

## Organization and Components of the Human Body



## A1 – Introduction to Health Science 12

### Student Achievement Indicators

At the end of this learning outcome students should be able to:

- Explain the meaning of “health”
- Understand the levels of organization in the human body
- Define the term anatomical position
- Define the directional terms used to describe structural features of the body
- Describe the major body regions
- Describe the four common planes used in sectioning the body or organs.
- Describe the two major cavities of the body
- Explain the meaning of homeostasis

## Introduction to Anatomy & Physiology

**Anatomy** – studies the structures of the body

**Physiology** – describes how the body works and how it relates to structure

**Pathophysiology** – describes the improper functioning of body parts.

- Shows what happens to the body when affected by disease

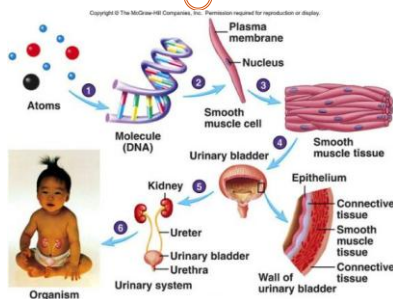
## Body's Level of Organization

- cells → tissue (groups of specialized cells) → organs (similar tissues) → organs → organ systems → organisms

### Example

- kidneys cells → kidney tissue → kidney → urinary system → human

## Body's Level of Organization



## Organ & Organ Systems

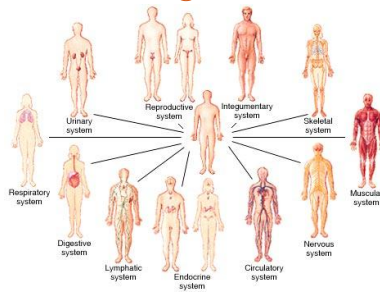
**Organ** - is a group of tissues arranged to accomplish a specific task.

**Organ system** - is a group of organs that function together to perform a specific task.

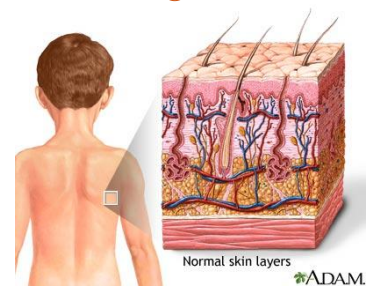
### Example

- In the circulatory system the heart is an organ that pumps blood. The blood vessels are organs that receive the blood. The heart distributes it through the body

## Major Organ Systems



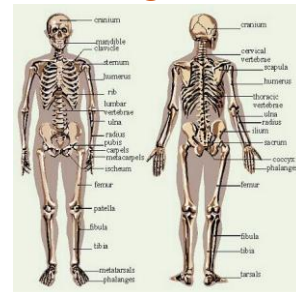
## Integumentary System



## Integumentary System

- Made up of skin and related structures; such as hair and nails.
- This system covers the entire body, and helps regulate body temperature.
- This system also contains some structures that are essential for sensation (“feeling”).

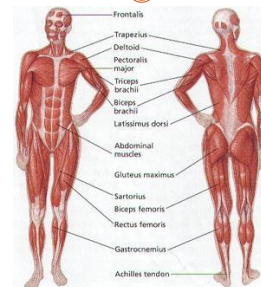
## Skeletal System



## Skeletal System

- Forms the basic framework of the body.
- Consists of bones, joints and cartilage.
- This system protects and supports body organs.

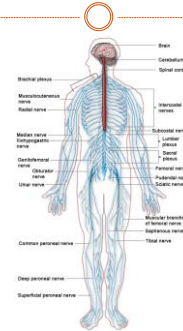
## Muscle System



## Muscle Systems

- A system that contains three types of muscles:
  - skeletal muscle – attaches to bone and is responsible for skeleton movement and the maintenance of body posture.
  - The other two types of muscle are found in organs and function in movement.

