

MULTICELLULAR ORGANISMS



SYLLABUS CHECKLIST

This is the knowledge that you should understand upon completing this section:

5.1 CELLS, TISSUES, ORGANS AND SYSTEMS

- Multicellular organisms have a hierarchical structural organisation of cells, tissues, organs and systems.

5.2 RESPIRATORY SYSTEMS

- In animals, the exchange of gases between the internal and external environments of the organism is facilitated by the structure of the exchange surface/s including spiracles, gills, alveoli and skin.

5.3 DIGESTIVE SYSTEMS

- In animals, the acquisition and processing of nutrients is facilitated by the structures of the digestive system; animals may have a gastrovascular cavity with one opening or a specialised alimentary canal with two opening; specialisation of alimentary canals is related to diet, for example, herbivores and carnivores.

5.4 CIRCULATORY SYSTEMS

- In animals, the transport of materials within the internal environment for exchange with cells is facilitated by the structure of open and closed circulatory systems according to the different metabolic requirements of organisms and differing environments.

5.5 TRANSPORT IN VASCULAR PLANTS

- In vascular plants, gases are exchanged via stomata and the plant surface and does not involve the plant transport system.
- In vascular plants, transport of water and mineral nutrients from the roots occurs via xylem involving root pressure, capillary action transpiration (adhesion and cohesion of water molecules); transport of the products of photosynthesis and some mineral nutrients occurs by translocation in the phloem. Terrestrial Australian plants are adapted to minimize water loss in an arid environment.

5.1 CELLS, TISSUES, ORGANS AND SYSTEMS



Terminology

These are some of the terms from this section which you should know. Write the meaning of each term in the space provided.

(i) cell

(ii) organ

(iii) system

(iv) tissue

(v) vascular tissue

Review Questions

1. Place the following terms in order of their size and complexity: *organ, system, cell, tissue*.

2. What is meant by:

(i) cell differentiation?

(ii) cell specialization?

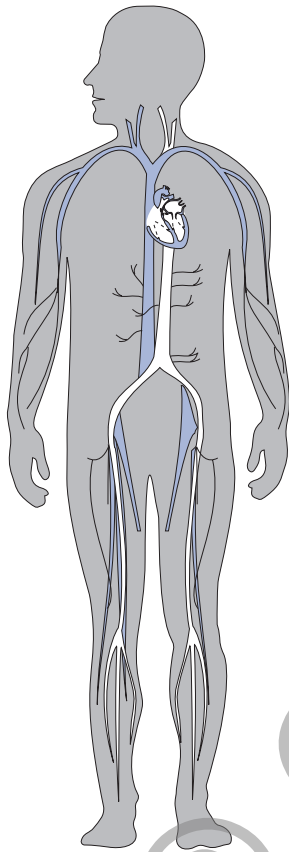
3. (i) Why is tissue which lines the windpipe different to that which lines the small intestine?

(ii) What are their respective functions?

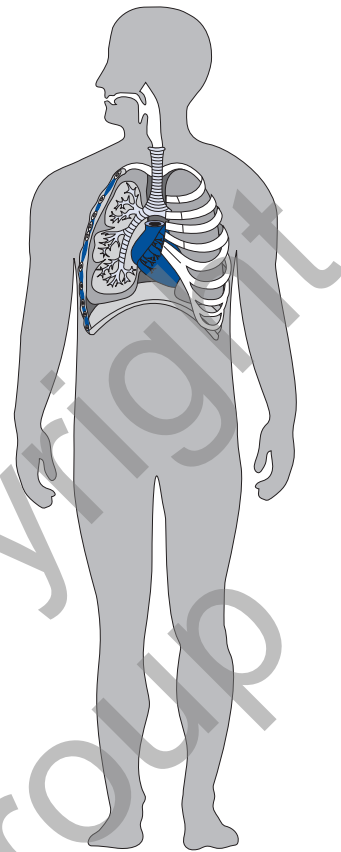
4. The table below refers to higher animals. Complete the blank spaces.

