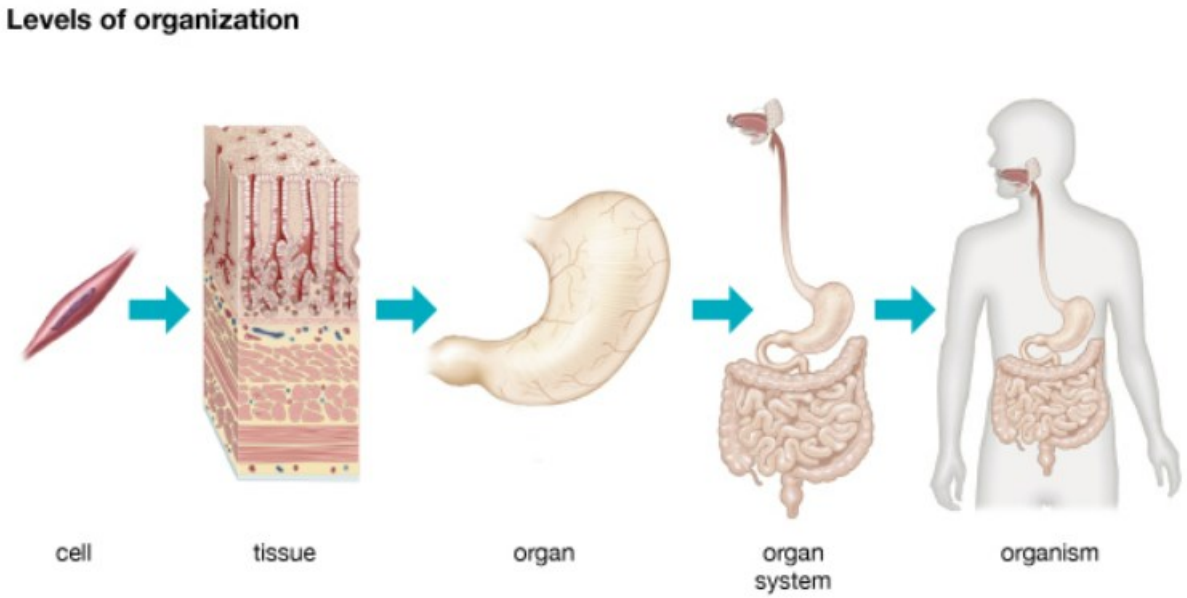
# Principles of Organisation




Name:

**Principles of Organisation**

Cells are the basic building blocks of all living organisms. Unicellular and simple multicellular organisms carry out all the exchanges they need across the cell membranes.

Large multicellular organisms may contain billions of cells and they have to overcome the problems linked to their size.

They have evolved different ways of exchanging materials. During the development of multicellular organisms, cells differentiate becoming specialised to carry out particular jobs. However, the adaptations of multicellular organisms go beyond specialised cells. Similar specialised cells are often found grouped together to form a tissue.

**Tissues**

A tissue is a group of similar cells with a similar structure and function working together. For example, muscular cells can contract to bring about movement. Glandular tissues contain secretory cells that can produce and release substances such as enzymes and hormones. Epithelial tissue covers the outside of your body as well as your internal organs.

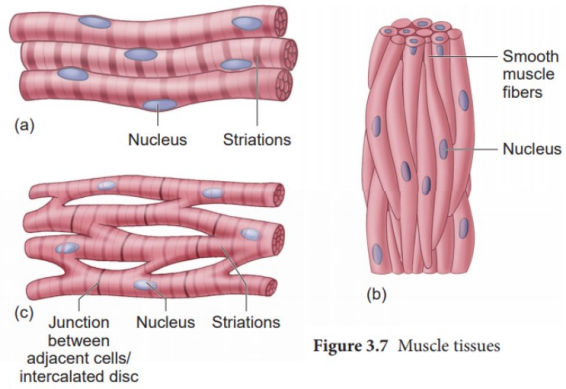
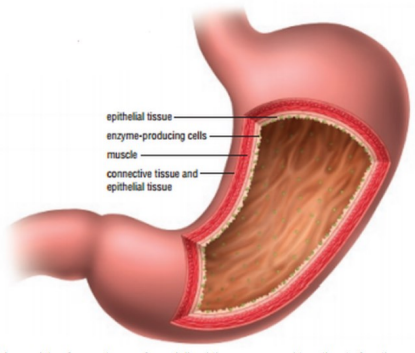


Figure 3.7 Muscle tissues

**Organs**

Organs are collections of tissues. Each organ contains several tissues working together to perform a specific function.



The stomach consists of many types of specialized tissues grouped together to function as an organ.

For example, the stomach is an organ involved in the digestion of food. It contains:

⇒ Muscular tissue to churn the food and digestive juices of the stomach together

⇒ Glandular tissue to produce the digestive juices that break down food

⇒ Epithelial tissue which covers the inside and the outside of the organ.

The pancreas is an organ that has two important functions. It makes hormones to control blood sugar as well as some of the enzymes that digest food. It contains two very different types of tissue, which produce these different secretions.

**Organ Systems:**

A whole multicellular organism is made up of a number of organ systems working together. Organ systems are groups of organ systems that work together to form specific functions.

