SKELETAL SYSTEM

18 3.09
Mf
Missfrancois

missfrancois.com

Lesson Objectives:

- Relate the structure of the skeleton to its functions.
- Identify the major bones of the skeleton.
- Relate the structure of a long bone to its functions.
- Distinguish between bone and cartilage.
- Distinguish between tendons and ligaments.
- Evaluate the factors which adversely affect the skeletal system

Them Not-So-Dry Bones-Schoolhouse Rock

What are the functions the Skeletal System?

Functions of the Skeleton System

- **Movement**-Facilitates movement of the entire human body.
- **Protect**-The Skeletal System protects vital organs such as, lungs, heart and brain.
- **Support**-It is designed to support the body and also absorb shock as in the vertebral column.
- **Storage**-Stores minerals such as calcium.
- **Production**-Red bone marrow the site where red and white blood cell are produced.

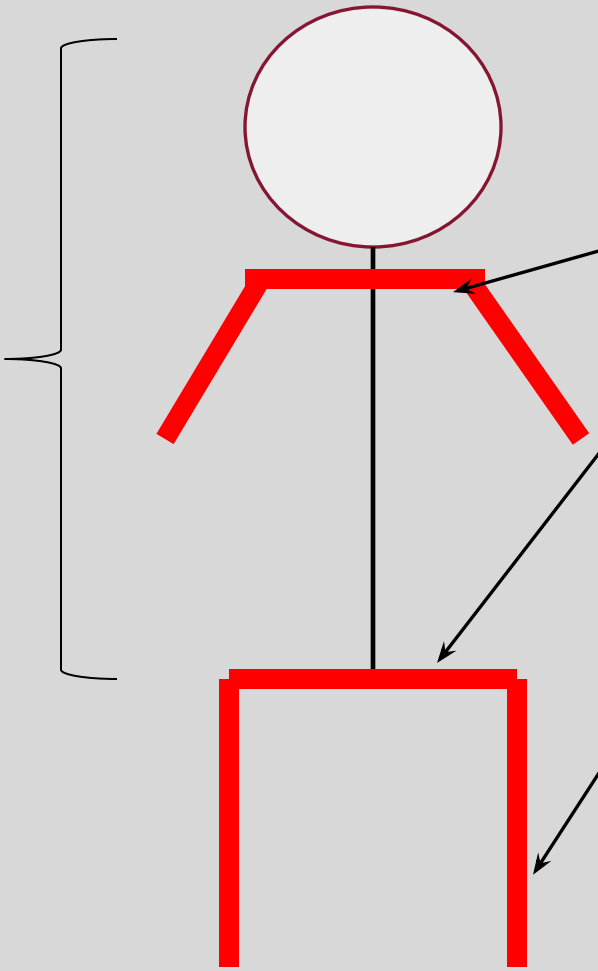
The Human Skeletal System is divided into two main parts:

- **The Axial Skeleton**-Consists of the skull and the vertebral column.

- **The Appendicular Skeleton**-Consists of the pelvic girdle, pectoral girdle and the appendages.

IMPORTANT DIAGRAM!

