

CLASS:IX.....
TOPIC:Chapter 1..... (The human Anatomy and Physiology)
TEACHER'S NAME:Ms. Kusum.....

Good Morning Students,

This lesson is of Class...IX...for the Subject...Physical Education..., Topic...Skeletal System...which is covered in Chapter...1... (The human Anatomy and Physiology) starting on Page No...17...of your Textbook...Physical Edu. & Sports...and is being submitted to you on [redacted] Health.

This voice is of Ms. Kusum.

If all students are ready then let us start with topic...Skeletal System...all of you please listen carefully as I will be asking a few questions in between the chapter.

Introduction to the Skeletal System :-

Humans are vertebrates, humans having a vertebral column or backbone. The human skeletal system consists of bones, cartilage, ligaments and tendons and account for about 20% of the body weight.

The living bones in our bodies use oxygen and give off waste products in metabolism. They contain active tissues that consume nutrients, require a blood supply and change or remodel in response to variations in mechanical stress.

Bones work together with muscles as simple mechanical lever systems to produce body movement.

Bones provide a rigid framework, known as the skeleton, that support and protect the soft organs of the body.

Signed

The skeleton supports the body against the pull of gravity. The large bones of the lower limbs support the trunk when standing.

The skeleton also protects the soft body parts. The fused bones of the cranium surround the brain to make it less vulnerable to injury. Vertebrae surround and protect the spinal cord and the rib cage help protect the heart and lungs of the thorax.

Bones contain more calcium than any other organ. The intercellular matrix of bone contains large amounts of calcium salts, the most important being calcium phosphate.

When blood calcium levels decrease below normal, calcium is released from the bones so that there will be an adequate supply for metabolic needs. When blood calcium levels are increased, the excess calcium is stored in the bone matrix. The dynamic process of releasing and storing calcium goes on almost continuously.

In infants red marrow is found in the bone cavities. With age, it is largely replaced by yellow marrow for fat storage. In adults, red marrow is limited to the spongy bone in the skull, ribs, sternum, pelvis etc. Red marrow functions in the formation of red blood cells, white blood cells and blood platelets.

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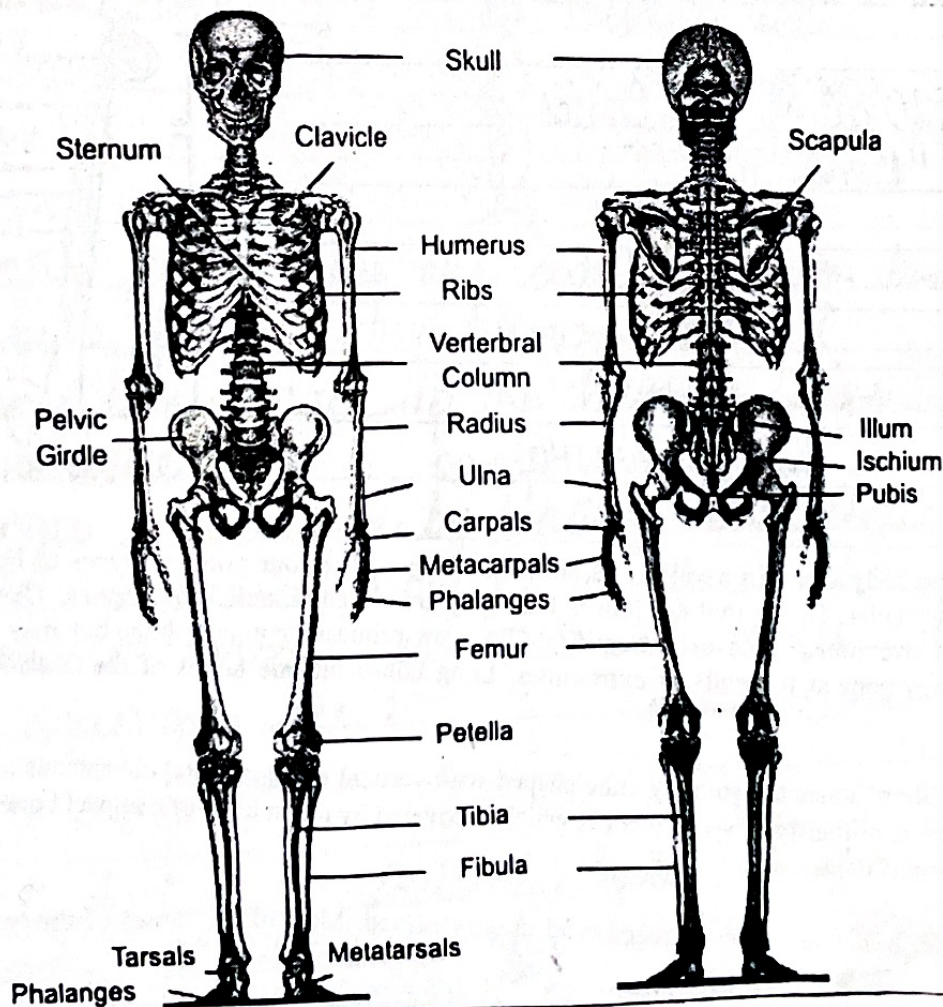
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Skeletal System Bones :-

