollow organs like fallopian tubes and bronchioles. Their function is to move particles in a specific direction.

ii) Compound epithelium

The compound epithelium is a layer of two or more cells with a protective function, as it does in our skin. They are thick and strong compared to the simple epithelium, as they comprise two or more cell layers; they render protection. They cover the dry skin surface, the moist surface of the buccal cavity, and the inner lining of the ducts of pancreatic ducts and salivary ducts.



Simple epithelium: (a) Squamous (b) Cuboidal (c) Columnar (d) Columnar cells bearing cilia

9. Distinguish between

(a) Simple epithelium and compound epithelium

(b) Cardiac muscle and striated muscle

(c) Dense regular and dense irregular connective tissues

(d) Adipose and blood tissue

(e) Simple gland and compound gland

Solution:

a. Simple epithelium and compound epithelium

Simple epithelium	**Compound epithelium**
Composed of one layer of cells	Consist of many layers of cells
They are involved in the function of absorption and secretion	They are involved in the protection
Present in the stomach lining and intestine	Present in the lining of the buccal cavity and pharynx.
Cells rest on the basement membrane	Cells of the lowermost layer rest on the basement membrane

b. Cardiac muscle and striated muscle

Cardiac muscle	**Striated muscle**
It is involuntary in function and never gets fatigued	It is voluntary in function, hence gets fatigued sooner
It is found in the heart	Found in the triceps, limbs and biceps
Branched fibres	Unbranched fibres

Uninucleated	Multinucleated

c. Dense regular and dense irregular connective tissues

Dense regular connective	**Dense irregular connective tissue**
Collagen fibres are present in rows between parallel boundless fibres	Consists of Fibroblasts having several fibres that are differently oriented
Regular patterns of fibres observed	Irregular patterns of fibres observed
They are present in tendons and ligaments	They are present in the skin

d. Adipose and blood tissue

Adipose tissue	**Blood tissue**
It is made of collagen fibres, fibroblasts, macrophages and adipocytes	It consists of RBC, WBC, platelets and plasma
It is a loose connective tissue	It is a fluid connective tissue
Its function is to synthesise, store and metabolise the fats	Its function is to transport food, gases, hormones and waste.
Present beneath the skin	Present in the blood vessels

e. Simple gland and compound gland

Simple gland	**Compound gland**
It contains isolated glandular cells	Contains cluster of secretory cells

It is unicellular	It is multicellular
Ex: Goblet cells of the alimentary canal	Ex: salivary glands

10. Mark the odd one in each series.

(a) Areolar tissue; blood; neuron; tendon

(b) RBC; WBC; platelets; cartilage

(c) Exocrine; endocrine; salivary gland; ligament

(d) Maxilla; mandible; labrum; antennae

(e) Protonema; mesothorax; metathorax; coxa

Solution:

1. The answer is **neuron** because it is not a connective tissue.
2. The answer is **cartilage** because it is not part of blood.
3. The answer is **ligament** because it is connective tissue, whereas the rest are glands.
4. The answer is **antennae** because the rest are the parts of a cockroach's stomach.
5. The answer is **Protenema** because it is a thread-like chain of cells found in the life cycle of moss, whereas others are the parts of segments of a cockroach's leg.

11. Match the terms in column I with those in column II.

Column I	**Column II**
(a) Compound epithelium	**(i) Alimentary canal**
(b) Compound eye	**(ii) Cockroach**
(c) Septal nephridia	**(iii) Skin**
(d) Open circulatory system	**(iv) Mosaic vision**
(e) Typhlosole	**(v) Earthworm**

(f) Osteocytes	**(vi) Phallomere**
(g) Genitalia	**(vii) Bone**

Solution:

Column I	**Column II**
(a) Compound epithelium	(iii) Skin
(b) Compound eye	(iv) Mosaic vision
(c) Septal nephridia	(v) Earthworm
(d) Open circulatory system	(ii) Cockroach
(e) Typhlosole	(i) Alimentary canal
(f) Osteocytes	(vii) Bone
(g) Genitalia	(vi) Phallomere