Axial Skeleton



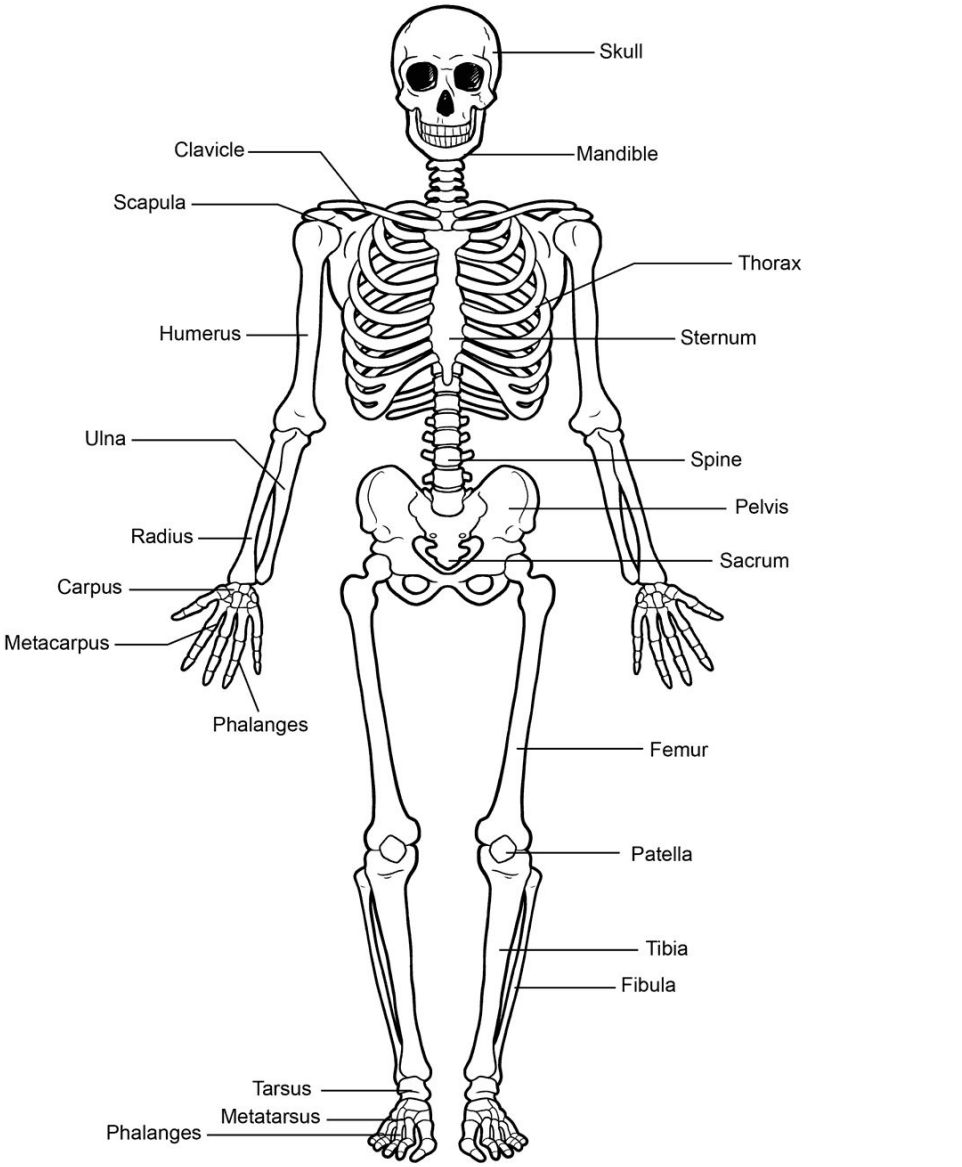
Appendicular Skeleton- Pectoral girdle Pelvic girdle and Appendages (aka arms and legs)

Two Main Parts of The Human Skeletal System

The Human Skeletal System is made up of:

- **Bone**-Bone is hard and has blood vessels running throughout. There is **206** bones in the human body.
- **Cartilage**-Elastic and flexible tissue helps to helps to reduce friction and it aids in shock absorption.

IMPORTANT DIAGRAM!