The skeletal system is a combination of various bones, cartilages, tendons and ligaments. A newborn baby has approximately 300 bones but after the age of adolescence the number of bones is reduced to 206. As matter of fact, some of the bones unite with each other completely. The structure of bone is rigid and hard, so it gives the body a framework, maintains its shape and protect delicate organs. Bones provide a place for muscles and supporting structures to attach. They also form a system of levers upon which muscles can act to produce body movements. The longest bone in the body is femur in the upper leg and the smallest is the stapes bone in the middle ear. In an adult, the skeleton comprises approximately 14% of the total body weight and half of this weight is water.



Front View of Human Skeleton

Back View of Human Skeleton

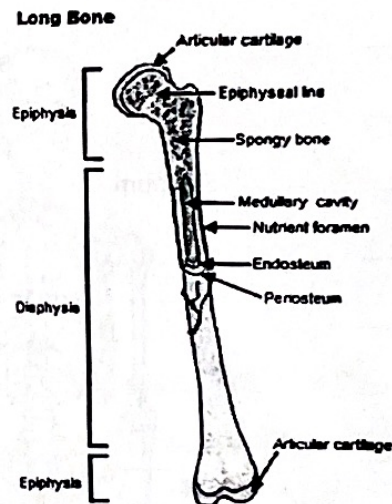
Structure of Bone Tissue :-

There are two types of bone tissue :- compact and spongy. The names imply that the two types differ in density or how tightly the tissue is packed together. There are three types of cells that contribute to bone homeostasis.

Osteoblasts are bone-forming cell, Osteoclasts resorb or break down bone, and Osteocytes are mature bone cells. An equilibrium between osteoblasts and osteoclasts maintains bone tissue.

Classification of Bones.

1. Long Bones



The bones of the body come in a variety of sizes and shapes. The four principal types of bones are long, short, flat and irregular. Bones that are longer than they are wide are called long bones. They consist of a long shaft with two bulky ends or extremities. They are primarily compact bone but may have a large amount of spongy bone at the ends or extremities. Long bones include bones of the thigh, leg, arm, and forearm.

Short Bones : Short bones are roughly cube shaped with vertical and horizontal dimensions approximately equal. They consist primarily of spongy bone, which is covered by a thin layer of compact bone. Short bones include the bones of the wrist and ankle.

Flat Bones: Flat bones are thin, flattened, and usually curved. Most of the bones of the cranium are flat bones.

Irregular Bones

Bones that are not in any of the above three categories are classified as irregular bones. They are primarily spongy bone that is covered with a thin layer of compact bone. The vertebrae and some of the bones in the skull are irregular bones.

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All bones have surface markings and characteristics that make a specific bone unique. There are holes, depressions, smooth facets, lines, projections and other markings. These usually represent passageways for vessels and nerves, points of articulation with other bones or points of attachment for tendons and ligaments.

