

IDENTIFY THE BONES OF THE AXIAL AND APPENDICULAR SKELETONS AND STATE THEIR FUNCTIONS

DESCRIBE AND STATE THE STRUCTURE OF A TYPICAL VERTEBRA AND DESCRIBE AT LEAST ONE UNIQUE

CHARACTERISTIC OF VERTEBRAE, INCLUDING THE ATLAS AND AXIS

- Axial Skeleton: composed of the skull, the vertebral column and the thoracic cage
 - **Skull**: 22 bones are divided into those of the **braincase** and the **face**
 - ◆ Braincase encloses the cranial cavity, consists of 8 bones that immediately surround and protect the brain
 - ◆ 14 facial bones form the structure of the face (mandible forms the moveable joint with the rest of the skull)
 - Maxilla: upper jaw
 - Mandible: lower jaw
 - **Vertebral column**: central axis of the skeleton extending from base of skull to past the end of the pelvis
 - ◆ 7 cervical vertebrae:
 - Have very small bodies except for the atlas which has no body
 - First cervical vertebrae is the **atlas** as it holds up the head
 - **Allows for nodding of head (YES)**
 - Second cervical vertebrae is the **axis**
 - **Allows for shaking of the head (NO)**
 - ◆ 12 thoracic vertebrae: long spinous processes that are directed inferiorly
 - Extra articular facets that articulate with the ribs
 - ◆ 5 lumbar vertebrae: large thick bodies and carry large amount of weight
 - ◆ 1 sacral bone: **sacrum**
 - ◆ 1 coccyx bone: 4 fused vertebrae consisting of extremely reduced vertebral bodies
 - ◆ Can be easily broken
 - **Rib Cage**: protects the vital organs within the thorax and prevents the collapse of the thorax during respiration. Consists of thoracic vertebrae, ribs and sternum
 - ◆ Ribs: true ribs attach directly to the sternum whereas false ribs do not attach directly, instead, through a common cartilage
 - ◆ Sternum: breastbone, divided into three parts
- Appendicular Skeleton: consists of bones of upper and lower limbs as well as girdles
 - **Pectoral Girdle**: two scapulae and 2 clavicles which attach to the upper limb to the body
 - ◆ Scapula is a shoulder blade, flat triangular bone with three large fossae where muscles are attached
 - ◆ Clavicle is the collarbone and provides the attachment of the scapula to the rest of the skeleton. First bone to begin ossification
 - **Upper Limb**: arm, forearm, wrist and hand
 - ◆ Arm is the region between the shoulder and the elbow

- Contains the **humerus** which has a small rounded head, attaching to the scapula
- Epicondyles on the distal end of the humerus provide attachment sites for forearm muscles
- ◆ Forearm has two bones – ulna and radius (ulna is closer to pinky finger, radius to thumb)
- ◆ Wrist is composed of **eight carpal bones**
- ◆ Hand has **five metacarpal bones** i.e. each digit
 - Each finger composes of three small bones called **phalanges**
- **Pelvic Girdle:** two coxal bones and the sacrum attach to the body
- **Lower Limb:** thigh, leg, ankle and foot
 - ◆ Thigh: region between the hip and the knee
 - Single bone called **femur**
 - Head of femur articulates with coxal bones whereas distal end attaches to tibia
 - Patella is the knee cap
 - ◆ Leg: two bones, tibia and fibula
 - ◆ Ankle: seven tarsal bones
 - ◆ Foot: metatarsal bones and phalanges of the foot are similar to that of the hand

DESCRIBE RESPIRATORY VOLUMES AND PULMONARY FUNCTION TESTS

- **Spirometry** is the process of measuring volumes of air that move in and out of the respiratory system
- **Respiratory volumes** are measures of the amount of air movement during different portions of ventilation, whereas **respiratory capacities** are sums of two or more volumes
 - **Tidal volume:** volume of air inspired with each breath
 - **Inspiratory reserve volume:** amount of air that can be forcefully inhaled beyond the resting tidal volume
 - **Expiratory reserve volume:** amount of air that can be forcefully exhaled beyond the resting tidal volume
 - **Residual volume:** amount of air still remaining in passages after maximum expiration
- **Pulmonary function tests:** pulmonary function tests are a group of tests that measure how well the lungs take in and release air and how well they move gases such as oxygen from the atmosphere into the body's circulation.

TABLE 21.15 Homeostasis: Local Control of Blood Flow

Stimulus	Response
Regulation by Metabolic Need of Tissues	
Increased vasodilator substances (e.g., CO ₂ , lactic acid, adenosine, adenosine monophosphate, adenosine diphosphate, endothelium-derived relaxation factor, K ⁺ , decreased pH) or decreased nutrients (e.g., O ₂ , glucose, amino acids, fatty acids, and other nutrients) as a result of increased metabolism	Relaxation of precapillary sphincters and subsequent increase in blood flow through capillaries
Decreased vasodilator substances and a reduced need for O ₂ and other nutrients	Contraction of precapillary sphincters and subsequent decrease in blood flow through capillaries
Regulation by Nervous Mechanisms	
Increased physical activity or increased sympathetic activity	Constriction of blood vessels in skin and viscera
Increased body temperature detected by neurons of the hypothalamus	Dilation of blood vessels in skin (see chapter 5)
Decreased body temperature detected by neurons of the hypothalamus	Constriction of blood vessels in skin (see chapter 5)
Decrease in skin temperature below a critical value	Dilation of blood vessels in skin (protects skin from extreme cold)
Anger or embarrassment	Dilation of blood vessels in skin of face and upper thorax
Regulation by Hormonal Mechanisms (Reinforces Increased Activity of the Sympathetic Nervous System)	
Increased physical activity and increased sympathetic activity causing release of epinephrine and small amounts of norepinephrine from the adrenal medulla	Constriction of blood vessels in skin and viscera; dilation of blood vessels in skeletal and cardiac muscle
Autoregulation	
Increased blood pressure	Contraction of precapillary sphincters to maintain constant capillary blood flow
Decreased blood pressure	Relaxation of precapillary sphincters to maintain constant capillary blood flow
Long-Term Local Blood Flow	
Increased metabolic activity of tissues over a long period	Increased diameter and number of capillaries
Decreased metabolic activity of tissues over a long period	Decreased diameter and number of capillaries