ORGAN SYSTEM	MAIN ORGANS	FUNCTION/S
(i) circulatory	heart, arteries, veins, arterioles, venules, capillaries	
(ii)	lungs, nose, nasal cavity, pharynx, trachea, bronchi, bronchioles	
(iii) digestive		
(iv)	cardiac, smooth and striated muscle	
(v)		protects soft tissue, anchors muscle, site for blood cell synthesis, stores fat, supports body
(vi) excretory		
(vii)	lymph vessels, lymph nodes	

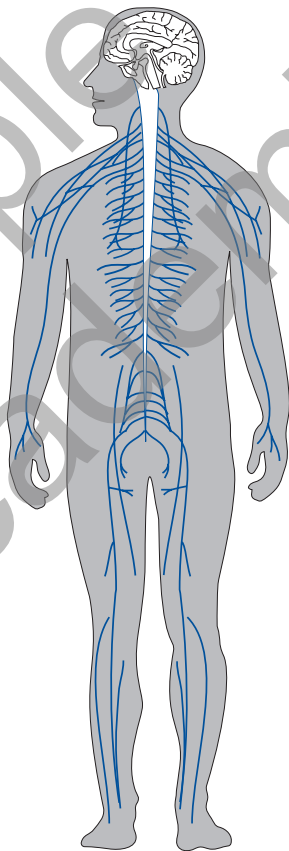
5. Name the system that is represented in each of the following diagrams:



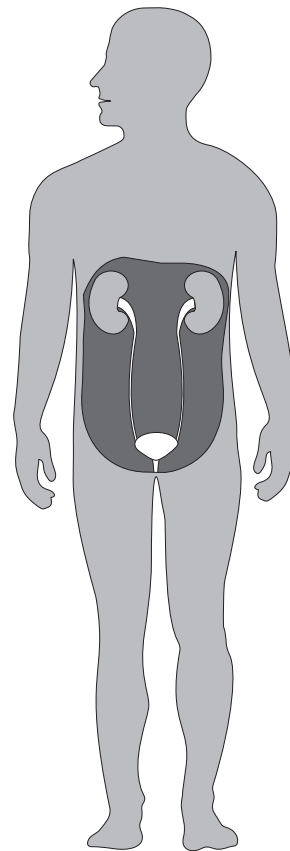
(i) _____



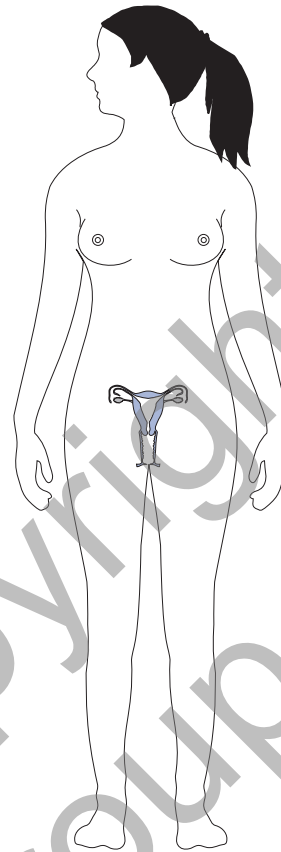
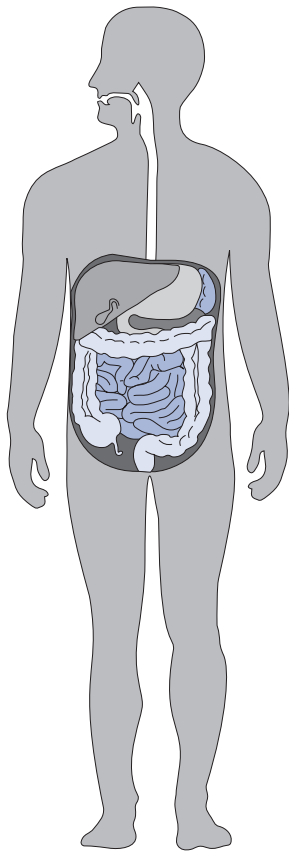
(ii) _____



(iii) _____

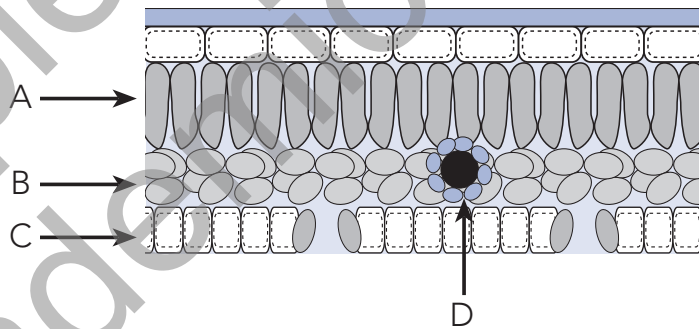


(iv) _____



(v) _____ (vi) _____

6. From the diagram below, name the tissues mark A-D and describe in the table how their cells are specialized to carry out particular functions.



