THEME: HUMAN BODY

TOPIC 1: MUSCULAR-SKELETAL SYSTEM

A skeletal system.

- This is a system that supports the body of an animal.
- This is a support system of the animal's body.
- It is a system that gives the body of an animal the ability to move.

A skeleton.

- This is a framework that supports the body of an animal.
- It is a support structure of an animal's body.

Types of skeleton.

- Exoskeleton
- Hydrostatic skeleton
- Endoskeleton

Exoskeleton

- This is a type of skeleton found outside the body of an animal.
- It is a hard outer covering on the bodies of arthropods called **cuticle**.
- It is made up of **chitin**
- It is common in arthropods e.g. **insects**, **arachnids**, **crustaceans** and **myriapods**.
- Animals which have exoskeleton increase in size or grow by **ecdysis/moulting.**
- They undergo ecdysis/moulting to grow/to increase in size.

What is ecdysis/moulting?

- This is the periodic loss of cuticles (exoskeletons) from arthropods.
- This is the shedding of cuticles (exoskeletons) by arthropods in order to grow.
- This is the process by which arthropods shed their exoskeletons/cuticles.

State one way how arthropods benefit from ecdysis/moulting

- It enables them to grow/It allows growth.

Examples of animals which have an exoskeleton

Insects	Arachnids	Crustaceans	Myriapods
• Butterflies • Cicadas • Mosquitoes • Crickets	• Spiders • Scorpions • Mites • Ticks	• Lobster • Crabs • Barnacles • Shrimps	• Centipedes • Millipedes • Symphylan • Pauropoda

Importance of exoskeletons to arthropods

- Provide protection to their soft parts
- Provide structural support
- Prevent water loss

Disadvantage/danger of exoskeletons to arthropods

- They limit growth

Hydrostatic skeleton

- This is the type of skeleton where an animal's body is filled with fluids under pressure.
- This type of skeleton is also known as **hydroskeleton**.
- It is composed of a fluid filled cavity known as **coelom**.

Examples of animals which have a hydrostatic skeleton

• Earthworms	• Slugs	• Jellyfish
• Leeches	• Squids	• Sea anemone
• Roundworms	• Flatworms	• Hydra
• Hookworms	• Tapeworms	• Octopus
• Caterpillars	• Eelworm	• Starfish

Endoskeleton

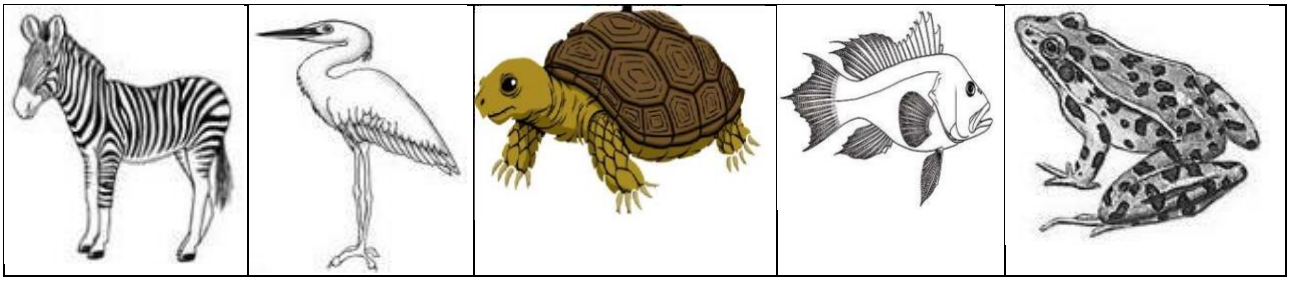
- This is a type of skeleton found inside the body of an animal.
- This is a type of skeleton within an animal's body covered by muscles.
- This is the internal framework of the body of an organism.

NB Endoskeleton is common in all **vertebrates**.

- It is made up of **bones** and **cartilages**.

Examples of animals which have endoskeleton

Mammals	**Reptiles**	**Amphibians**	**Birds**	**Fish**
• Man	• Chameleon	• Toad	• Eagle	• Tilapia
• Gorilla	• Snake	• Frog	• Duck	• Mudfish
• Rat	• Crocodile	• Newt	• Ostrich	• Catfish
• Lion	• Gecko	• Caecilian	• Turkey	• Salmon
• Bat	• Lizard	• Salamander	• Owl	• Nileperch



The human skeleton

- A human skeleton is the frame work of bones in the human body.
- The human skeleton is an example of endoskeleton.
- The skeleton of an adult human being has **206 bones**.
- The skeleton of babies has **300 bones** at birth.