## Nervous System



## Nervous System

- Consists of the brain, spinal cord, nerves and sensory organs.
  - Sensory nerves receive information from the environment and bring it to the spinal cord and brain.
  - The brain then sends the information to the body.
- Example
- When you touch a hot stove, sensory receptors in your hand send a message to your brain. Your brain then sends a message to your hand to pull back.

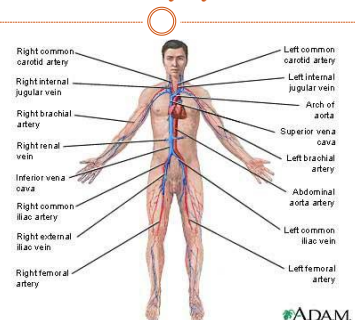
## Endocrine System



## Endocrine System

- Consists of numerous glands that secrete hormones and chemical substances that regulate body functions, such as growth, reproduction and water balance.

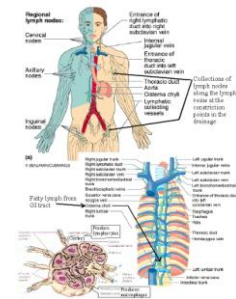
## Circulatory System



## Circulatory System

- Consists of the heart and blood vessels.
- This system pumps blood through the body.
- Blood carries oxygen and nutrients to all cells and carries wastes away from cells.

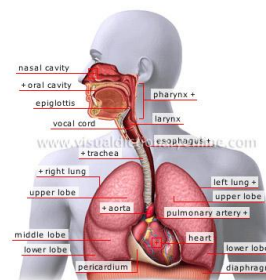
## Lymphatic System



## Lymphatic System

- Consists of lymph nodes, lymphatic vessels, lymph and other lymphoid organs.
- This system functions to protect the body (immune system).

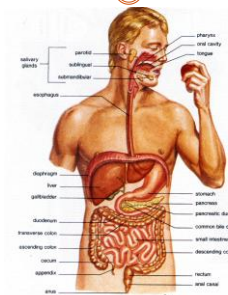
## Respiratory System



## Respiratory System

- Consists of lungs and other structures that conduct air to and from the lungs.
- Oxygen moves to the lungs and carbon dioxide away from the lungs.

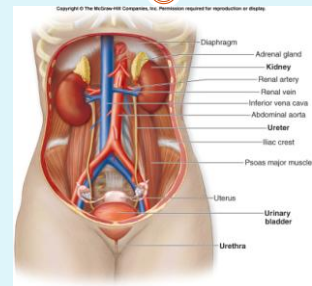
## Digestive System



## Digestive System

- Consists of organs designed to eat and breakdown food, so that it can be used by the body.
- This system functions to absorb food and eliminate wastes.

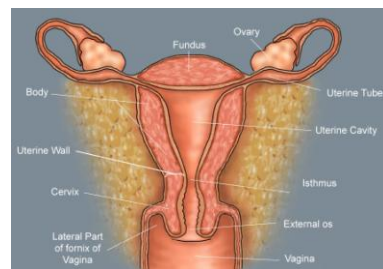
## Urinary System



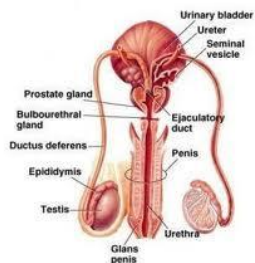
## Urinary System

- Consists of kidneys and other structures that help excrete waste products from the body through urine.
- This system helps control the amount and composition of water and other substances in the body.

## Female Reproductive System



## Male Reproductive System



## Reproductive System

- Contains the reproductive organs

## Homeostasis

- Is the body's ability to maintain a stable internal environment despite changes in the external environment.

### Example

- Body temperature is 37°C despite changes in the environmental temperature.
- Body has approx. 100 homeostatic mechanisms that help maintain homeostasis.

## Homeostasis

- These mechanisms help maintain temperature, oxygen levels, water balance and plasma levels in the blood.
- When a homeostatic mechanism is not functioning properly, a disease can occur.
- Homeostatic imbalance = disease

## Anatomical Terms

- Terms used to describe the location, position and regions of body parts.
- **Anatomical position** – is when the body is standing upright, face forward, arms at the sides, with toes and palms of hands facing forwards.
- **Superior** – a part that is above another body part, or closer to the head.