TISSUE	NAME	CELL SPECIALIZATION
A		
B		
C		
D		

5.2 RESPIRATORY SYSTEMS



Terminology

These are some of the terms from this section which you should know. Write the meaning of each term in the space provided.

(i) alveolus

(ii) gas exchange

(iii) oxygenated

(iv) respiratory system

(v) spiracle

(vi) tracheal system

Review Questions

1. Two main gases are exchanged by animals' lungs and gills. Name these two gases.

(i) _____

(ii) _____

2. Which organisms exchange these gases using the following structures:

(i) moist skin

(ii) tracheal system

(iii) lungs

(iv) gills

3. (i) Why must the gills of a fish have a greater surface area than the lungs of a similarly sized mammal?

(ii) Why does oxygen diffuse from the water into the plasma in the gills of a fish?

(iii) Compare the gas exchange surfaces of insects and birds.

(iv) Why do respiratory surfaces need to remain moist?

(v) How do fish keep oxygenated water moving over their gills?

4. How are each of the following adapted to maximise their respiratory surface areas?

(i) mammals

(ii) amphibians

(iii) fish

5. (i) A microscopic protozoan has a large surface area to volume ratio. How does this assist the organism in obtaining oxygen and excreting carbon dioxide?

(ii) What problem with gaseous exchange would this organism have if it were to continue to grow to the size of a human?

5.3 DIGESTIVE SYSTEMS



Terminology

These are some of the terms from this section which you should know. Write the meaning of each term in the space provided.

(i) alimentary canal

(ii) carnivore

(iii) cnidaria

(iv) detrivore

(v) herbivore

(vi) insectivore

(vii) omnivore

(viii) parasite

(ix) rectum

(x) ruminant

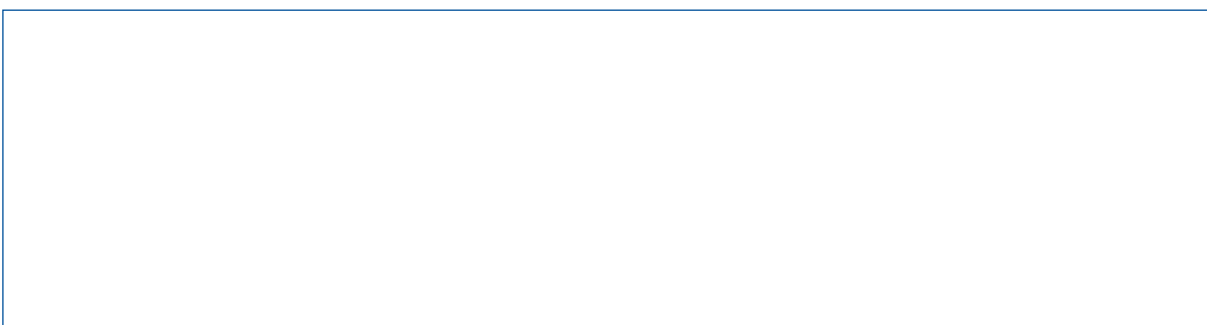
Review Questions

1. (i) What is digestion?

(ii) Why is digestion necessary?

2. (i) Name the two animal phyla that have a gastrovascular cavity.

(ii) Draw a simple sketch of either phyla's gastrovascular cavity in the space below.



(iii) How does this differ from the alimentary canal of higher animals?

3. (i) Animals can be classified according to what they eat. Which animal group would consume the most protein? Explain.

(ii) Which animal group would consume the most carbohydrates? Explain.