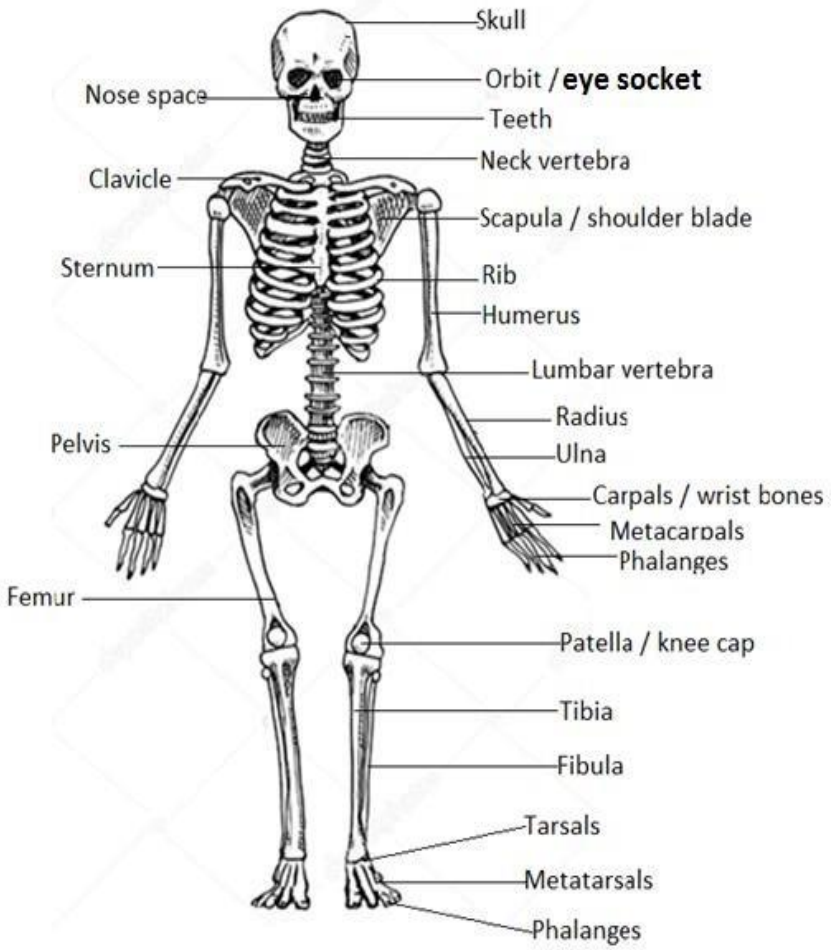
Why do adults have fewer bones than babies?

- Bones fuse together reducing in number as one grows.

Why do babies have more bones than adults?

- Babies are born with more cartilages which join to form bones.

The structure of the human skeleton



Regions of the human skeleton

- Appendicular skeleton
- Axial skeleton

Appendicular skeleton.

- This consists of the **limbs** and **limb girdles**.

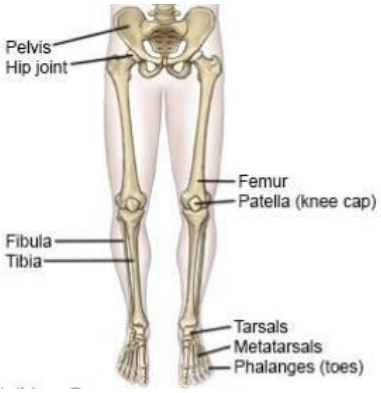
Limbs

- Limbs are grouped into forelimbs (arms) and hind limbs (legs)

Bones of the forelimbs (arms)

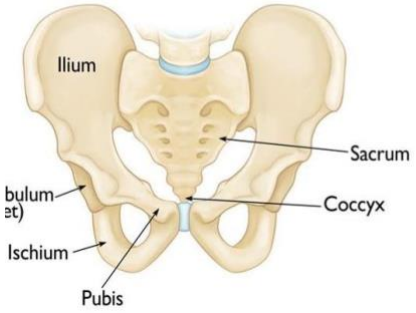
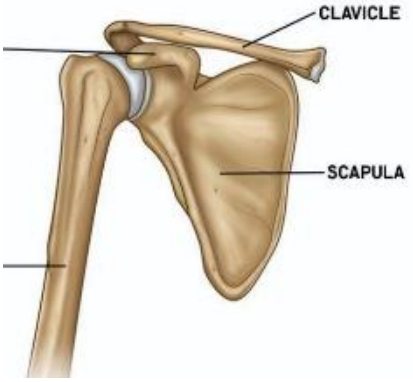
- Humerus (long bone of the upper arm)
- Radius (forearm bone)
- Ulna (forearm bone)
- Carpals (wrist bones)
- Metacarpals (palm bones)
- Phalanges (finger bones)