Students before going any further in the chapter, let me ask you a few questions. You may kindly listen to the questions carefully and pause the audio for 3 mins to write down the answers in your notebook. The questions are :-

Q1 Define the terms :-

a) Skeletal System

b) Cartilage

c) Ligaments

d) Tendons

e) Metabolism

f) Bone Marrow

g) Osteocytes

h) Osteoblasts

i) Organ

j) Tissue

k) Cell

Q2 How many bones does the adult human body have?

Q3 Which bone protects the human Heart?

Q4 How many bones make up the human spine.

Q5 The Axial skeleton is comprised of _____ bones.

Q6 What do you understand by Anatomy and Physiology?

Students you may now pause the audio for 3 minutes. 3 minutes break is over children. Answers to the above questions are :-

Ans :- 1

a) Skeletal System :- Skeletal system is the supportive of the body. It consists of cartilage, bones, joints which provide attachment to the movement of muscles.

b) Cartilage :- Cartilage is a connective tissue consists of a dense matrix of collagen fibres and elastic fibres.

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- c) Ligaments :- Ligaments connect two bones together, particularly in the joints, like strong, firmly attached straps or ropes, they stabilize the joint or hold the ends of two bones together.
- d) Tendons :- Tendons attach muscle to bone. It is made up of fibrous connective tissue.
- e) Metabolism :- Metabolism^{is the} the sum of chemical reactions in human body. (Anabolism Catabolism)
- f) Bone Marrow :- It is flexible tissue. It is found in the hollow interior of bones.
- g) Osteocytes :- Bone cells are called osteocytes
- h) Osteoblasts :- Osteoblasts are bone-forming cells.
- i) Organ :- An organ is a group of tissues that perform a specific function.
- j) Tissue :- Tissues are composed of cells, not necessarily identical but of the same origin.
- k) Cell :- Cell is the smallest and functional unit of life.

Ans :- 2 206 bones

Ans :- 3 Sternum protects the human heart

Ans :- 4 33 bones

Ans :- 5 80 bones

Ans :- 6 Anatomy :- Anatomy is a branch of biology which studies the human body structure, its shape and

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interrelation of various parts of the body.

Physiology :- Physiology is the science of mechanical, physical, bio-electrical and bio-chemical functions of human organs and the cells.

Note :-

Hope you all have understood the topic skeletal system. All of you are required to read this topic from your book and you will write above question and answers in your note book.

Thank you.

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Good Morning Students,

This lesson is of Class IX for the Subject Physical Education, Topic Identification of various bones which is covered in Chapter 1 (The human Anatomy & Physiology) starting on Page No. 3 of your Text Book, Titled Health Phy. Education & sports and is being submitted to you on 12 April - 21

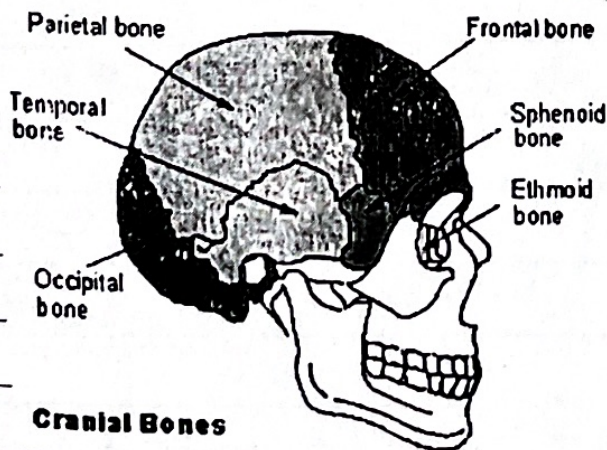
This voice is of Ms. Kusum

If all students are ready then let us start with topic Identification of Bones all of you please listen carefully as I will be asking a few questions in between the chapter.

Identification of Various Bones :-

A Neck - Cranium and Vertebrae :-

Cranium :- The cranium is the part of the top portion of the skull which protects the brain. It consists of eight bones :- Frontal, parietal, occipital, temporal, sphenoid and ethmoid. Each parietal as well as temporal consist of two bones.



