

# HEART OF SCIENCE

FIRST EDITION

## LEARNER'S BOOK



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***LET'S SHINE FOREVER***

## ACKNOWLEDGEMENT

Developing a book of this nature requires a lot of support from colleagues, Friends and family. I would like to register my deep-rooted gratitude to the following people for their unlimited assistance offered towards the completion of this book.

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-All authors whose books we used and consulted during our research for some of the materials in this book.

**We do sincerely regret any mistakes which may be found anywhere in this book. It is not intended to be part of this book but accidental.**

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Author. Epidu Paul

## PREFACE

**Flourishing in Science pupils' book seven** has been developed basing on the revised Primary seven integrated science syllabus as prescribed by the new curriculum of the National Curriculum Development Center (NCDC). The book contains accurate, relevant and current information covering all topics in all terms of the year in their order. It is intended to guide both teachers and learners.

The pupil's book caters for the interests in terms of simple and concise language used, Simplified content to cater for all learners with different abilities and clear illustrations to make learning enjoyable through observation. Key words for each topic have also been included in order to enrich the learner's vocabulary and mastery to ease understanding.

The topics have well organized, relevant and easy to understand notes and facts. It is written in a simple language and is well aided with illustrations/diagrams where necessary to ease understanding.

The book is remarkably precise but detailed in content with **no fact left hanging**. it has been mainly written for primary Five in a language that is suitable for both rural and urban pupils. The book can therefore be used with minimum teacher guidance.

The book has inbuilt and continuous assessment activities at the end of sub topics. These questions are o help the learners to test their understanding of the concepts covered and are to enable the teachers to track progress as coverage goes on. This also makes the book convenient for individual and class learning by the pupils.

The activities are set basing on the three main levels of assessment at primary level that is to say: **Knowledge, Comprehension and Application**. The questions are carefully set in order to challenge the pupils in thinking, recalling, observing comprehending and applying knowledge and skills in day-to-day life. These tested skills are also key to excellent performance at PLE since it tests all the above levels.

Projects and experiments have been included to make the subject practical and to enable learners discover knowledge and facts by themselves. This is also to promote a positive attitude towards integrated science as a subject.

The book intend to provide learners with knowledge, skills and desired attitudes and values of basic science, health education, agriculture and the environment that are important to prepare learners for the final assessment of the primary level,

The book is written and developed by experience teachers of integrated science and we welcome all comments on the publication with an open mind for the improvement in the teaching and learning of integrated science. Comments and orders can be communicated directly through the following contacts: Call or Whatsapp: +256788281825/+256707986278.

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## THEME: HUMAN BODY

### TOPIC 1: MUSCULAR AND SKELETAL SYSTEM

#### A skeletal system.

- A skeletal system is a system that supports the body of an animal.
- It's also a system that gives the animal ability to move.
- It's a composition of bones and muscles or liquid in pressure.
- It also consist of two systems which closely work together and they are inseparable that is to say: **skeletal** and **muscular system**

#### A skeleton.

- A skeleton is a supportive structure of the body of an organism.
- A human skeleton Is a frame work of bones in the body.

#### Types of skeleton.




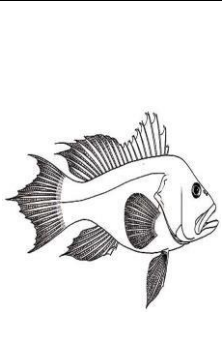

- Endo skeleton                      ii) Exoskeleton                      iii) Hydrostatic skeleton

#### ENDOSKELETON

- An endoskeleton is a type of skeleton found inside the body of an animal.
- It is mainly found in vertebrates and sponges.

#### Examples of animals that have an endoskeleton.

- Human beings / people –Cows –Dogs –Cats –Goats –Lions –Elephants –Tiger
- Monkeys –Fish –Birds –Frog –Crocodiles –Tortoises –Salamanders –Sponges

				
Mammals	Birds	Reptiles	Fish	Amphibians

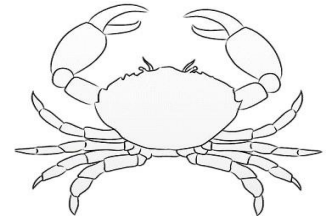
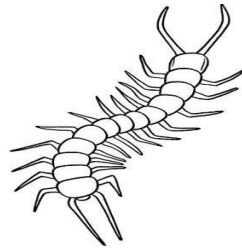
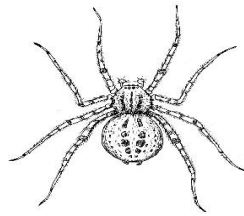
#### Exoskeleton

- An exoskeleton is a type of skeleton found outside the body of an animal.
- It is a characteristic of arthropods.
- It is composed of a hard cuticle lying outside the muscles.

#### Examples of animals with an exoskeleton

- Insects e.g. mosquitoes, houseflies.
- Arachnids e.g. spider, scorpion.
- Myriapods e.g. centipedes, millipedes.

- Crustaceans e.g. crab , lobster



### **Ways in which animals with an exoskeleton increase in size or grow.**

- By moulting or ecdysis

#### **Note**

Both tortoise and turtles are examples of animal with animals(reptiles) that have both exo and endoskeleton.

### **MOULTING**

- Moulting is the periodic loss of cuticles from arthropods.

#### **Moulting in different animals:**

**i) Birds:-** It is the process by which birds shed their feathers to replace them periodically.

**ii) Reptiles:-** It is the process by which reptiles shed their skin to increase in size.

**NB:-** it is achieved by the snake rubbing its head against a hard rough surface or between rocks causing the already stretched skin to split and this cause the skin to peel off backwards as the snake crawls out of the skin.

**iii) Invertebrates and insects.**

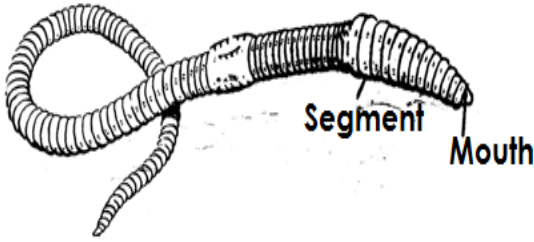
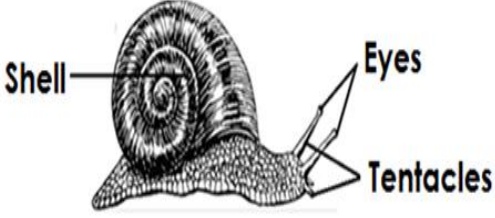
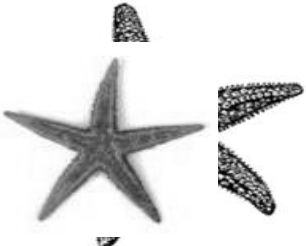
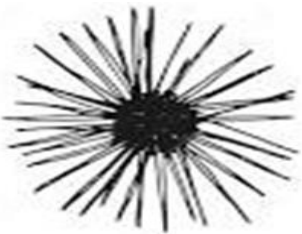
It is the process by which invertebrates and insects shed their shell (exoskeleton) in order to grow.

### **Hydrostatic skeleton**

- A hydrostatic skeleton is a type of skeleton where the body of an animal is filled with a liquid fluid under pressure.
- Here the pressure of the fluid and action of the surrounding muscles are used to change the shape of an organism and produce movement is soft bodied animals.