4. All animals need the six types of nutrients: **water, carbohydrates, fats, protein, minerals and vitamins**. The proportion of each type of nutrient in the diet varies according to the species to which the animal belongs. Complete the following with the appropriate food types.

(i) Animals that eat only plant matter obtain most of their energy from:

(ii) Animals that eat only meat obtain most of their energy from:

5. Because different animals consume different foods, their digestive tracts need to be specialized.

(i) Why is the carnivore's digestive tract comparatively shorter and less complex than a herbivore's?

(ii) What special role does the microflora in an herbivores gut play in their digestive process?

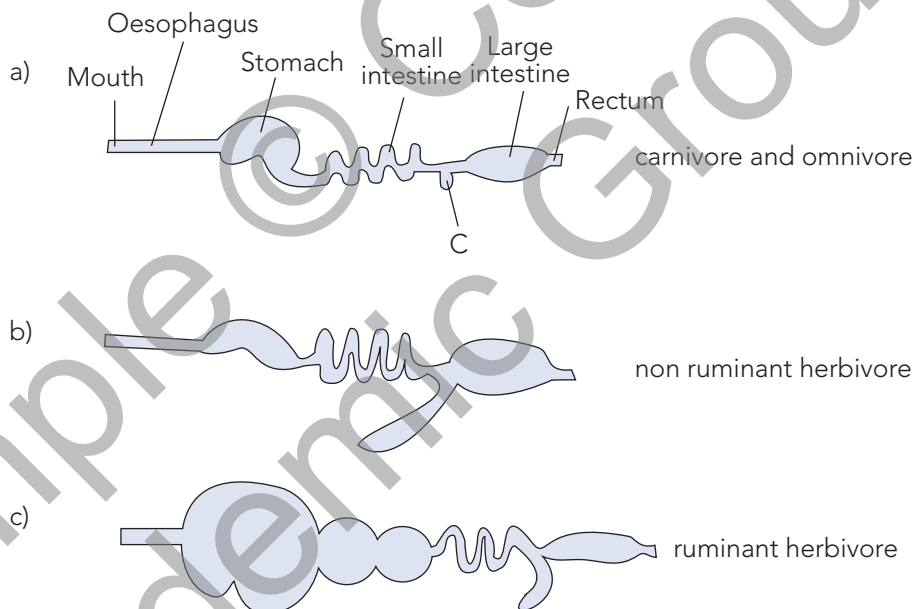
(iii) Name two examples of ruminant herbivores and two examples of non ruminant herbivores.

(iv) Describe the difference in digestive processes between ruminant and non-ruminant herbivores.

(v) Which is the most efficient? Explain.

(vi) What is similar in their digestive process?

6. Study the generalized diagrams below then answer the questions that follow:



(i) What is the main structural difference between the ruminant and the non ruminant alimentary canals? Explain.

(ii) The carnivore and omnivore alimentary canals are similar. How do they differ structurally from the herbivores? Explain.

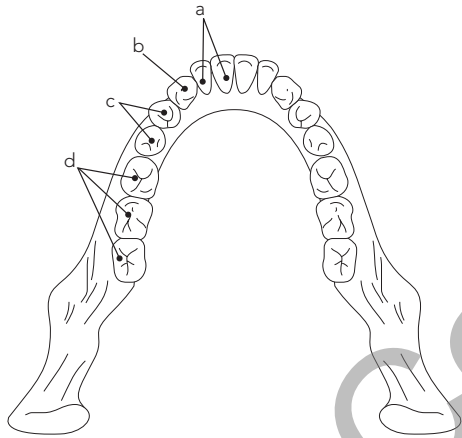
7. What are the chemical 'building blocks' of the following organic compounds?

(i) carbohydrates _____

(ii) lipids _____

(iii) proteins _____

8. (i) Label the four tooth types shown.



a _____

b _____

c _____

d _____

(ii) What type of digestion do the teeth carry out? _____

(iii) How is physical digestion different to chemical digestion?

(iv) What is the function of physical (or mechanical) digestion?

(v) Explain why the human dental formula is written as $\frac{2\ 1\ 2\ 3}{2\ 1\ 2\ 3}$.

(vi) The dental formula of a sheep is $\frac{0\ 0\ 3\ 3}{3\ 1\ 3\ 3}$. Describe the teeth in the sheep's upper and lower jaw.