Bones of the hind limbs (legs)



- Femur (thigh bone)
- Tibia (shinbone)
- Fibula (calf bone)
- Tarsals (ankle bones)
- Metatarsals
- Phalanges (toe bones)

Limb girdles

Pelvic girdle	**Pectoral girdle**
 **Bones of the pelvic girdle** • Ilium • Pubis • Ischium	 **Bones of the pectoral girdle** • Scapula • Clavicle

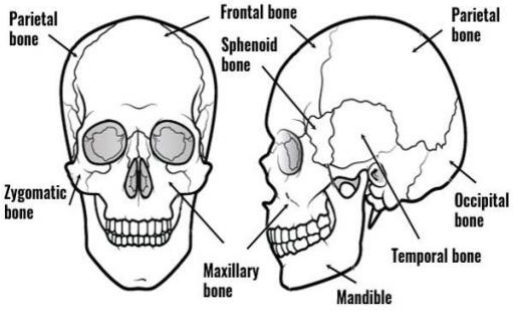
Axial Region

-It is the main longitudinal section of the skeleton in vertebrates.

-It consists of the skull, vertebral column and the ribcage.

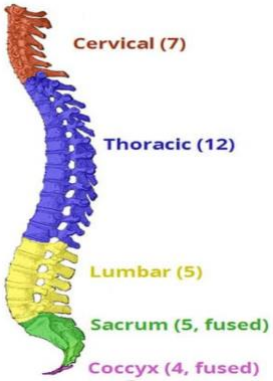
The skull

-The skull has 22 bones.

Cranial bones	Facial bones	The structure of the skull
- Frontal bone (1) - Parietal bone (2) - Occipital bone (1) - Ethmoid bone (1) - Temporal bones (2) - Sphenoid bone (1)	- lacrimal bone (2) - Maxilla bones (2) - Mandible bone (1) - Nasal bone bones (2) - Palatine bones(2) - Zygomatic bones (2) - Vomer bone (1) - Nasal conchae (2)	

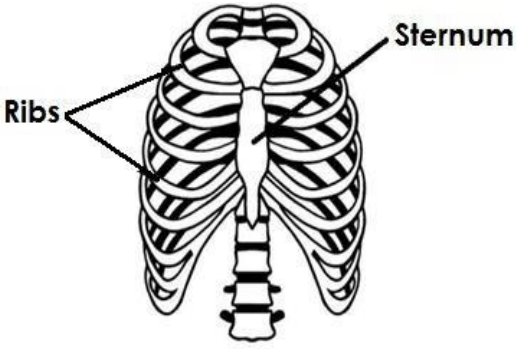
Back bone/spine/vertebral column

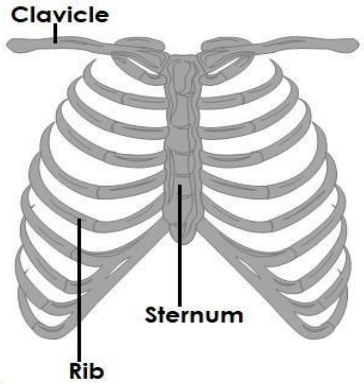
- It consists of 33 bones.
- It is divided into
- Cervical vertebrae (7)
- Thoracic vertebrae (12)
- Lumbar vertebrae (5)
- Sacrum (5)
- Coccyx (4)



Ribcage

- This is made up of 12 paired ribs which make a total of 24 ribs





Functions of the skeleton

- It gives shape to the body
- It supports the body/It gives support to the body
- It helps an organism to move.
- It allows movement of body parts.
- It manufactures blood cells
- It provides room for muscle attachment
- It stores and releases calcium and fats

- It protects vital (delicate) body organs

Part of the skeleton	**Vital organs protected**
Skull	- Brain, eyes, inner ear, tongue
Ribcage	- Heart, lungs
Spine/backbone/vertebrae	- Spinal cord
Pelvic girdle	- Ovaries, oviducts, uterus