#### **Examples of animals with a hydrostatic skeleton.**

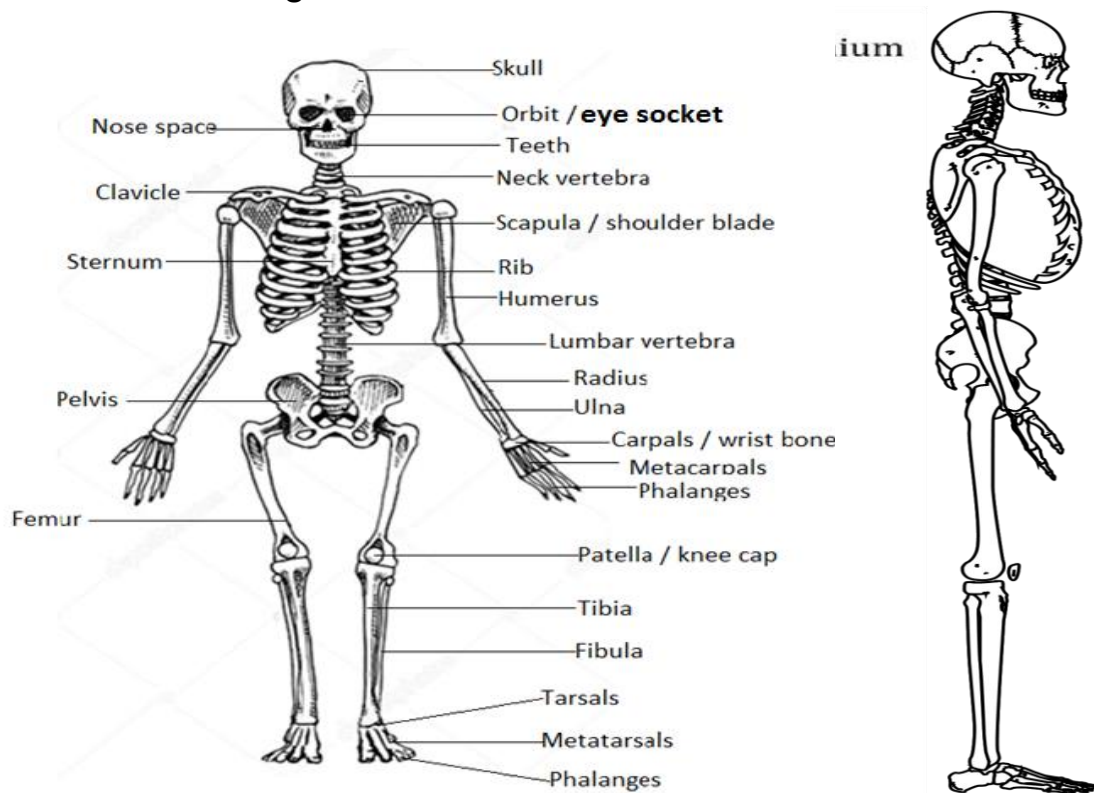
- Snails –Slugs –Worms -Star fish -Jelly fish –Caterpillars -Sea urchins. -Earthworms
- Squids –Octopus –Leeches –Hookworms –Tapeworms

An earthworm has hydrostatic skeleton	A garden snail
	
A star fish	Sea urchin
	

### The structure of the human skeleton

- A human skeleton is the frame work of bones in the human body.
- An adult human being has about **206 bones**.

#### Illustration showing structure of the human skeleton



## Main parts of the human skeleton.

The human skeleton is made up of four main parts

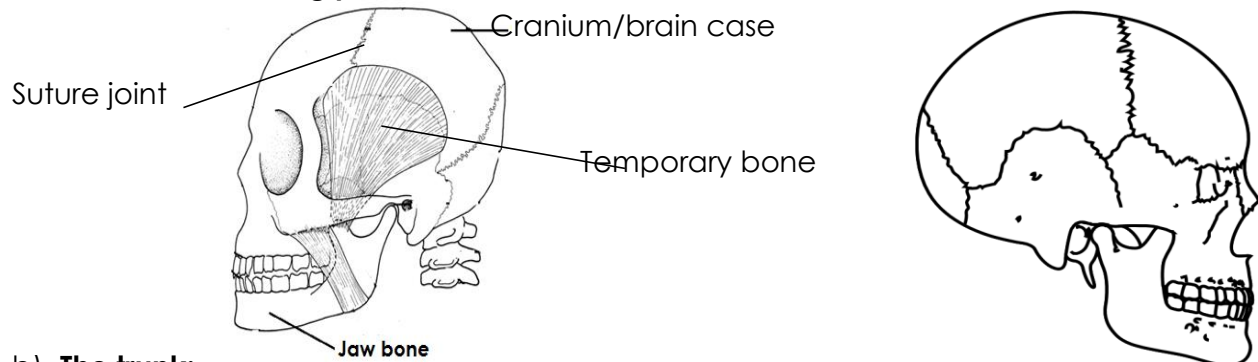
- i) The skull    ii). The trunk (Back bone / spine / vertebral column)
- iii) The limbs ( Hands and legs)    iv) The limb and girdles (pelvis and scapula)

**Delicate body organs protected by the following parts of the skeleton.**

### a) Skull.

- It is made up of 22 bones that are fused together except the mandible.
- The 21 fused bones are separate in children (babies) to allow the skull and the brain to grow. But fuse to give added strength and protection in adults.
- The mandible remains as a movable jaw bone and forms the only movable joint in the skull with the temporal bone.
- The bones of superior and anterior portion of the skull are known as **cranium** and **it protects the brain from damage.**
- The bones of inferior and anterior portion of the skull are known as facial bones and supports the following parts: - **Brain –Tongue –Eyes -Middle and inner ear.**

#### Illustration showing parts of the skull.



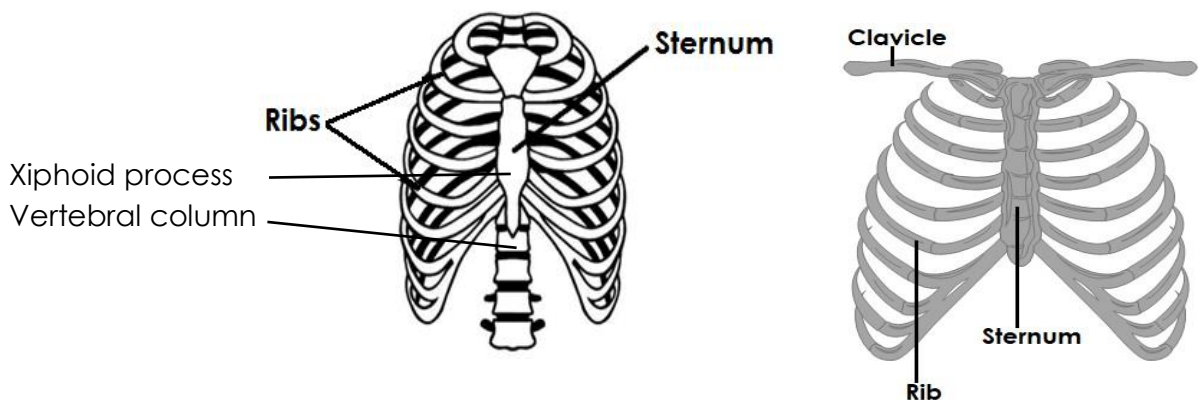
### b) The trunk:

The trunk includes the chest, the back, shoulder and the abdomen as parts that make up the body

#### **Examples of bones that make up the trunk.**

- Clavicle (collar bone)    -Ribs    - Vertebral column/ back bone/ spine. – Pelvis.
- Sternum (breast bone)

#### Illustration showing the bones that make up the trunk part of the skeleton





## **The limbs.**

This refers to the legs and the arms.

-These are grouped into forelimbs and hind limbs.

### **Therefore limbs consist of the following bones;**

- Humerus - Radius - Ulna - Carpals - Metacarpals - Ulna Phalanges - Hind limbs

### **- These consist of the following bones;**

- Femur tarsals
- Tibia metatarsals
- Fibula phalanges

## **Limb girdles**

### **There are two limb girdles i.e.**

Pectoral or shoulder girdles:- made up of clavicle and scapula.

Pelvic or hip girdle:- made up of the pelvis.

**Note:** - The parts of the skeleton are divided into two divisions of the skeleton according to the way how they are arranged in the body.

## **Divisions/Regions of the skeleton**

### **The skeleton is divided into two regions namely.**

- Axial region. - Appendicular region

## **Axial Region**

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

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

### **Parts of the skeleton that make up the axial region.**

- Skull -Back bone -Ribs

## **Appendicular Region**

### **Parts that make up the appendicular region.**

- Girdles -Limbs

### **The human skeleton is made up of four main parts i.e.**

- The skull - The back bone/vertebral column - The limbs - The limb girdles

### **-The human skeleton is made up of 206 bones.**

-The skull has 22 bones and the back bone has 33 bones.

