

**1. A higher level of organization exhibits emergent properties when:**

- a) Its parts function independently
- b) The sum of its parts is greater than the whole
- c) The individual parts are more important than the whole
- ✓ d) Its parts interact to perform more functions

🔑 **Explanation:** Emergent properties arise when all parts of a system **work together** to perform complex tasks that individual parts **cannot perform alone**.

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**2. Which of the following demonstrates the levels of organization of the body, from simplest to most complex?**

- a) Cell – Organ – Tissue – Organelle – Organ system
- ✓ b) **Organelle – Cell – Tissue – Organ – Organ system**
- c) Tissue – Organelle – Organ – Cell – Organ system
- d) Cell – Organelle – Organ system – Tissue – Organ

🔑 **Explanation:** Biological organization increases in this order:  
**Organelle → Cell → Tissue → Organ → Organ system.**

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**3. At which level of organization gas exchange occurs between body and environment?**

- a) Organelle level in mitochondria
- b) Cellular level in alveolar cells
- c) Tissue level in epithelial tissues
- ✓ d) **Organ system level in the respiratory system**

🔑 **Explanation:** Gas exchange ( $O_2$  &  $CO_2$ ) mainly occurs through the **respiratory system**, especially in **lungs**.

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**4. The epithelial tissue in the stomach wall is responsible for producing:**

- a) Mucus
- b) Pepsinogen
- c) Hydrochloric acid
- ✓ d) **All of these**

🔑 **Explanation:** The stomach's epithelial lining includes different cells producing **mucus**, **enzymes like pepsinogen**, and **HCl**.

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**5. In the wall of stomach, which tissue also contains blood vessels and nerves?**

- a) Epithelial
- b) Muscle
- ✓ c) **Inner connective**

d) Outer connective

🦋 *Explanation:* **Connective tissue** supports and binds other tissues and contains **blood vessels and nerves**.

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**6. In a leaf, which tissue is responsible for photosynthesis?**

a) Xylem

✓ **b) Mesophyll**

c) Epidermis

d) Phloem

🦋 *Explanation:* **Mesophyll cells**, especially **palisade layer**, are rich in chloroplasts and perform **photosynthesis**.

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**7. What is the primary function of spongy tissue in a leaf?**

a) To transport sugars to other parts

b) To transport water to leaf

✓ **c) To synthesize chlorophyll**

d) To control the opening and closing of stomata

🦋 *Explanation:* **Spongy mesophyll** contains **chloroplasts** and performs photosynthesis; it also aids in gas exchange.

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**8. Which of these is a function of the human skeletal system?**

✓ **a) Storing minerals and producing blood cells**

b) Removing carbon dioxide from blood

c) Filtering blood to remove waste products

d) Breaking down food for energy

🦋 *Explanation:* Skeletal system **supports the body, stores calcium**, and produces **blood cells in bone marrow**.

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**9. Which structures are responsible for the transport of food in plant body?**

a) Xylem tissue

b) Palisade mesophyll

✓ **c) Phloem tissue**

d) Spongy mesophyll

🦋 *Explanation:* **Phloem** transports **glucose and other food materials** from leaves to rest of the plant.

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**10. In a plant, which of the following is the primary function of the flower?**

- a) Transporting water and minerals
- b) Supporting leaf growth
- ✓ c) **Facilitating reproduction through pollination**
- d) Regulating gas exchange

✎ *Explanation:* Flowers help in **reproduction** through **pollination**, leading to formation of fruits and seeds.

**1. Enlist the levels of organization from cells to organ systems.**

✓ **Answer:**

Cell → Tissue → Organ → Organ System → Organism

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**2. What are the major roles of the epithelial tissue present in the stomach?**

✓ **Answer:**

- Secretes mucus to protect stomach lining
  - Produces digestive enzymes and hydrochloric acid
  - Absorbs nutrients and water
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**3. How do the smooth muscles contribute to the stomach's function?**

✓ **Answer:**

Smooth muscles help in **mixing and pushing food** (peristalsis), aiding digestion by contracting rhythmically.

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**4. What is the function of the palisade mesophyll in the leaf?**

✓ **Answer:**

Performs **photosynthesis** due to presence of chloroplasts; it absorbs sunlight effectively.

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**5. What is the role of the shoot system in plants?**

✓ **Answer:**

- Supports the plant above ground
  - Performs photosynthesis (leaves)
  - Bears flowers for reproduction
  - Transports water and food
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## 6. What is homeostasis, and why is it important for organisms?

✓ **Answer:**

Homeostasis is the **maintenance of a stable internal environment**. It is essential for survival and proper functioning of cells and organs.

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## 7. How does the human body maintain a stable internal temperature?

✓ **Answer:**

Through **thermoregulation** – e.g., sweating to cool down, shivering to generate heat, and blood flow regulation by the skin.

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## 8. Differentiate between the following:

### i. Tissue and organ

- **Tissue:** Group of similar cells performing a function.
- **Organ:** Structure made of different tissues working together.

### ii. Root system and shoot system

- **Root system:** Below ground, anchors plant and absorbs water/minerals.
- **Shoot system:** Above ground, supports, photosynthesizes, and reproduces.