Assessment exercise

1. What is skeletal system.
2. Identify one organ of the muscular skeletal system
3. What is a skeleton?
4. How many bones make up the skeleton of an adult human being?
5. Name the type of skeleton possessed by a millipede.
6. Which parts of the body make up a human skeleton?
7. Name the type of skeleton that is found inside the body of an animal.
8. Give one example of an animal with the type of skeleton named above.
9. Mention two examples of organisms with the following types of skeletons.

a). Endoskeleton b) Exoskeleton c) Hydrostatic skeleton

10. What do you understand by the term ecdysis?
11. How is the skeleton of a monkey different from that of a spider?
12. Name two examples of organisms that carry out moulting/ecdysis.
13. How is moulting/ecdysis importance to the organisms named above?
14. Name one body organ protected by the following parts of the skeleton.

a) Skull b) Ribcage c) Spine

15. State two functions of the skeleton to the human body.

BONES

- **A bone** is a hard living tissue found inside the body of vertebrates.
- Bones are the hardest tissues in the human body.
- Bones are made up of a mineral salt called **calcium** and protein called **collagen**.
- Bones develop form connective tissues and cartilages
- The process of bone formation is called **ossification.**

Common and scientific names of bones

Common name	**Scientific name**
Jawbone (lower) Jawbone (upper	Mandible Maxilla
Collarbone	Clavicle
Shoulder blade	Scapula

Breastbone	Sternum
Funny bone	Humerus
Spine	Vertebrae
Hipbone	Pelvis
Thighbone	Femur
Kneecap	Patella
Shinbone	Tibia
Anklebones	Tarsals
Wrist bones	Carpals

Types/classes/groups of bones

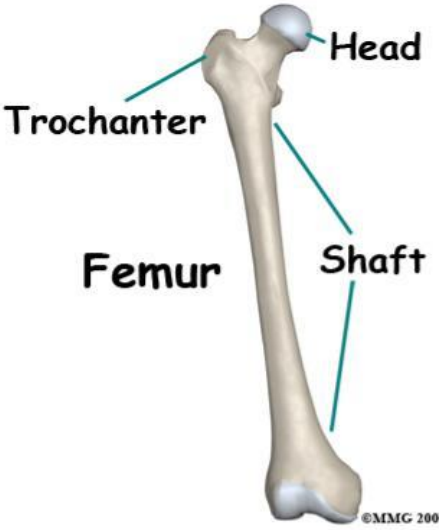
- Long bones
- Short bones
- Flat bones
- Irregular bones/shapeless bones
- Sesamoid bones

Long bones.

- These are longer than their width.
- They are cylindrical in shape.
- They contain yellow bone marrow used to produce white blood cells.
- They are mainly found in the limbs e.g.

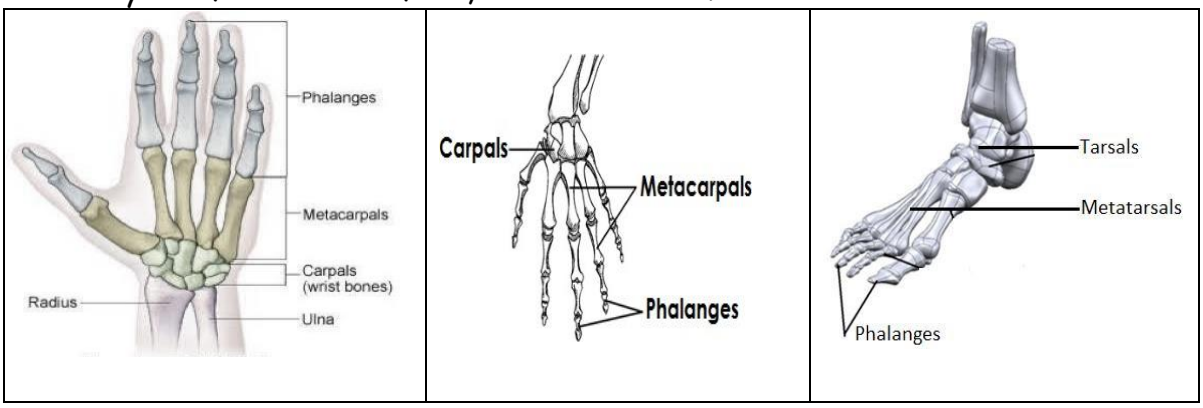
- Femur
- Tibia
- Fibula
- Ulna
- Radius

NB The femur is the longest and strongest bone in the human body



Shortbones

- They are found in the feet, hands and ears.