Example – the head is superior to the abdomen

Example – shoulders are superior to legs

## Anatomical Terms

- **Inferior** – means a part that is located below another part or closer to the feet.  
Example – the chest is inferior to the head
- **Anterior** – means towards the front surface (belly surface).  
Example – the head is anterior to the spinal cord
- **Posterior** – means towards the back.  
Example – the heart is posterior to the breast bone
- Another word for anterior is ventral, and another word for posterior is dorsal.

## Anatomical Terms

- **Medial** – the body can be divided down the middle; into left and right halves.  
○ *Medial means towards the midline of the body.*  
Example – the nose is medial to the ears.
- **Lateral** – means away from the midline of the body.  
Example – the ears are lateral to the nose.
- **Proximal** – means that structure or body part is nearer the trunk (main part) of the body or is closer to the point of attachment.  
Example – the elbow is proximal to the wrist, while the wrist is proximal to the fingers.

## Anatomical Terms

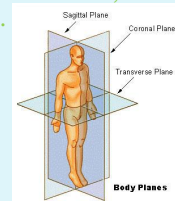
- **Distal** – means that the part is farther away from the trunk or point of attachment.  
Example – the wrist is distal to the elbow
- **Superficial** – the part is located on or near the surface of the body.  
Example – the skin is superficial to the muscles
- **Deep** – means the body part is away from the surface.  
Example – bones are deep to skin

## Anatomical Terms

- **Central** – means the part is located towards the centre.  
Example – the heart is located centrally
- **Peripheral** – means that the part is located away from the centre.  
Example – blood vessels are located peripherally

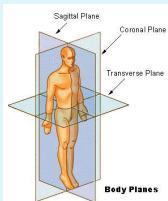
## Planes & Sections of the Body

- **Sagittal plane** – divides the body lengthwise into right and left portions.
  - If the division is directly down the midline, it is known as a midsagittal section.



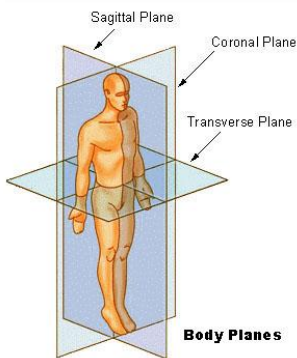
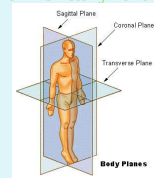
## Planes & Sections of the Body

- **Frontal plane** – divides the body into anterior (ventral) and posterior (dorsal) portions.
  - The frontal plane is called the coronal plane.



## Planes & Sections of the Body

- **Transverse plane** – divides the body horizontally creating an upper (superior) portion and a lower inferior portion.
  - When an organ or body is cut horizontally it is known as a cross section.



## Regional Terms

- Terms used to describe the anterior side:
  - Abdominal** – anterior trunk, just below the ribs
  - Antecubital** – are in front of the elbows
  - Axillary** – armpit
  - Brachial** – arm
  - Buccal** – cheek
  - Cephalic** – neck region
  - Cervical** – neck region
  - Cranial** – nearer the head

## Regional Terms

**digital** – fingers and toes  
**femoral** – thigh area  
**inguinal** – area where the thigh meets the trunk  
**Oral** – mouth  
**Orbital** – area around the eye  
**Patellar** – area in front of the knees  
**Pedal** – foot  
**Pubic** – genital area  
**Sternal** – middle of the chest  
**Umbilical** – navel

## Regional Terms

- *Terms used on the posterior side:*
- **Caudal** – nearer to the lower region of the spinal column (near the tailbone)
- **Deltoid** – rounded area of shoulder closest to the upper arm.
- **Gluteal** – buttocks
- **Lumbar** – area of the back between the ribs and hips
- **Occipital** – back of head
- **Popliteal** – behind, or back of knee area
- **Scapular** – shoulder blade area