(vii) The sheep has a tough pad where its upper incisors would be expected. Explain how this may help it eat grass.

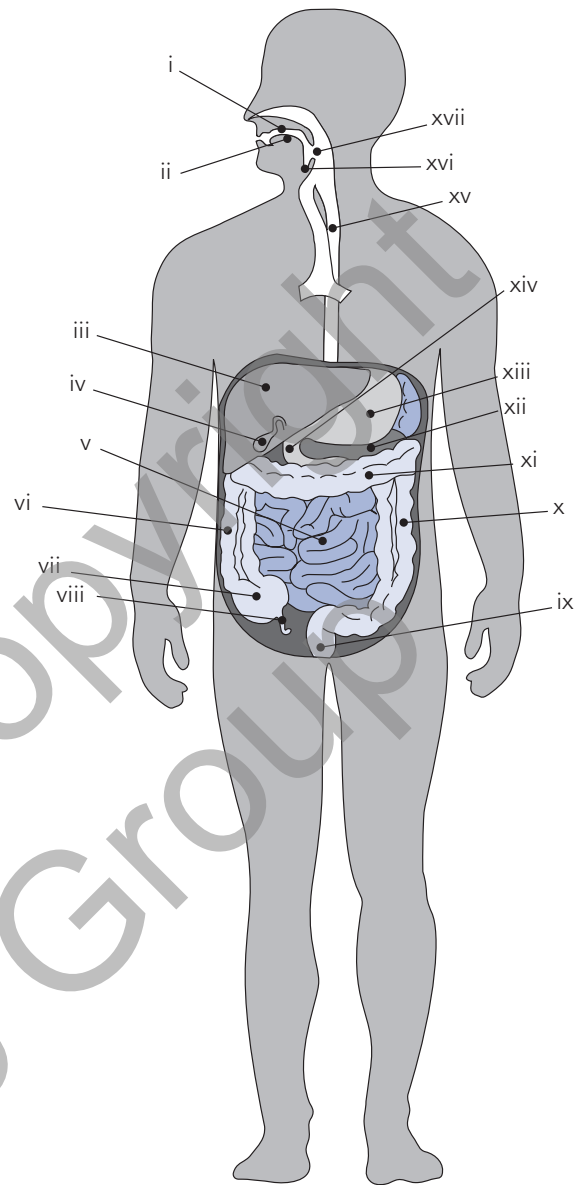
(viii) How are the sheep's molars and premolars adapted for its diet?

(ix) The dental formula of a domestic cat is $\frac{3\ 1\ 3\ 1}{3\ 1\ 2\ 3}$. Describe the teeth in the cat's upper and lower jaw.

(x) What are carnassial teeth and what is their function?

9. Label the diagram of the alimentary canal and its associated organs.

- i _____
- ii _____
- iii _____
- iv _____
- v _____
- vi _____
- vii _____
- viii _____
- ix _____
- x _____
- xi _____
- xii _____
- xiii _____
- xiv _____
- xv _____
- xvi _____
- xvii _____



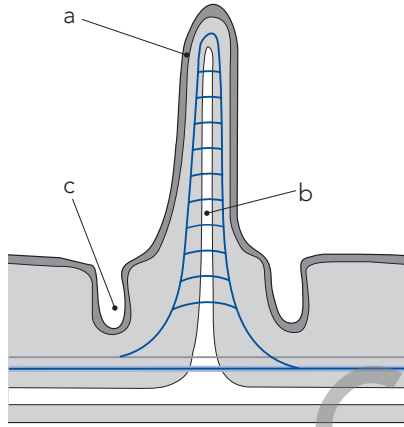
10. Name the part/s of the alimentary canal that is/are involved in:

- (i) Secretion of enzymes _____
- (ii) Absorption of nutrients _____
- (iii) Peristalsis _____
- (iv) Defecation _____

11. (i) Explain the role of the circulatory system in absorbing and transporting nutrients.

(ii) Explain the role of lymphatic system in absorbing and transporting nutrients

12. (i) The diagram below shows a single villus. Label the parts shown.



a _____
b _____
c _____

(ii) Where are villi found in the digestive system?

(iii) Why are the villi so small and so numerous?