### iii. Epidermal and mesophyll tissue

- **Epidermal:** Outer protective layer of leaf.
- **Mesophyll:** Inner tissue that performs photosynthesis.

### iv. Palisade and spongy mesophyll

- **Palisade mesophyll:** Tightly packed cells, rich in chloroplasts, absorb light.
- **Spongy mesophyll:** Loosely arranged cells, allow gas exchange.

## C. Write answers in detail:

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### 1. Explain the levels of organization in multicellular organism. How does each level contribute to the overall function of an organism?

✓ **Answer:**

- **Cell:** Basic unit of life (e.g., muscle cell)
- **Tissue:** Group of similar cells (e.g., muscle tissue)

- **Organ:** Structure made of different tissues (e.g., heart)
  - **Organ system:** Group of organs performing a function (e.g., circulatory system)
  - **Organism:** A complete living individual.
- Each level builds upon the previous one to ensure proper growth, function, and survival.
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## 2. What is a tissue level? Explain the major tissues.

✓ **Answer:**

Tissue level is the second level of organization where similar cells perform a specific function.

**Major tissues:**

- **Epithelial tissue:** Covers body surfaces and lines organs.
  - **Connective tissue:** Supports and binds tissues (e.g., blood, bone).
  - **Muscle tissue:** Causes movement.
  - **Nervous tissue:** Transmits nerve impulses.
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## 3. Describe the tissue composition of the stomach. How does each tissue contribute to digestion?

✓ **Answer:**

- **Epithelial tissue:** Secretes digestive enzymes and acid, protects inner lining.
  - **Muscle tissue:** Performs mixing of food by contraction (peristalsis).
  - **Connective tissue:** Supports and binds other tissues; contains blood vessels and nerves.
  - **Nervous tissue:** Controls contractions and secretions.
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## 4. Describe the tissue composition of the leaf. How does each tissue contribute to the function of the leaf?

✓ **Answer:**

- **Epidermal tissue:** Protective outer layer, reduces water loss.
  - **Mesophyll tissue:** Contains palisade (photosynthesis) and spongy cells (gas exchange).
  - **Vascular tissue:** Xylem transports water, phloem transports food.
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## 5. How do the organ systems come together to form the human body?

✓ **Answer:**

Different organ systems like digestive, circulatory, respiratory, nervous, etc., work together to perform complex life functions.

They are **interdependent** and coordinate to maintain the **survival and balance** of the body.

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**6. Describe the role of the digestive system and the excretory system in homeostasis.**

✓ **Answer:**

- **Digestive system:** Breaks down food into nutrients; provides energy.
  - **Excretory system:** Removes waste materials like urea and maintains water and salt balance.
- Both systems maintain internal balance and prevent toxic buildup.
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**7. Explain the functions of various plant organs.**

✓ **Answer:**

- **Root:** Anchors plant, absorbs water and minerals.
  - **Stem:** Supports plant, transports substances.
  - **Leaves:** Perform photosynthesis and gas exchange.
  - **Flower:** Reproduction.
  - **Fruit:** Protects seeds and helps in seed dispersal.
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**8. Describe the structure and function of the plant root system.**

✓ **Answer:**

- **Structure:** Tap root or fibrous roots with root hairs.
  - **Function:** Anchors the plant, absorbs water and minerals, and stores food.
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**9. Define homeostasis and explain its importance. Discuss how different organ systems work together to maintain homeostasis.**

✓ **Answer:**

**Homeostasis** is the maintenance of a **constant internal environment**.

It is essential for cell function and survival.

**Examples:**

- **Nervous + Endocrine systems** regulate body temperature and glucose.
  - **Excretory + Respiratory systems** remove wastes and maintain pH.
  - All systems cooperate to maintain stable internal conditions.
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**10. Describe how the respiratory and circulatory systems work together to maintain homeostasis of oxygen and carbon dioxide levels.**

✓ **Answer:**

- **Respiratory system** brings in oxygen and removes carbon dioxide.
  - **Circulatory system** transports oxygen to cells and brings CO<sub>2</sub> back to lungs.
- This coordination ensures **stable oxygen and pH levels**, maintaining homeostasis.
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#### **D. Inquisitive Questions:**

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**1. How does the structure of epithelial tissue relate to its function in different parts of the body?**

✓ **Answer:**

Epithelial tissue varies in structure based on function:

- **Flat cells (squamous):** For diffusion (lungs).
  - **Columnar cells:** Secretion and absorption (intestine).
  - **Ciliated epithelium:** Moves mucus (trachea).
- Structure supports role in **protection, secretion, absorption, and filtration**.
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**2. Evaluate the importance of organ systems working in harmony and predict the consequences of a failure in one system on the others.**

✓ **Answer:**

All organ systems are **interconnected**.

For example:

- If the **respiratory system fails**, oxygen supply drops → **circulatory and muscular** systems suffer.
  - If **kidneys fail**, toxins build up → affects **nervous, cardiovascular, and digestive** systems.
- Harmony is essential for maintaining homeostasis and life.