## Cavities of the Body

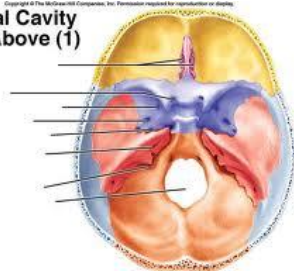
- Organs are located within body cavities.
- Cavities are large internal spaces.
- There are two major cavities:
  - **Dorsal cavity** – made up of 2 divisions, the spinal (vertebral) cavity and the cranial cavity.
  - **Ventral cavity** – made up of 2 divisions; the thoracic cavity and abdominopelvic cavity.

## Dorsal Cavity

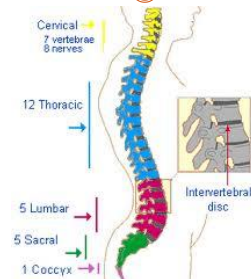
- **Cranial cavity** – located within the skull and contains the brain.
- **Spinal (vertebral) cavity** – extends downward from the cranial cavity and is surrounded by bony vertebrae.
  - *The cavity contains the spinal cord.*
- These two areas form one continuous space

## Cranial Cavity

**Cranial Cavity from Above (1)**



## Spinal Cavity

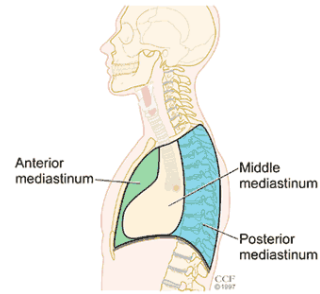




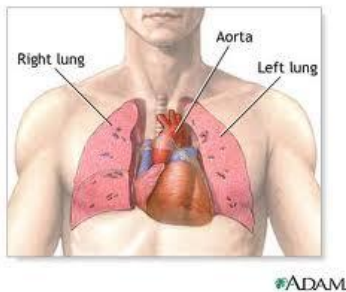
## Ventral Cavity

- **Thoracic Cavity** – is surrounded by the ribcage and is separated from the abdominopelvic cavity by the diaphragm.
  - The thoracic cavity is located above the diaphragm.
  - The lungs occupy most of the space in the thoracic cavity.
  - Cavity is divided into two compartments by the mediastinum.
- **Mediastinum** - is a space that contains the heart, esophagus, trachea, thymus gland and the large blood vessels attached to the heart.

## Mediastinum



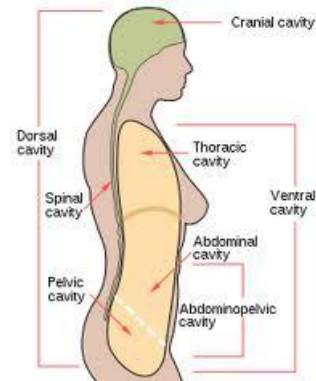
## Thoracic Cavity



## Ventral Cavity

- The right and left lung are located on either side of the mediastinum.
- **Abdominopelvic cavity** – is located below the diaphragm.
- The upper portion of the cavity is the abdominal cavity and it contains the stomach, most of the intestine, liver, gallbladder, pancreas, spleen and kidneys.
- The lower portion of the cavity is the pelvic cavity, and it contains the rectum, bladder and reproductive parts.

## Abdominopelvic Cavity



## Ventral Cavity

- The abdominopelvic cavity is divided into 4 quadrants:
  - Right upper quadrant (RUQ)
  - Left upper quadrant (LUQ)
  - Right lower quadrant (RLQ)
  - Left lower quadrant (LLQ)



## Ventral Cavity

- Each quadrant is further divided into 9 regions:
- Three central regions form top to bottom; epigastric, umbilical and hypogastric.
- Three right regions from top to bottom: right hypochondriac region, right lumbar region and right iliac region.
- Three left regions from top to bottom; left hypochondriac region, left lumbar region and left iliac region.