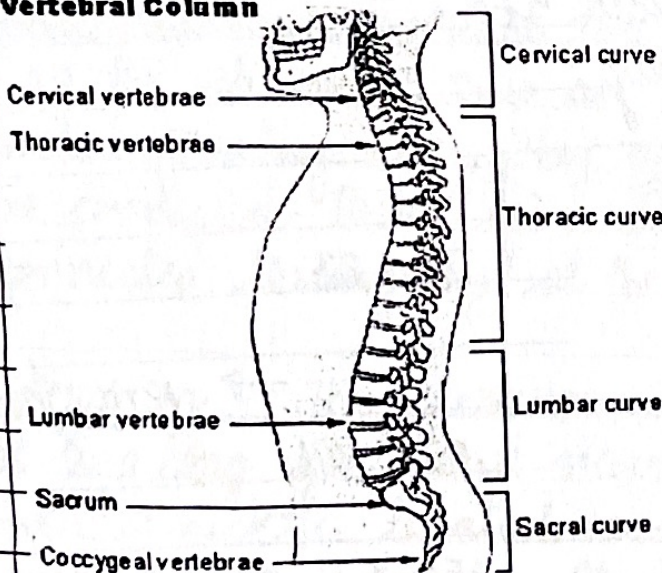
Cranial Bones

- Parietal (2)
- Temporal (2)
- Frontal (1)
- Occipital (1)
- Ethmoid (1)
- Sphenoid (1)

Vertebrae :- Vertebrae are the bones of vertebral or spinal column. Vertebrae take their names from regions of the vertebral column that they occupy. There are thirty-three ^{same}

vertebrae in human vertebral column. Between each two bones or vertebrae there are pads of fibro-cartilage. There are seven cervical vertebrae, twelve thoracic vertebrae, five lumbar vertebrae, five sacral vertebrae and four coccygeal vertebrae in a vertebral column but the neck related vertebrae are cervical vertebrae. These vertebrae are the smallest of the bones except the first and second cervical vertebrae. These vertebrae are in general, small and delicate. The first cervical i.e. C1 is called the atlas and C2 is called the axis. Due to these vertebrae the neck and head have a large range of motion.

Vertebral Column

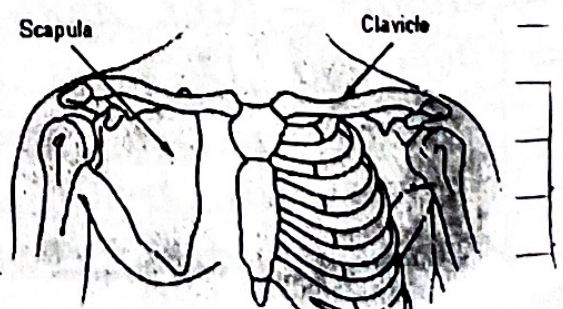


Vertebral Column

- Cervical vertebrae (7) Lumbar vertebrae (5)
- Thoracic vertebrae (12) Sacrum (1)
- Coccyx (1)

B) Shoulder - Scapula and Clavicle :-

The scapula is also called as the shoulder blade. It is a triangular as well as flat bone which provides as a site for the attachment for various



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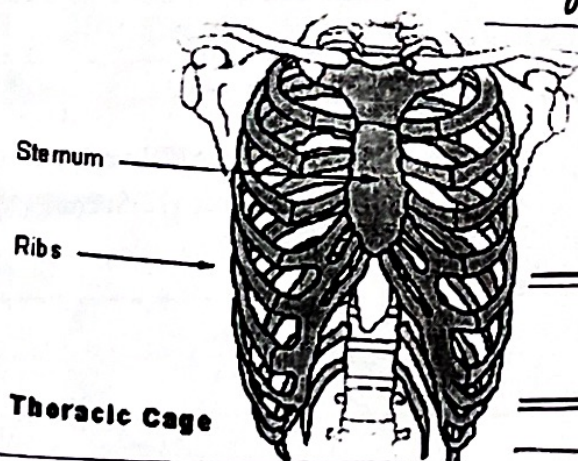
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muscles. It articulates with the humerus bone and with the clavicle. The anterior surface of the scapula is termed as 'costal' because this side faces the rib cage. The lateral surface of the scapula faces the humerus. The posterior surface of the scapula faces outwards.