Examples of shortbones

- Tarsals
- Metatarsal
- Carpals
- Metacarpals
- Phalanges
- Ossicles

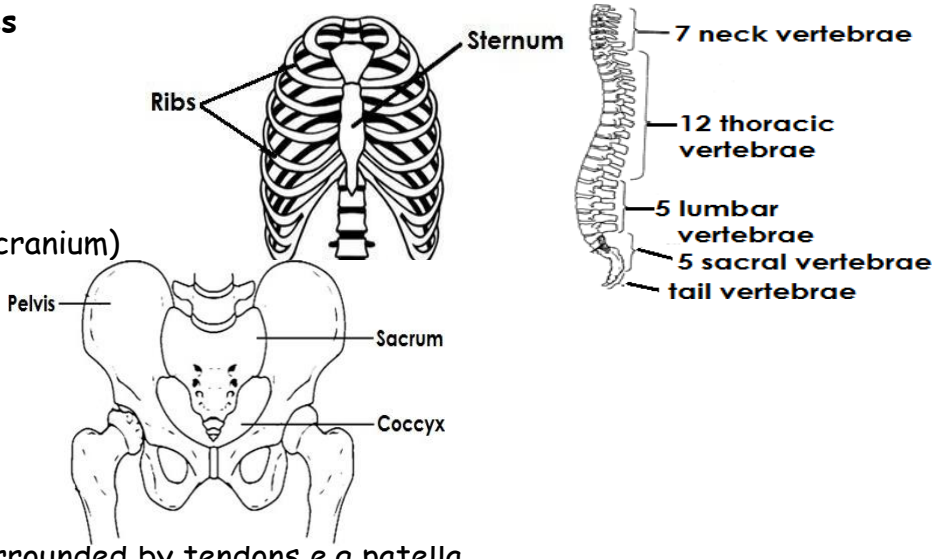
NB. The **stapes/stirrup** is the shortest bone in the human body

Flatbones

- They protect internal vital organs
- They provide a large surface area for muscle attachment.
- They contain red bone marrow used to produce red blood cells

Examples of flat bones

- Scapula
- Sternum
- Ribs
- Jawbone
- Bones of the skull (cranium)
- Hipbone (pelvis)



Irregular bones

- Vertebrae
- Sacrum

Sesamoid bones

- These are bones surrounded by tendons e.g patella.

Importance of bones

- Produce blood cells
- Store minerals e.g. calcium and phosphorus
- Store fats in the bone marrow
- Protect vital delicate organs .
- Provide surfaces for muscle attachment

Joints

- **A joint** is a point where two or more bones meet in the body.
- A joint is a place where two or more bones meet in thebody.

Classes/groups/types of joints

- Movable joints
- Immovable joints

Immovable joints

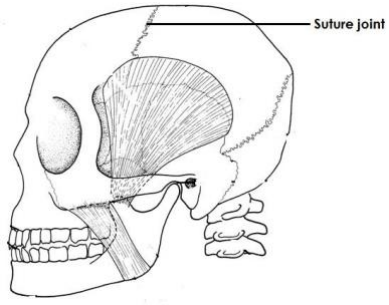
- These are joints which don't allow any movement.
- They are also known as **fixed joints/synarthroses**

Why don't immovable joints allow movement?

-Bones at these joints are in close contact.

Characteristics of immovable joints

- They don't allow any movement
- They lack joint cavities
- They lack synovial membranes.



Examples of immovable joints

- Suture joint
- Gomphosis

Movable joints (synovial joints)

These are joints which allow movement between the bones.

Characteristics of movable joints

- They allow movement
- They have joint cavities
- They have synovial membranes.

Types/groups of movable joints

- Hinge joints
- Ball and socket joints.
- Pivot joints
- Gliding joints

Hinge joints (ginglymus)

- These are movable joints which allow movement in one plane.

Why are hinge joints called so?

- Their movement is similar to that of the door on its hinges.

Examples of hinge joints

- Knee joint
- Elbow joint

Ball and socket joints (spheroid joints)

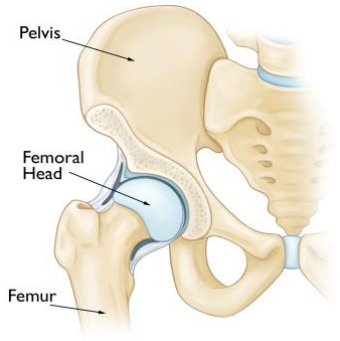
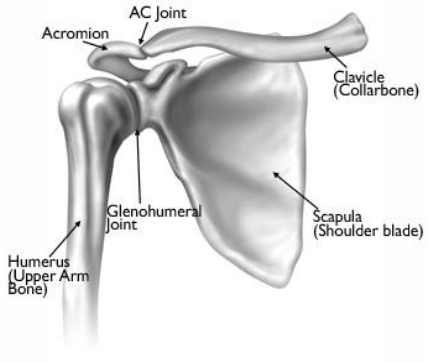
- This is a type of movable joints which allow movement in all (three) planes.