The Human Skeleton

18 3.09
Mf
Missfrancois

missfrancois.com

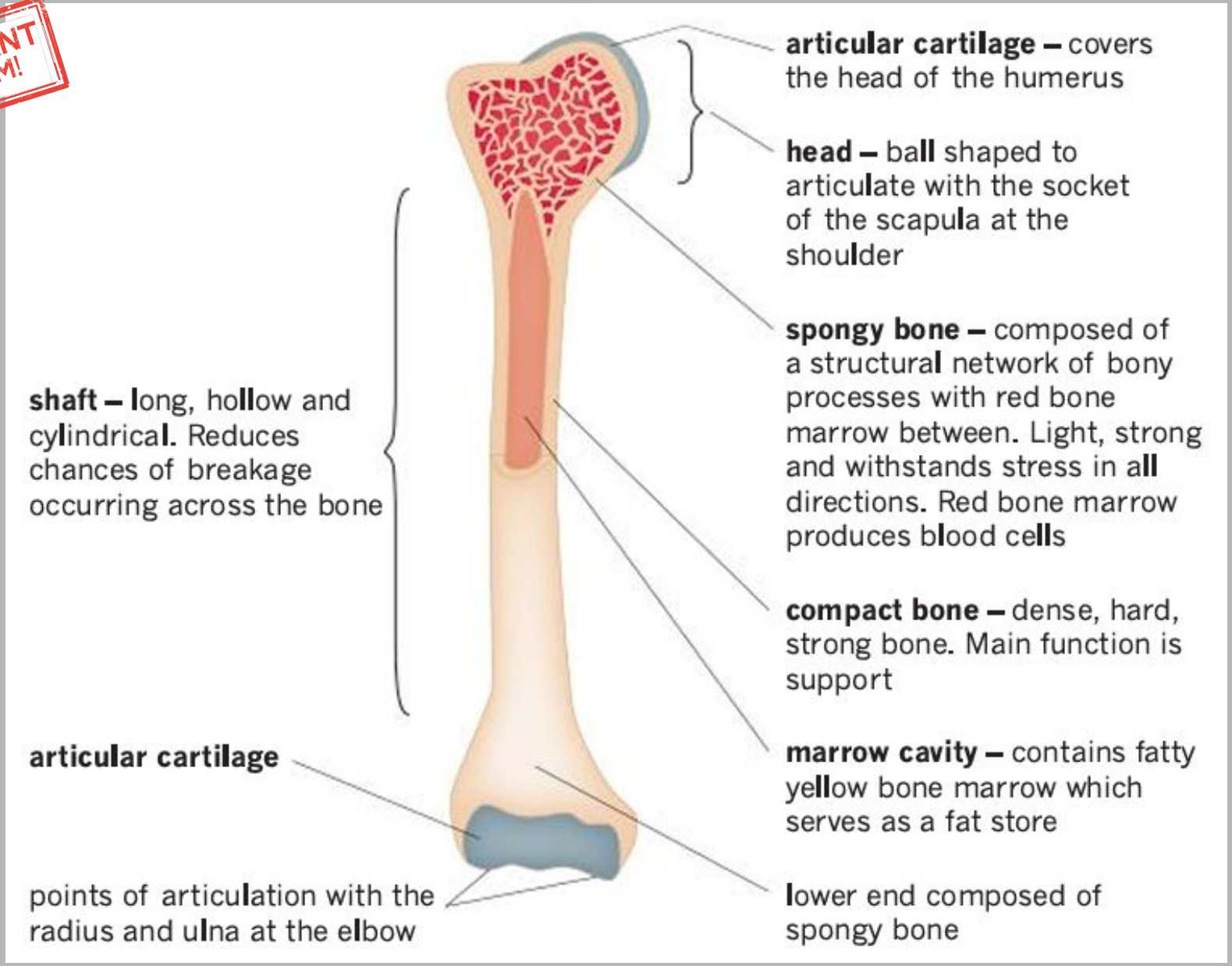
State 10 major bones in the Human Skeleton.

The Human Skeletal System is held together by:

- **Joints**-Where two bones meet.
- **Ligaments**-Connects bones to joints.

BONE

IMPORTANT DIAGRAM!



Structure and functions of parts of a typical long bone – the humerus

Source: Concise Revision Course: Human and Social Biology

Bones

- **Bones** are rigid organs that constitute part of the endoskeleton of vertebrates. They support, and protect the various organs of the body, produce red and white blood cells and store minerals. Bone tissue is a type of dense connective tissue

FUNCTIONS OF BONE

Mechanical:

- **Protection** — bones can serve to protect internal organs, such as the skull protecting the brain or the ribs protecting the heart and lungs.
- **Structure** — bones provide a frame to keep the body supported.
- **Movement** — bones, skeletal muscles, tendons, ligaments and joints function together to generate and transfer forces so that individual body parts or the whole body can be manipulated in three-dimensional space. The interaction between bone and muscle is studied in biomechanics.
- **Sound transduction** — bones are important in the mechanical aspect of overshadowed hearing

FUNCTIONS OF BONE (con't)

Synthetic:

- **Blood production** — The bones are responsible for the production of red and white blood cells.