## **Back bone / spine / vertebral column**

- Spinal cord

## **c) Rib cage / Ribs**

- Heart -Lungs

**a) Pelvis / Hip girdle**

- Reproductive organs

**e) Eye Socket / Orbit**

- Eyes

**Functions of the skeleton.**

- The skeleton gives the body shape. -The skeleton helps in body movement.
- The skeleton protects the delicate body parts.
- The skeleton provides support to the body.
- The skeleton helps in manufacture of blood cells.
- The skeleton provides room for muscle attachment.

**Assessment exercise.**

1. State two components of the muscular skeletal system.
2. Define the term skeleton?
3. Explain the following types of a skeleton:  
i) Endoskeleton. ii) Exoskeleton iii) Hydrostatic skeleton
4. Mention two examples of organisms with the following types of skeletons.  
a). Endoskeleton. b) Exoskeleton c) Hydrostatic skeleton
5. What is moulting?
6. Name two examples of organisms that carry out moulting.
7. What do you understand by the term human skeleton?
8. Name the part of the skull that protects the brain.
9. Mention any two body organs protected by the skull.
10. State any two functions of the human skeleton.

**BONES:** are the hardest tissue found in the body of an animal.

- Bones are made up of mineral salts and proteins.
- Bones develop from cartilage through **ossification**.
- **Ossification** is the process by which cartilages turn into bones.
- Is the gradual replacement of cartilage by bones in the body.
- The human body has 206 bones.
- Especially an adult has 206 bones.
- A baby has 300 – 305 bones

**Reason why babies are said to have more bones than adults.**

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

**Different items / substance contained in bones.**

- Blood -Blood cells -Nerves -Living cells

## Mineral salts that make bones and teeth strong

- Calcium -Phosphorous -Iron.

- **Types / classes / groups of bones/classification of bones**

Bones are grouped according to their shape and length namely:

- Long bones    **ii)** Short bones    **iii)** Flat bones    **iv)** Irregular (Shape less) bones

- a) Long bones**

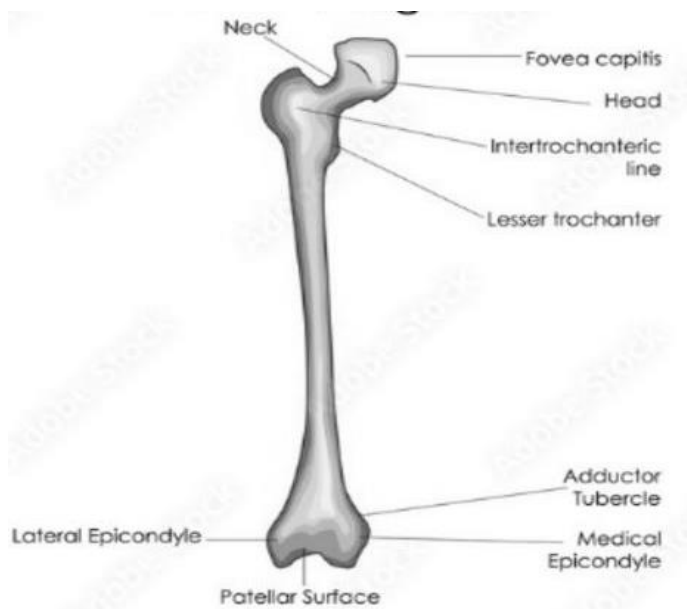
- Long bones are the bones found mainly in the limbs.
- Long bones are cylindrical in shape.
- They have the thick ends that enable them fit in the bone to which they are connected.
- Long bones support the weight of the body and facilitate movement.
- They are mainly found in the limbs (hands and legs)
- They contain the yellow bone marrow used to produce white blood cells.

- Examples of long bones**

- Tibia -Femur -Fibula -Humerus -Radius -Ulna

**NB:- Femur is the longest and strongest bone in the body.**

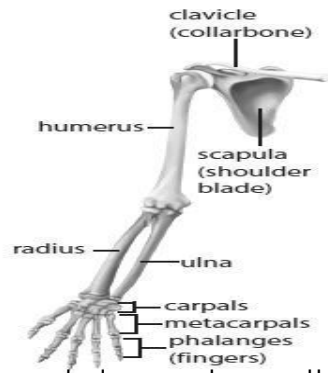
**Diagrams showing the long bones in the body (Femur bone)**



**b) The tibia and fibula.**

- i) The bones of the lower parts of the legs.
- ii) The tibia is the long bone of the lower leg; it connects with the femur to form the knee joint.
- iii) The tibia is much larger than the fibula.
- iv) The fibula is the thinnest of the lower leg which helps to maintain balance.

## Illustration showing Humerus, Radius and Ulna



- NB: Humerus, Radius and ulna make up the upper limbs (hands)
- The **Humerus** is the only long bone of the upper part of the arm.
- The **Radius** is the one of the long bones of the forearm which connects with the humerus to form the elbow.
- The **Ulna** is also one of the long bone of the forearm which connects with the humerus to form the elbow.

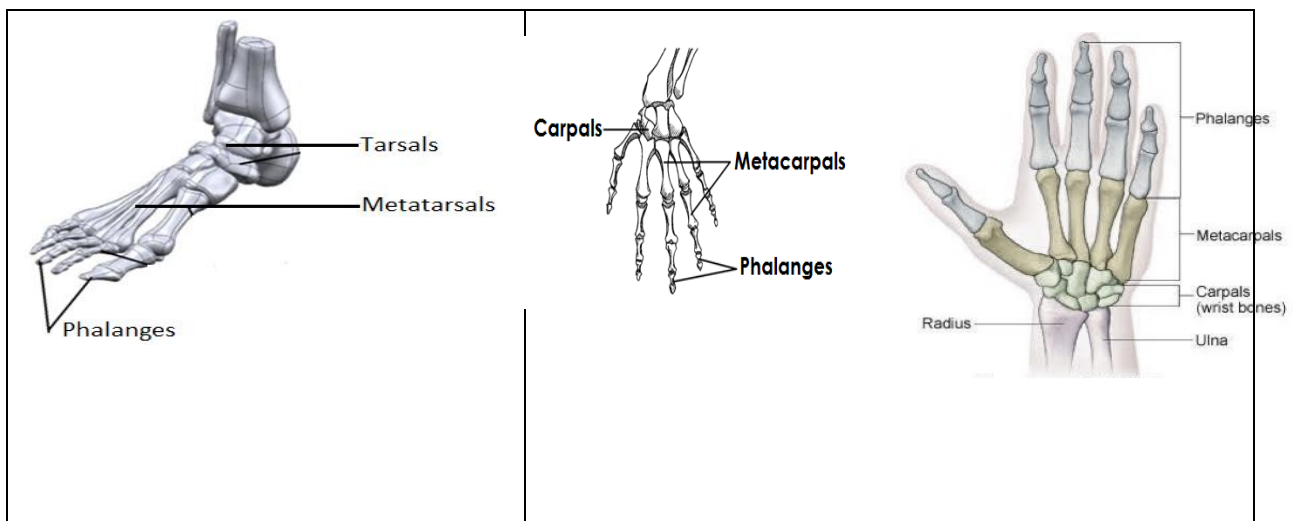
### **c) Short bones**

- Short bones are bones found mainly in the feet and hands.
- They consist of soft material covered with thin layer of the harder bone.
- They look like cubes and some are round in shape.
- They are mainly found at the wrist and ankle.

#### **Examples of short bones**

- Carpals: - Small bone of the wrist.
- Tarsals: - Small bone of the foot.
- Metacarpals: - Small bone of the hand.
- Phalanges: - Bone of the fingers and toes.