Why are ball and socket joints called so?

- A ball shaped end of one bone fits into a socket of another bone at these joints.

Examples of ball and socket joints

- Shoulder joint
- Hip joint

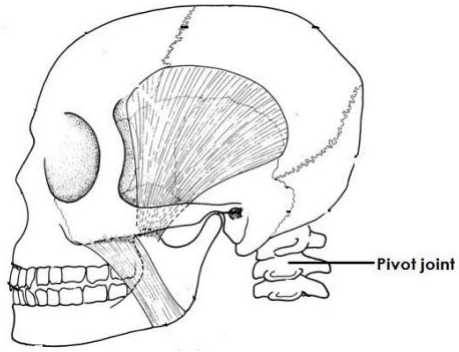
Hip joint	**Shoulder joint**
	

Pivot joints/rotary joints

- These are movable joints that permit single axial rotation.
- These are movable joints that allow rotational movement of bones around one axis.

Examples of pivot joints

- Pivot joint in the neck (Atlantoaxial joint)

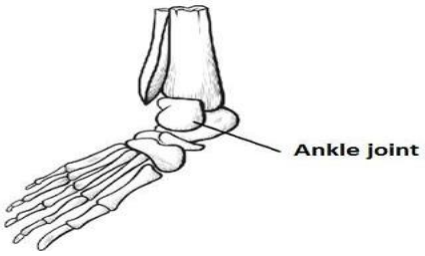


Gliding joints/planar joints

- These are movable joints which allow bones to slide over each other.
- These are synovial joints which allow sliding motion of bones.

Examples of gliding/planar joints.

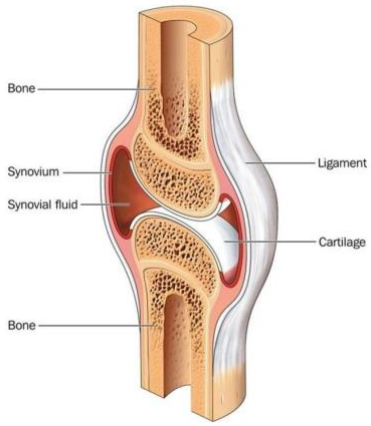
- Wrist joint
- Ankle



Importance of joints in the body

- They allow movement
- They allow bending
- They promote flexibility
- Provide stability.

Parts of a movable joint and their functions.



Ligament

- This is tough elastic fibre that joins a bone to another bone.
- Ligaments prevent dislocation during normal movement

Tendon

- This is a tough elastic fibre that joins a bone to a muscle/tendon.

Synovial membrane (synovium)

- It produces synovial fluid.

Synovial fluid

- It reduces friction at a joint.

Cartilage

- This is a connective tissue softer than a bone.
- Cartilages cushion bones in a joint
- They also act as shock absorbers.
- They reduce friction at a joint/Protect tips of bones from wear and tear
- Maintain shapes of certain organs e.g. trachea, ear pinna, nose etc.
- Form skeletons of some Organisms e.g. cartilaginous fish.

Parts of the body where cartilages are found

- Ear pinna
- Nose
- Wind pipe
- At the joint
- At the end of every bone (At the tips of the bone).

Bone marrow

- This is a soft tissue found inside a bone.
- It stores fat and produces blood cells.

Assessment activity

1. What is a joint?
2. How are cartilages similar to the synovial fluid in terms of their function.
3. Name two structures that helps to reduce friction in a joint.
4. Give any two important of joints in the body
5. Write two examples of ball and socket joints of the body.
6. Give the difference between ball and socket joints and hinge joints

SUBTOPIC: MUSCULAR SYSTEM

What is a muscular system?

- This is a body system that consists of contractile muscle fibres/tissues.
- It is responsible for the movement of the human body.

What are muscles?

- Muscles are soft contractile body tissues that affect motion.
- Muscles contract and relax to produce movement.
- Most of the muscles are attached to the bones of the skeleton.
- They are connected to bones by tendons.

Types of muscles

- Involuntary muscles
- Voluntary muscles

Voluntary muscles