Clavicle :- The clavicle bone is also called collar bone. It is a long curved bone that forms the anterior part of the shoulder girdle. It extends between the sternum and the acromion of the scapula. It has a shaft and two extremities. Usually, in thin individuals it is clearly visible under the skin. It attaches the upper limb to the trunk and transmits force from the upper limb to the axial skeleton. The clavicle bone is the most commonly fractured bone in the body.



True Ribs

→ RIB CAGE

False Ribs

Floating Ribs.

c) **Thorax - Ribs and sternum :-**

There are 12 pairs or 24 Ribs. The Ribs are flat and thin bones. They are attached behind to the thoracic vertebrae. They provide protection to the vital organs in the upper body including heart and lungs. They give shape and ^{Support} to the

support to the chest. They protect stomach, spleen and kidneys. They also help in breathing process.

The ribs are divided into the following three categories - true ribs, false ribs and floating ribs.

brief description of these ribs :-

- i) True Ribs :- The first seven pairs of rib bones (beginning from the top of the sternum) are called true ribs. They are attached to spine by ligaments at the back and connect to the sternum in the front.
- ii) False Ribs :- The next three pairs of ribs are known as false ribs. They are also attached to the spine at back. They are not connected to the sternum in front but they are connected to the lowest true rib.
- iii) Floating Ribs :- The last two pairs of ribs are the smallest of all the rib bones. These are called floating ribs. They are called floating ribs. They are so called because they are connected to the spine at the back but are not connected to anything at the front.

Sternum :- The sternum is also called Breast bone. It is a long flat and narrow bone. Its shape is just like a necktie located in the centre of the chest. It is connected to the ribs. It forms the front of the rib cage.

In this way, it helps to protect lungs, heart and major blood vessels from injury. The sternum is one of the largest and longest flat bones of our body. The sternum can be sub-divided into three regions as given below :-

- i) Manubrium ii) Body iii) Xiphoid Process.

Students before going any further in the chapter, let me ask you a few questions. You may kindly listen to the questions carefully and pause the audio for 3 mins. and to write down the answers in your notebook. The questions are :-

Q1 Define the terms :-

- | | |
|-------------------------|--------------|
| i) Digestive system | iv) Rib Cage |
| ii) Nervous system | v) Scapula |
| iii) Respiratory System | vi) Humerus |
| | vii) Sternum |

Q2 What do you understand by Fibula and Tibia?

Q3 Write three types of Sternum?

Students you may now pause the audio for 3 minutes.
Answer to the above questions are :-

Ans :- 1

- i) Digestive System :- It consists of digestive organs like that the stomach, food pipe intestine. It helps in energy production.
- ii) Nervous system :- It consists of brain, spinal cord and nervous. It controls the working of various organs of the body.
- iii) Respiratory System :- It consists of breathing organs like ^{Spinal}

lungs, trachea, alveoli etc. It helps in energy production.

iv) Rib Cage :- Twelve pairs of ribs which along thoracic vertebrae and the breast bone constitute the bony cage or rib cage.

v) Scapula :- It is broad and triangular shaped bone. It is situated in the upper part of the back.

vi) Humerus :- Humerus is a long bone. Its upper end is round which sets on the clavicle. Its lower end joins to both the bones of the forearm and forms elbow joint.

vii) Sternum :- It is also called breast bone. It is a long flat and narrow bone. Its shape is just like a neck tie located in the centre of the chest. It is connected to the ribs. It forms the front of the rib cage.

Ans :- 2 Fibula :- It is slim and roughly four sided and its shape varies with the strength of the attached muscles.
Tibia :- It is also known as the shin bone. It is larger and stronger of the two lower leg bones.

Ans :- 3 Types of sternum :- i) Manubrium ii) Body iii) Xiphoid Process.

Hope you all have understood the topic identification of bones and students you will write above question and answers in your notebook.

Thank you.