#### **Diagrams showing short bones of the wrist and foot**



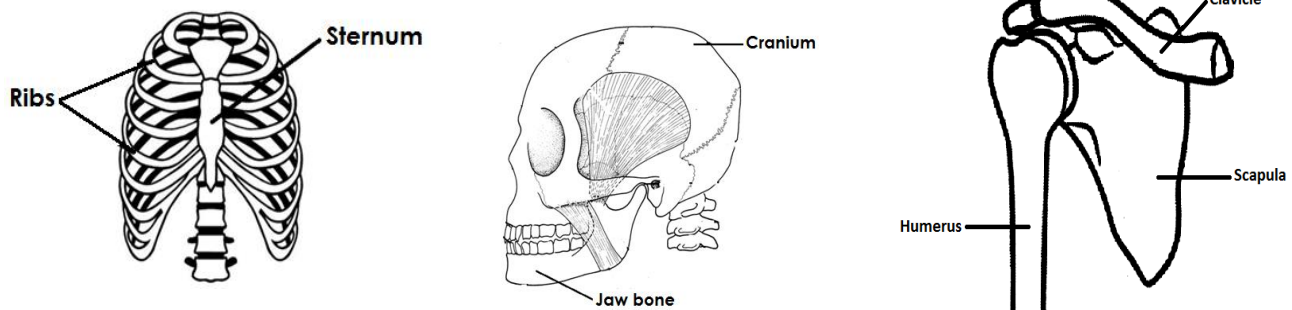
### **d) Flat bones**

- These bones are thin flat and are protective in nature that is to say they protect delicate body organs.
- They also provide a large surface area of attachment for muscles.
- They contain red bone marrow used to produce red blood cells.

### Examples of flat bones in the body.

- Bones of the skull (Cranium) -Scapula / shoulder blade -Jaw bones
- Sternum / breast bones -Ribs -Pelvis -

### Illustration showing flat bones



### e) Irregular bones: -

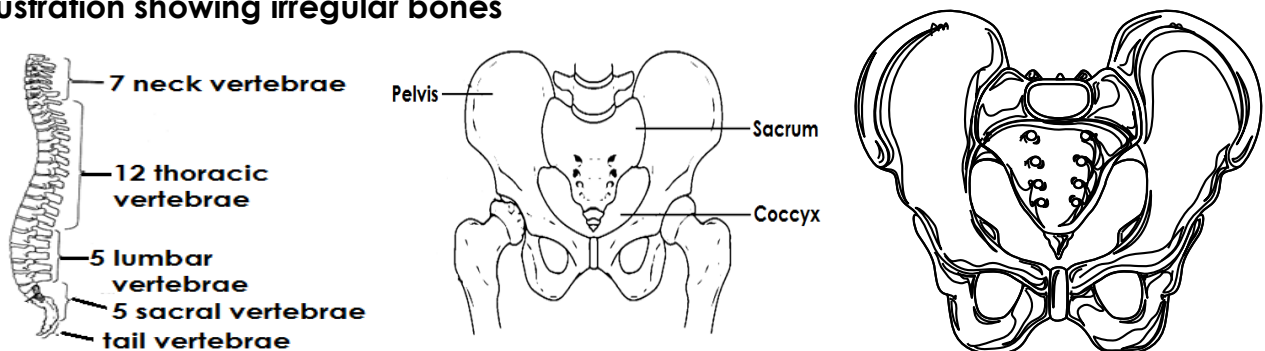
- These are named from having irregular shape and improper shape.
- Irregular bones vary in shapes and structure and therefore do not fit into any other category.
- They fairly have complex shape which helps to protect internal organs.

### Examples of irregular bones in the body.

- Vertebrae column bones -Pelvis -Sacrum/tail bone -Ear ossicles -Bones of the neck vertebra.

**Note:** - The shortest and smallest bone in the body is called **stapes/stirrup** found in the middle ear among the ear ossicles

### An illustration showing irregular bones



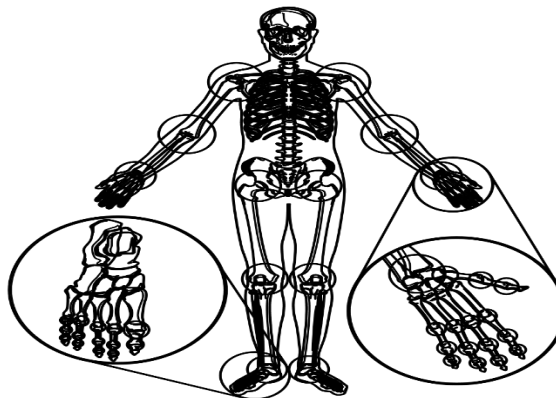
### Assessment exercise

1. Name the hardest tissue in the human body.
2. State the process through which bones develop from the cartilage.
3. What is meant by the term ossification?
4. List any two mineral salts that make up bones.
5. Write down one of the four main bones in the human body.
6. How are thick ends important on the human body?
7. Name two human body parts where the long bones are found.
8. Give one way how long bones are important to the circulatory system.
9. Name the longest and the strongest bone in the human body.
10. Name the shortest and the smallest bone in the body.
11. Mention two body parts where short bones are mainly found in the body.
12. Name the bone that connects the scapula to the ulna and radius.
13. How is fibula bone important in the human in the human body?
14. Name two long bones that that make up the legs.

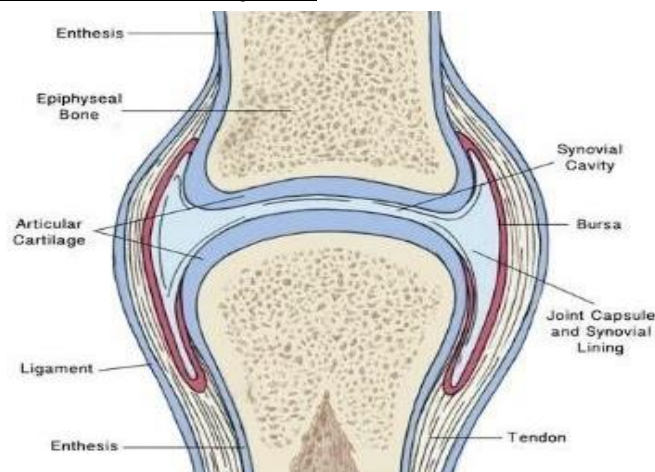
### JOINT

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

#### Joints



#### Diagram showing the structure of a joint.



## **Importance of parts of a movable joint and their functions.**

### **a) Ligament**

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

### **b) Tendon**

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

### **c) Synovial membrane**

- Synovial membrane produces synovial fluid.

### **d) Synovial fluid**

Synovial fluid reduces friction at a joint.

### **e) Cartilage**

- Cartilages are soft, flexible and elastic parts of bones found in animals.
- A cartilage is a connective tissue softer than a bone.
- Cartilages are soft connected tissues in the body.
- A cartilage cushions bones in a joint//They also act as shock absorbers.
- A cartilage reduces friction at a joint.
- They prevent the bone ends from frictional damage after rubbing directly onto each other by acting as a cushion.

#### **Bone marrow**

- A bone marrow is a soft tissue found in a bone.

#### **Parts of the body where we find a cartilage.**

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

#### **Importance of cartilage in the body of animals.**

- They maintain shapes of certain body organs e.g. The nose, wind pipe, ear pinna.
- They form an endoskeleton of some animals e.g. Cartilaginous fish.

#### **Ways how joints are adapted to a friction free movement.**

- They contain synovial fluid which reduces friction at the joint.
- The bones covered with cartilage at the ends which also reduce friction.

#### **Functions of cartilages in the body.**

- A cartilage reduces friction at a bone.      -A cartilage cushions bones.
- A cartilage protects the tip of bones from wear and tear.
- A cartilage allows smooth bending of bones at the joint.

## **Types of joints**

**There are two main types of joints in the body namely:**

- i). Movable joints      ii). Immovable joints

**Movable joints:** is a joint that allows movement in the body.



### Types / examples of movable joints.

- Ball and socket joint. -Hinge joint -Pivot joint -Gliding joint / plane joint.