Metabolic:

- **Mineral storage** — bones act as reserves of minerals important for the body, most notably calcium and phosphorus.
- **Growth factor storage** — mineralized bone matrix stores important growth factors such as insulin-like growth factors, transforming growth factor, bone morphogenetic proteins and others.
- **Fat storage** — the yellow bone marrow acts as a storage reserve of fatty acids.
- **Acid-base balance** — bone buffers the blood against excessive pH changes by absorbing or releasing alkaline salts.

CARTILAGE

Cartilage

Cartilage is a flexible connective tissue found in many areas in the bodies of humans and other animals, including the joints between bones, the rib cage, the ear, the nose, the elbow, the knee, the ankle, the bronchial tubes and the intervertebral discs. It is not as hard and rigid as bone but is stiffer and less flexible than muscle.

FUNCTIONS OF CARTILAGE

- Cartilage acts as a cushion between joints, to prevent the bones from rubbing against each other, such as the cartilage in the knees and elbows. It also holds some bones together, such as rib cartilage.
- It forms the skeleton of certain fleshy appendages, e.g. the nose and outer ear, which maintains their shape.
- It makes up the intervertebral discs between the vertebrae enabling the discs to act as shock absorbers.

LIGAMENTS

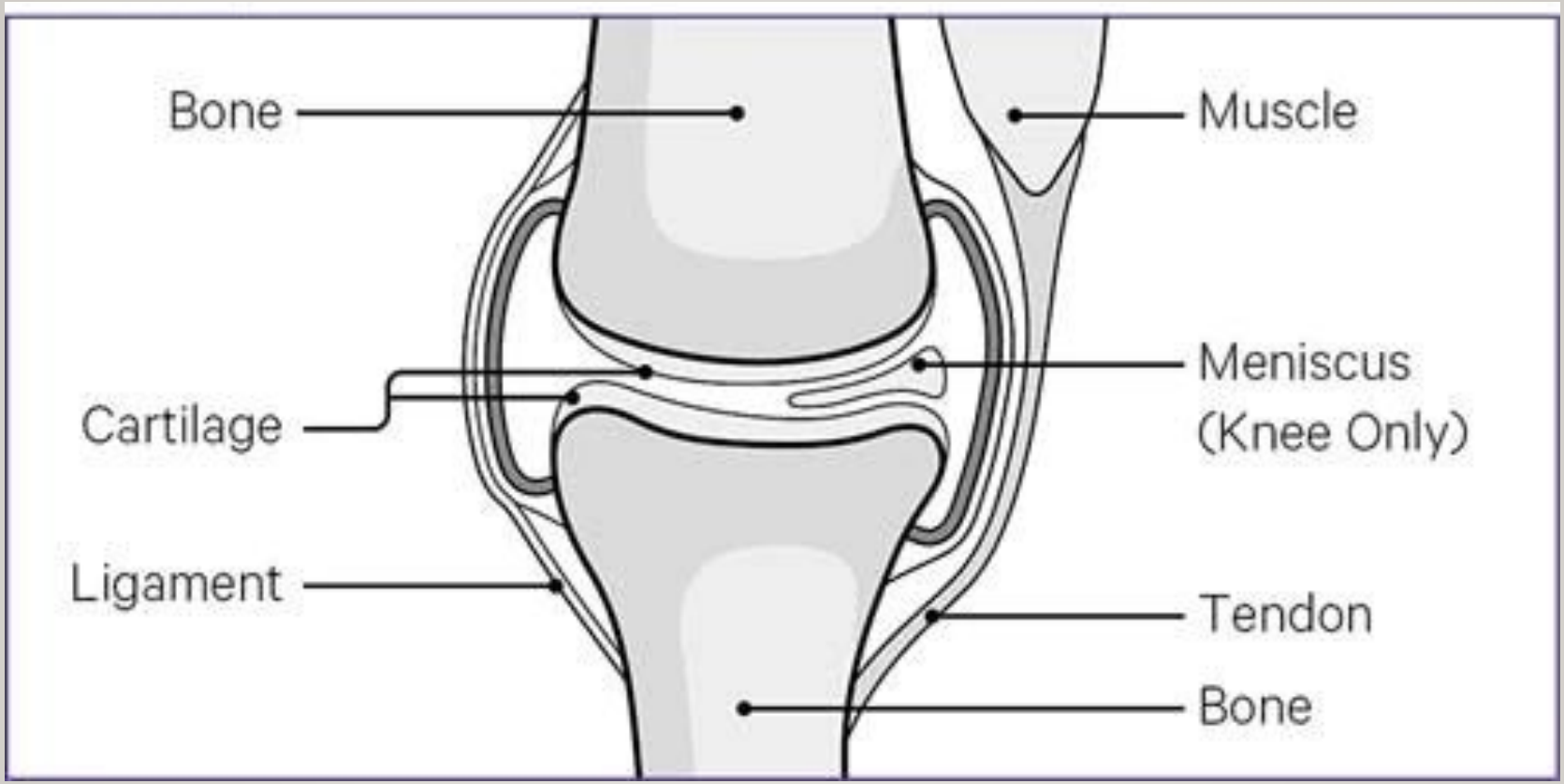
Ligaments

Ligaments attach **bones together at joints**. They are made of tough, fibrous connective tissue with some elastic tissue. They are strong but elastic so they hold the bones together firmly and prevent dislocation, but can stretch slightly to allow movement at the joints.

TENDONS

Tendons

Tendons attach the ends of **muscles to the bones** of the skeleton. They are made of tough, fibrous connective tissue. They are strong and non-elastic so that, when a muscle contracts, the force is transmitted directly to the bone, causing the bone to move.