The way in which one organ functions often depends other organs in the system. Organ systems work together to form organisms.

Organ systems within the human body include the digestive system, respiratory system and the gas exchange system.

All of these systems have adaptations in some of their organs that make them efficient exchange systems. These adaptations include features to increase the surface area of a part of an organ system, a rich blood supply to areas where exchange takes place, areas with short diffusion distances for exchange and mechanisms to increase the concentration gradients by ventilating surfaces or moving materials on.

**Deliberate Practice**

Use the information on the previous pages to help you to complete the following tasks.

1. Define the word tissue:

_____

_____ [1 mark]

2. Define the word organ:

_____

_____ [1 mark]

3. For each of the following, state whether they are a specialised cell, a tissue or an organ. Explain your answers.

Sperm: _____

Explanation: _____

_____ [2 marks]

Kidney: _____

Explanation: _____

_____ [2 marks]

Stomach: _____

Explanation: _____

_____ [2 marks]

4. Describe how the stomach is adapted for its role in the digestion of food.

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____ [5 marks]

PPQs

## Q1.

This question is about organisation in living organisms.

(a) Write the biological structures from the box in the correct size order.

| cell | nucleus | organ | tissue |
|---|---|---|---|

Smallest

_____

_____

_____

Largest

_____

**(3)**

(b) Name **one** animal organ.

_____

**(1)**

(c) Which is a plant tissue?

Tick (✓) **one** box.

Flower ☐

Leaf ☐

Phloem ☐

Root ☐

**(1)**

## Q2.

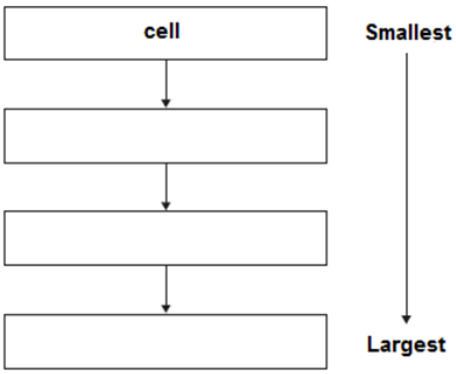
The human body is organised to carry out many different functions.

(a) Use words from the box to complete **Figure 1** by putting the parts of the body in order of size from smallest to largest.

The smallest one has been done for you.

| cell | organ system | organ | tissue |
|---|---|---|---|

**Figure 1**




**(2)**

(b) The stomach is made of different types of tissue.

Draw **one** line from each type of stomach tissue to the correct description.

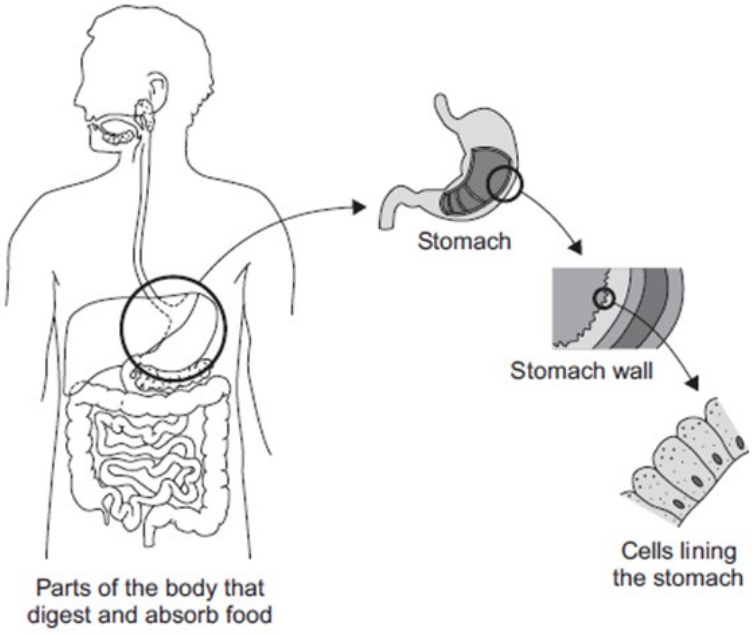
| | |
|---|---|
| Epithelial tissue | Allows food to be churned around the stomach |
| Glandular tissue | Covers the outside and the inside of the stomach |
| Muscular tissue | Produces digestive juices |
| | Coordinates nerve impulses |

**(3)**

**Q3.**

The diagram below shows the parts of the body that digest and absorb food.

It also shows some details about the structure of the stomach.




(a) Complete the table to show whether each structure is an organ, an organ system or a tissue.

For each structure, tick (✓) **one** box.

| **Structure** | **Organ** | **Organ system** | **Tissue** |
|---|---|---|---|
| Stomach | | | |
| Cells lining the stomach | | | |
| Mouth, oesophagus, stomach, liver, pancreas, small and large intestine | | | |

**(2)**

(b) Draw **one** line from each part of the human body to its correct scientific name.

| **Part of human body** | **Scientific name** |
| --- | --- |
| Layer of cells lining the stomach | An organ |
| Stomach | An organism |
| Mouth, stomach, intestines, liver and pancreas | An organ system |
| | A tissue |

**(3)**

**Pivot Question:**

Why don't single celled organisms require organ systems to exchange substances with the environment?

_____

_____

_____

_____

_____

_____