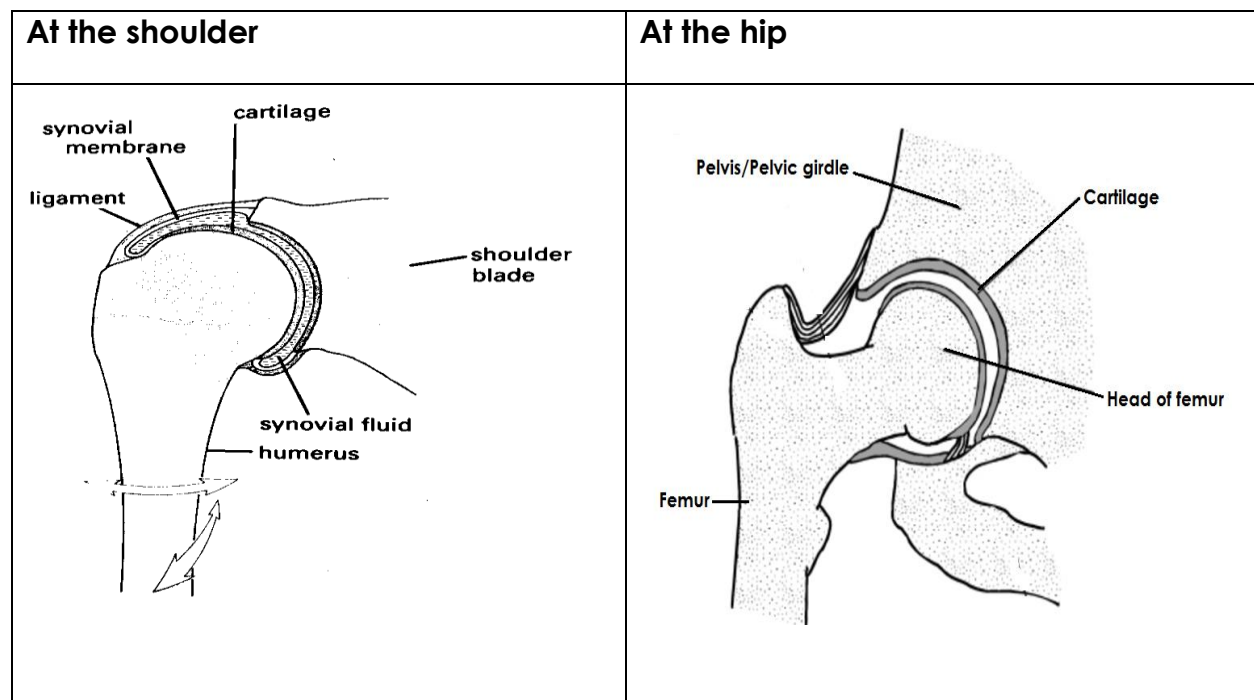
#### 1. Ball and socket joint

- A ball and socket joint is a joint that allows movement in all planes such as forward, backward and sideways.
- These are joints that allow movement in three planes/ all directions.
- They are called so because the ball shaped end of a long bone fits into a hollow part of another bone called a socket.
- They allow free movement of the limbs in the human body.

#### Examples of the ball and socket joints in the body.

- Shoulder joint
- Hip joint

#### An illustration showing the ball and socket joint



#### 2. Hinge joints

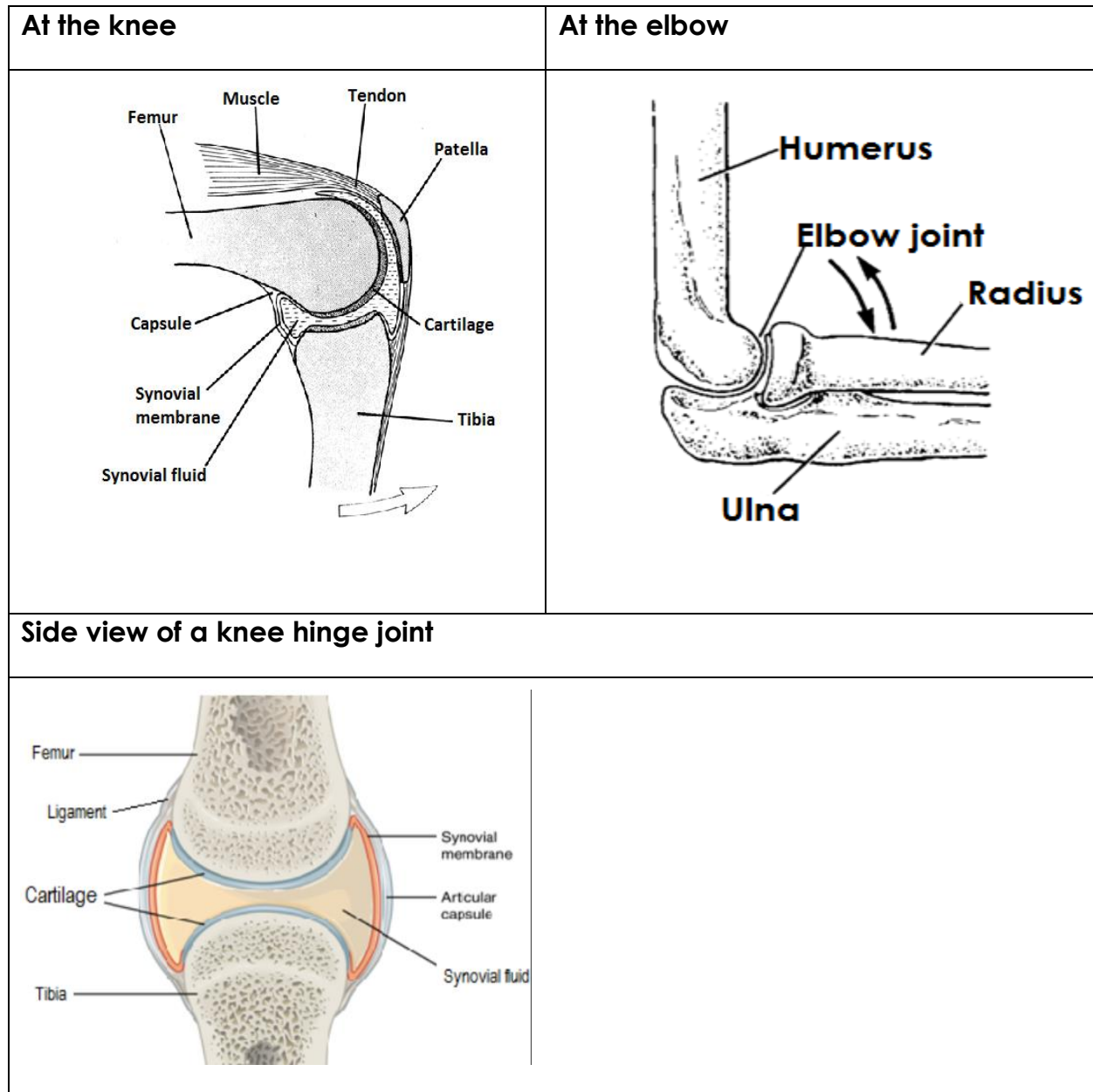
- Hinge joints are movable joints that allows movement in only one plane.
- They allow movement in only two directions that is to say forward and backward movement.
- They are called hinge joint because their movements is like that of a door on its hinges.

#### Examples of hinge joints in the body.

- Knee joint -Elbow joint -Knuckle joints



A diagram showing a hinge joint:

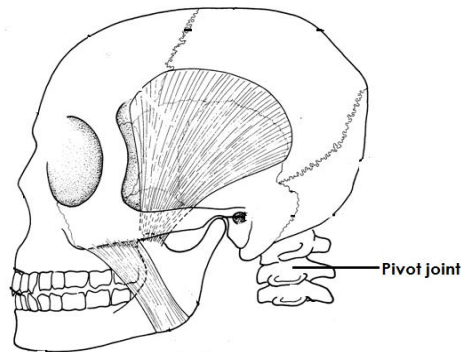


### 3. Pivot joint/rotary joints

- A pivot joint is a joint that allows rotation of certain parts of the body on other parts.
- They consist of a round end of one bone fitting into a ring formed by the other bone.
- These structure allows rotational movement as the rounded bone turns on top of another one.

### Examples of pivot joint in the body.

- The joint where the head is fixed to the neck: between the atlas and axis vertebral bones.
- **A diagram showing the pivot joints at the neck**



### Immovable joints / fixed joints/ fibrous joints

- Immovable joints are joints which do not allow movement in the body.
- Are joints that do not allow any movement between them.

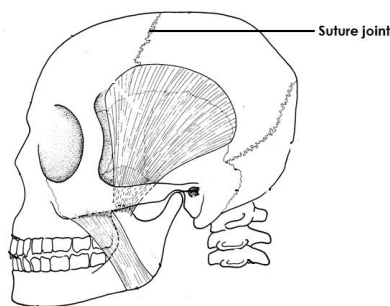
#### Note:

- Immovable joints do not allow movement because the bones are fixed together.