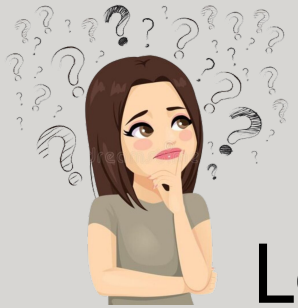


Knee Joint: Showing the Connect between Bone, Cartilage, Tendons and Ligaments

Why is good posture important?

Factors which adversely affect the skeletal system:

- **Poor posture** strains muscles and causes major organs to become compressed and to function less efficiently.
- **Wearing poor footwear** causes the body weight to shift forwards to the ball of the foot, leading to painful arches and a change in the curvature of the spine, which causes bad posture and can result in lower back pain.
- **Obesity**-Extra weight puts strain on the skeleton, especially the joints. This causes cartilage to wear down and leads to arthritis.



Lesson Review Questions:

1. Distinguish between bone and cartilage.
2. State TWO reasons why cartilage is important in the skeleton.
3. Distinguish between a tendon and a ligament.
4. Johnny often slouches when he sits and has a poor diet, state two reasons why Johnny's skeleton system can be affect by his lifestyle habits.

Summary

- The main functions of the human skeletal systems are: movement, support, protection and storage of minerals.
- The skeletal system consists of the axial skeleton and the appendicular skeleton.
- The skeletal system is made up of bones and cartilage and held together by tendons and ligaments.
- There are 206 bones in the human body.
- Poor posture, poor footwear and obesity can adversely affect the skeletal system.

Lesson Sources:

- Concise Revision Course - Human and Social Biology - a Concise Revision Course for CSEC® Textbook by Anne Tindale and Shaun deSouza
- Human & Social Biology for CSEC® Examinations 6th Edition Student's Book by Phil Gadd
- https://www.britannica.com/science/human-skeleton