12. Mention the circulatory system of earthworms briefly.

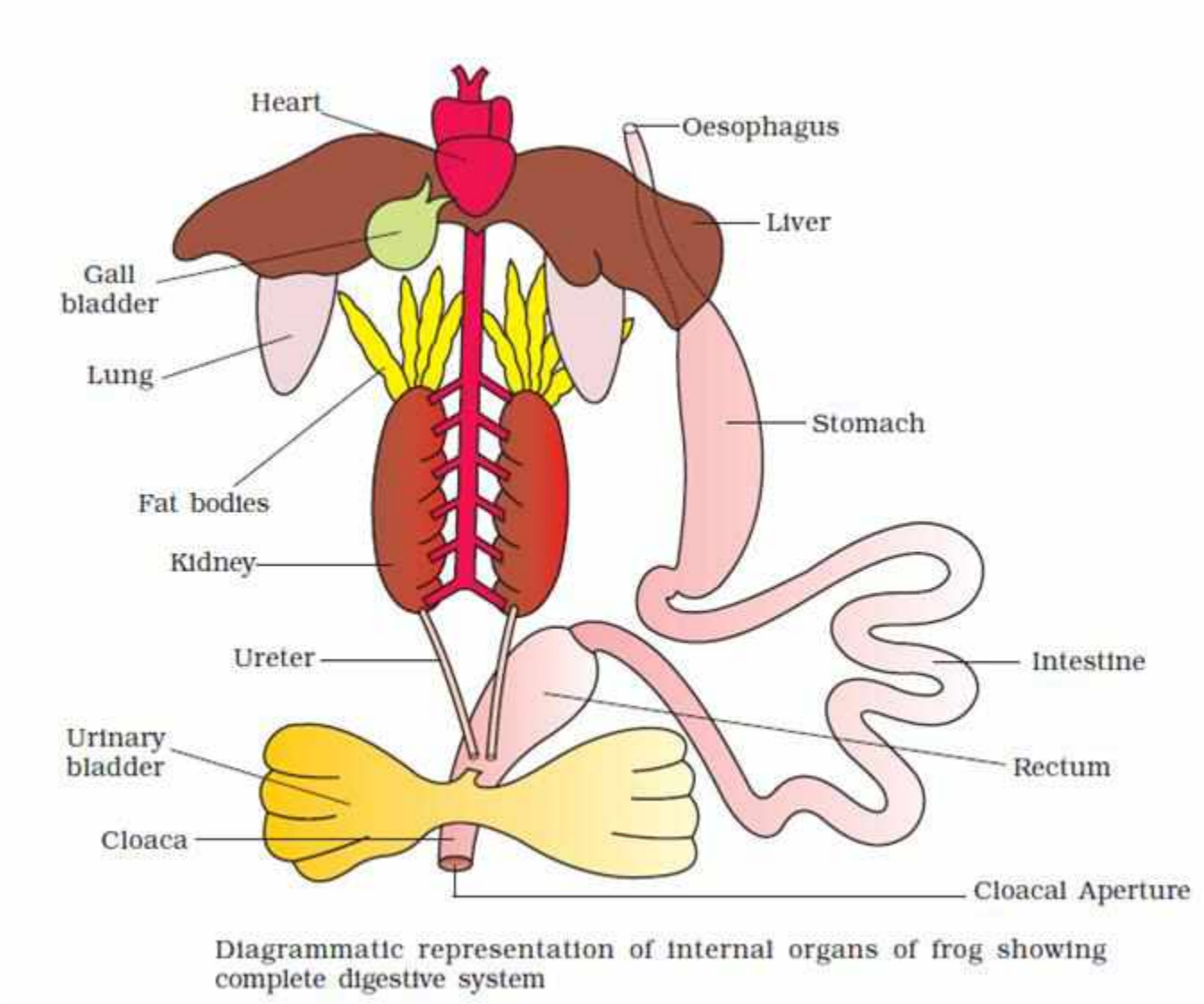
Solution:

- The earthworm has a closed circular system which comprises blood vessels, capillaries and the heart.
- In earthworms, blood is confined to the heart and blood vessels, as they have a closed circulatory system.
- Contraction keeps blood circulating in one direction.
- Blood glands are present on the 4th, 5th and 6th segments. They produce blood cells, haemoglobin, that are dissolved in the plasma of the blood.
- Blood cells are phagocytic.
- A specialised breathing system is absent; hence, the moist body surface helps in the respiratory exchange with their bloodstream

13. Draw a neat diagram of the digestive system of a frog.

Solution:

The diagram is as below.



Diagrammatic representation of internal organs of frog showing complete digestive system

14. Mention the function of the following (a) Ureters in frogs (b) Malpighian tubules (c) Body wall in earthworms

Solution:

1. Ureters in frog – Acts as a urinogenital duct which carries urine and sperm in the male frog.
2. Malpighian tubules – Malpighian tubules are excretory organs in cockroaches.
3. Body wall in earthworm – Helps in movement and burrowing