### Examples of immovable joints in the body.

- Suture joints in the skull -joints of the pelvis.

#### **Diagram showing the suture joints of the skull.**



**Note:** - The main function of joints in the body is to allow movement.

### 4. Gliding / Plane joints

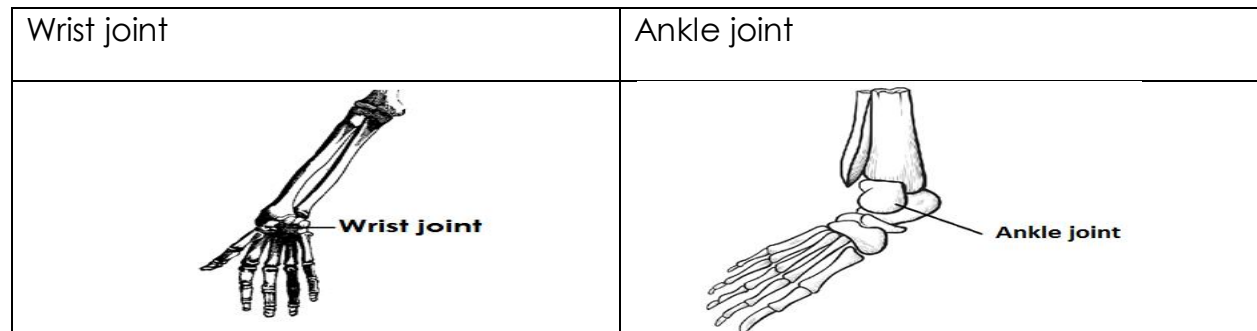
- Gliding joints are joints which allow bones to slide over each other.
- They occur between the surface of two flat bones that are held together by ligaments.
- Some of the bones in the wrists and ankles by gliding against each other.

- They allow flat bones to slide over one another.

### **Examples of gliding joint in the body.**

- Wrist joint      -Ankle joint

### **Diagram showing examples of gliding joints**



### **Functions of joints in the body.**

- Joints allow directional movement in the body.
- Joints allow non-directional movement in the body.

### **Assessment activity.**

1. What is meant by the term joint?
2. State the importance of the following parts of a joint.
  - a). A tendon
  - b). Ligament
  - c). Cartilage
  - d). Synovial fluid
3. Name two structures that helps to reduce friction in a joint.
4. Give any two functions of the joints.
5. Give two examples of mineral salts stored in the bones of the skeleton.
6. State one relationship between the skeletal system and the circulatory system.
7. Name the body parts that are protected by the following parts of the skeleton.
  - a). Ribs
  - b). Pelvis
  - c). The skull
  - d). Vertebral column
8. How is the movement made by hinge joints different from that made by ball and sockets joints?
9. Write two examples of ball and socket joints of the body.
10. What kind of movement is allowed by hinge joint?

### **Muscular system**

- A muscular system is a system of the body consisting of muscle cells having contractile elements.
- The muscular system is responsible for the movement of the human body.

- Most of the muscles are attached to the bones of the skeleton.

## Muscles

- Muscles are bundles of elastic substances found in the body of an animal.
- The muscular belong to the muscular system and they cover the skeleton in our body.
- Muscles contract and relax to produce movement in the body.
- They are connected to bones by **tendons**.

## Types of muscles

- Voluntary muscles / skeletal muscles / striped muscles.
- Involuntary muscles / smooth muscles.

### a) Voluntary muscles

- Voluntary muscles are muscles whose movement can be controlled.
- Voluntary muscles are muscles whose movement is under one's will.
- We control over their movement,
- They are usually attached to the skeleton and that is why they are called **skeletal muscles**.
- The contract and relax in order for the bones to make intentional/conscious movement.
- Any action that a person consciously undertakes involves the use of skeletal muscles.

**Examples of such activities include:** - Running, Chewing **and** writing

**Examples of voluntary muscles in the body include:**

- Biceps (flexor) - Muscles of the jaw - Quadriceps - Triceps (extensor) - Muscles of the back
- Calf muscles.

### Note:

- some voluntary muscles work in pairs but have an opposite effect to each other:
- They are called **Antagonistic muscles**.

## Examples of voluntary muscles in the body include.

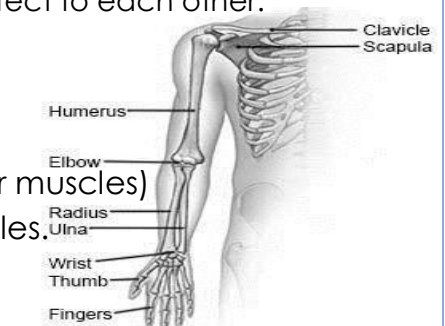
- Biceps muscles (flexor muscles) -Triceps muscles (Extensor muscles)
- Thigh muscles -Quadriceps - Calf muscles - Calf muscles.

## Characteristics of voluntary muscles.

- Voluntary muscles are fibrous.
- Voluntary muscles get tired quickly.
- Movement of voluntary muscles is under one's will.

**Note:** The biceps and triceps muscles are regarded as **antagonistic muscles**.

## ANTAGONISTIC MUSCLES.



- Antagonistic muscles are muscles that work in pairs and have opposite effect on each other.

**Examples of antagonistic muscles in the body include:**

- Biceps muscles (flexor muscles) -Triceps muscles (Extensor muscles)

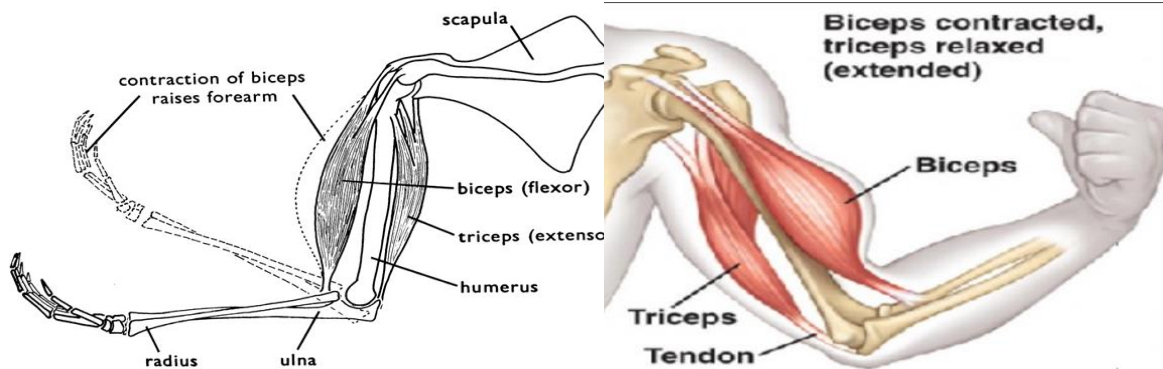
**How antagonistic muscles of the arm work**

- When the arm is straightened, the biceps relax while triceps contract.
- When the arm is bent, the biceps contract while the triceps relax

**Reasons why triceps and biceps are regarded as antagonistic muscles.**

- Biceps and triceps muscles work in pairs and have opposite effect on each other.

**A diagram showing the biceps and triceps muscles**



**Qn. State what happens to the following muscles when the arm is straight.**

- Biceps:** - The biceps relaxes.
- Triceps:** - The triceps contracts.

**Qn. State what happens to the following muscles when the arm is bent.**

- The biceps:-** The biceps contracts.
- Triceps:-** The triceps relaxes.

**Note:**

- Biceps muscles are called flexor muscles because they bend the arm / leg.
- Triceps are called extensor muscles because they extend /stretch the arm / leg.

**b) Involuntary muscles // Smooth muscles.**

- Involuntary muscles are muscles whose movement is not under our will.
- Involuntary muscles are muscles whose movement cannot be controlled.
- Their movement is automatic and we cannot control.
- They don't connect to bones but control organs within our body.

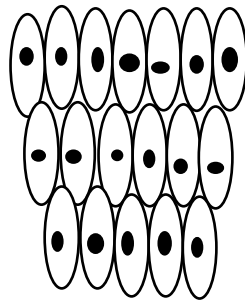
### **Characteristics of involuntary muscles.**

- Involuntary muscles work continuously.
- Involuntary muscles do not get tired quickly.
- Movement of involuntary muscles cannot be controlled.

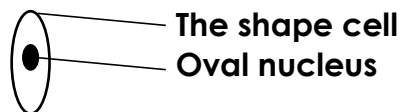
### **Examples of involuntary muscles in the body.**

- Muscles of the heart (cardiac muscles)      -Muscles of the diaphragm.
- Muscles of the stomach.      -Muscles of the intestines. // alimentary canal
- Muscles of the eyelids // ciliary muscles      -Muscles of the excretory system
- Muscles of the reproductive system.      -Muscles of blood.

### **Structure of involuntary (smooth) muscles**



### **A single muscle cell**



### **(C) CARDIAC MUSCLES**

- They are found in the walls of the heart.
- These muscles combine both structures of the voluntary and involuntary muscles.
- They contract and relax alternatively without any nervous stimulation. They move automatically and rhythmically.

### **Examples of cardiac muscles.**

- Muscles of the heart;
- These have the capacity to contract and relax throughout life without getting tired.
- They only stop when the person is dead.

### **Ways how contraction of muscles is important in the body.**

- Contraction of muscles leads to the pumping of blood by the heart.
- Contraction of muscles leads to the exchange of gases in the body.
- Contraction of muscle causes movement of food in the alimentary canal.

## Functions of muscles in the body.

- Muscles join bones in the body. -Muscles help in body movement.
- Muscles enable people to perform heavy activities.
- Muscles protect the organs they surround. - Muscles maintain the body posture.
- Muscles of the eye control the amount of light entering the eye.
- They are used in the storage of oxygen by the help of the **myoglobin** found in the muscles.
- The aid in the breathing e.g. the diaphragm and intercostal muscles.

### Assessment exercise



1. What is meant by the term muscle?
2. Name the structure that connect muscles to bones in the body.
3. Name two types of muscles in the human body.
4. Why are voluntary muscles referred to as antagonistic muscles?
5. Give four examples of voluntary muscles in the human body?
6. What are antagonistic muscles?
7. Name two examples of antagonistic muscles.
8. What happens to the following muscles of the arm:
  - a). when the arm is bent:
    - i). Biceps
    - ii). Triceps
  - b). when the arm is straightened
    - i). Biceps
    - ii). Triceps
9. What are involuntary muscles?
10. Mention any two examples of involuntary muscles in the human body.
11. To which body system do muscles belong?
12. Give two functions of muscles in the human body.

## Diseases and disorders of the skeletal muscular system

### Disorders of the skeletal system

- Dislocation -Fracture such as vertebral fracture, limb fracture.
- Skull deformity -Osteoporosis (weak bones)

#### a) Dislocation

- Dislocation is the displacement of bones at a joint.
- Is when bones move out of their normal position at a joint.
- When the bone is displaced at a joint.
- Dislocation is caused by a twist/severe stretch of the bone.
- This occurs when extreme force is put on a ligament allowing the ends of the two connected bones to separate.

#### Causes of dislocation

- Stepping in a ditch. -Losing a step when walking.

### Signs and symptoms of dislocation.

- Swelling of the affected part. -Pain around the injured part.
- Difficulty in moving the injured part / limb.
- Tenderness around the dislocated joint.

### First aid given to a dislocation.

- Apply ice on the injured site to reduce pain and swelling.
- Wrap a cold wet bandage around the injured part.
- Apply splints or arm sling if it is a severe dislocation to keep the joint in position.
- The **RICE** (Raise the injured part, ice the injured part, compress the injured part and Elevate the injured part.)

**NOTE:** RICE is a common first aid

- Techniques given to Sprains, Strains and Dislocation.

### b) Fractures.

- A fracture is a cracked or broken bone in the body.

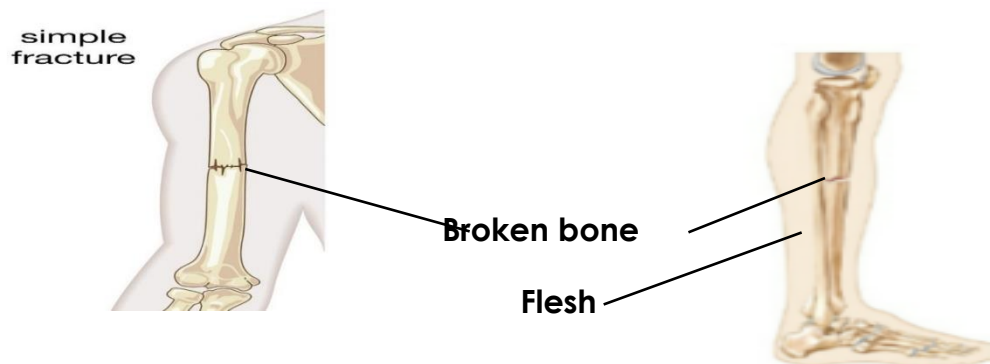
### Types of fractures.

1. Simple fracture (closed fracture)
2. Compound fracture (open fracture)
3. Green stick fracture
4. Comminuted fracture
5. Depressed fracture.

### 1. Simple fracture

- is a type of fracture where the bone breaks and remains inside the skin or flesh.

### Illustration showing simple fracture



### Signs and symptoms of a simple fracture.

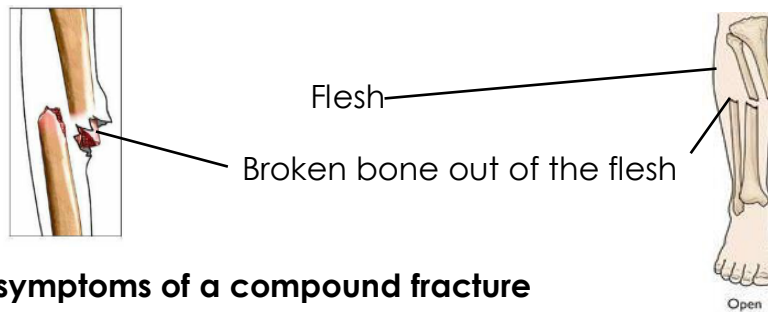
- The broken bone does not come out of the flesh/skin.
- Swelling of the injured part.
- The injured part appears crooked.
- Difficulty in movement.
- Pain around the injured part.



## 2. Compound fracture

A compound fracture is a type of fracture where the bone breaks and comes out of the flesh or skin.

- This is when the bone breaks and comes out of the skin (flesh).



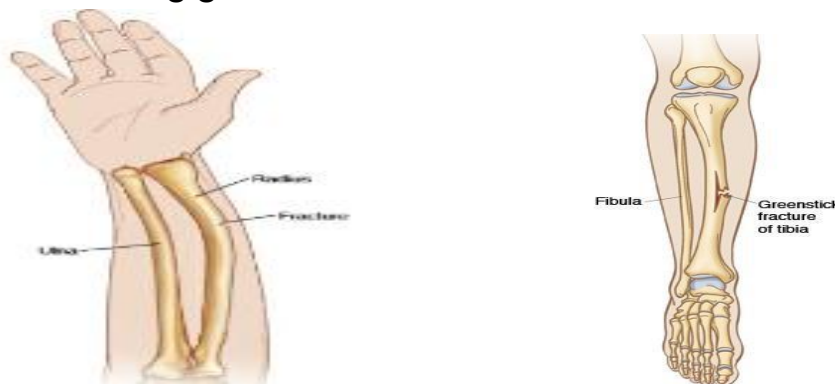
## Signs and symptoms of a compound fracture

- The broken bone comes out of the flesh.
- Torn flesh
- Wounds around the injured part.
- Swelling of the injured part.
- Bleeding around the injured part.

## 3. Green stick fracture

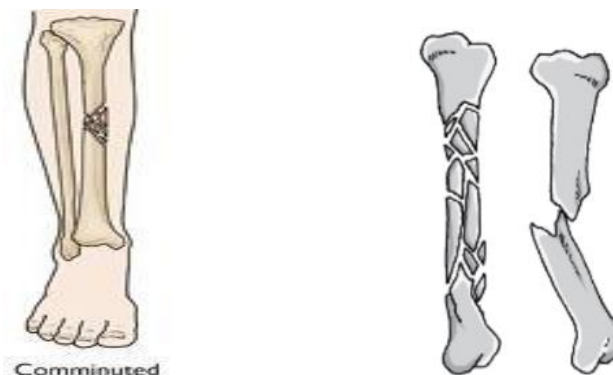
- A green stick fracture is a type of fracture where the bone cracks or bends.
- This is a type of fracture where the bone does not break completely. Part of the bone remains attached.
- It is common among babies/children

## Illustration showing green stick fracture



## 4. Comminuted fracture.

This is a type of fracture where the bone is broken into many small bones (several parts)



### **Signs of fracture**

1. Severe pain and tenderness of the site of injury.
2. Failure to move the fractured part with ease.
3. Bleeding of the wound in case of a compound fracture.
4. In case of a compound fracture, the bone is seen pushing out of the skin.
5. Swelling and bruising of the fractured part
6. The injured limb may be shortened or may lie in an unusual position. □
7. The broken limb appears crooked.

### **Reasons why green stick fracture is common in children**

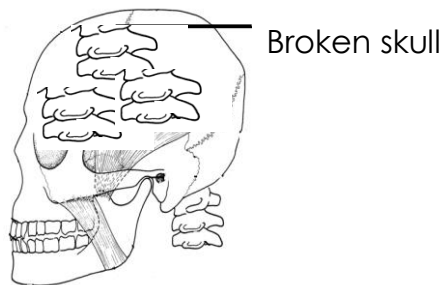
- Children have cartilage-like bones.
- Children have soft bones.

### **Signs and symptoms of a fracture.**

- Swelling of the injured part.
- Bleeding of the injured part.
- Pain around the injured part.
- The broken bone tears the flesh in case of a compound fracture.

### **5. Depressed fracture.**

Is the breaking of the skull.



### **First aid given for a fracture.**

- Tie splints around the injured/broken part.
- Provide crutches for the victim to move.
- Use a stretcher to carry the victim to hospital.

### **Why are splints used for giving first aid for fractures?**

- - To keep the broken bone in one position.
- - To immobilize the broken bone.

### **First aid tools used when giving first aid for fracture.**

**Stretcher:-** for carrying the casualty to the hospital.

**Arm sling:-** Supports the broken arm

### **A diagram showing tools used when giving first aid for fracture.**

Crutches	Stretcher	Arm sling.
		

### **c). Sprains and strains**

#### **i). Sprain**

- A sprain is a torn or stretched ligament.
- Sprains mainly affect the ankles and wrists.

#### **ii). Strains**

- A strain is a torn or stretched tendon or muscle.
- It is caused by twisting or pulling of the muscles or tendon.
- Strains result from over working the muscles or tendon.

### **Signs and symptoms of sprains and strains.**

- A lot of pain around the injured part. -Swelling around the injured part.
- Difficulty when moving the injured part. -The affected parts become hot.
- Tenderness around the strained area.

### **First aid is given for a sprain or strain?**

- Keep the injured part in rest position,
- Wrap a wet cold bandage around the injured part to reduce swelling.
- Massage on the injured part with liniment, this help to reduce swelling and pain.
- Wrap a piece of ice around the injured part.
- In case of a severe sprain or dislocation splints should be used.

#### **Assessment activity**



1. State any two disorders of the following body systems.
  - a). Skeletal system
  - b). Muscular system,
2. What is meant by the term fracture?
3. Name any two types of fracture.

4. In which type of fracture does the broken bone stays inside the body?
5. State any two characteristics of simple fracture.
6. Name the type of fracture which is common among babies.
7. Why is the above type of fracture common among babies?
8. What type of fracture affects the skull?
9. What first aid can be given to a person with fracture.
10. How are the following important in giving first aid for fracture?  
 a). Splints                                      b). Stretcher                                      c). Arm sling.
11. What is meant by the term dislocation?
12. Write down two symptoms of dislocation,
13. Give one first aid measures for dislocation.

### **Diseases of the muscular skeletal system**

- Polio //poliomyelitis. -Tetanus

#### **Disorders of the muscular system.**

- Sprain -Strain -Muscle cramps -Cuts -Wounds

### **Diseases of the skeletal system**

- Polio//Poliomyelitis -Rickets -Bone cancer -Leprosy -Osteomyelitis -Tetanus
- Achondroplasia -Tuberculosis (Tuberculosis of the bones/spine). -Arthritis.

#### **a) Polio**

- Polio is caused by polio viruses which attacks the nerves cell and spinal cord causing paralysis.
  - It is immunisable diseases that affects the skeletal system and nerves.
  - It affects the limbs (arms and legs).
  - It attacks both muscles and bones.
  - The virus can be spread through drinking contaminated water with polio viruses
- NB: The virus is called poliovirus.

#### **A child suffering from polio**



#### **Ways how polio spreads**

- Through drinking contaminated water.
- Through eating contaminated food.
- Through faeces.

#### **Signs / symptoms of polio**

- Fever -Paralysis of one limb. -Weakness in one limb. -Inability to move the legs.
- Thinness of the limbs. -Headache -Vomiting Back and neck pain.

## Prevention and control of the spread of polio.

- Immunizing children using polio vaccine.
- Always drink boiled water.
- Wash hands with clean water before eating food.
- Proper disposal of faeces

**Note:** - There is no cure for polio, it can mainly be prevented by immunization

## c) Tuberculosis of the spine (bone).

- Tuberculosis is immunisable disease.
- It is caused by a bacterium called mycobacterium bovis, which travel through the blood from the lungs into bones of the spine. **A child suffering from tuberculosis**
- It affects the bone marrow and spinal cord.



## How tuberculosis of the spine is spread

- By droplet infection through air.
- Through drinking unboiled milk from a cow having tuberculosis (**tubercular**).
- Through drinking contaminated milk.

## Signs of tuberculosis.

-Persistent cough    -A lump grows on the spine.    -Failure to walk.

## Symptoms of tuberculosis.

Long lasting backache.    Paralysis in the bones.    -Pain in the backbone.

- Swelling of the spine.

## Control and prevention of tuberculosis.

- Immunizing children at birth using BCG vaccine on the right upper arm.
- Isolating infected people with TB.
- Treating infected people with TB.
- Drinking boiled milk.

## d) Rickets

- Rickets is a deficiency disease caused by lack of vitamin D in the diet.

## Signs of rickets.

- Oxbow legs    -Knock knee legs

## Ways of preventing rickets.

- Eating foods rich in vitamin D.    -Sun bathing children in the morning sunshine.

### e). Tetanus

- Tetanus is caused by bacterium called colostridiumtetani but mostly live in the soil.
- It affects the muscular skeletal system. **A child suffering from tetanus**
- Tetanus is immunisable disease.
- Tetanus bacteria enters the body through fresh wounds (cuts)
- In new bone babies' tetanus enters through umbilical cord.



#### **How tetanus germs enter the body.**

- The bacteria enter our bodies through open cuts and wounds on the body.
- Also through umbilical cord at birth if cut with unsterilized instrument.

### **Signs and symptoms of tetanus.**

- Stiff muscles all over the body. –Sensitive when touched. –Diarrhea - Sweating.
- The baby stops suckling the mother's breasts. –Difficulty in breathing. – High Fever.
- Rapid heartbeat- General body weakness. -Uncontrolled jerky body movements.

### **Prevention /control of tetanus.**

- Always cover open wounds using sterilized bandages.
- Early treatment of the infected person.
- Early Immunization of children using DPT vaccine at 6, 10 and 14 weeks on the left upper thigh.
- Immunizing girls at the age of 15 and above and pregnant mothers using tetanus toxoid (TT vaccine)

### **f). Bone cancer.**

- It is characterized by uncontrolled growth of the bone cells.
- It is mainly treated through surgery.

### **g). Paget's disease.**

- It affects the bones and causes the affected bones to become large.
- It is commonly spread genetically and its cause is not known.

#### **Control and prevention of Paget's disease.**

- Exposing the patients to sunshine - Avoiding weight gain.
- Feeding the patients on food rich in calcium.
- Doing regular physical body exercises.

## **Prevention and control of diseases and disorders of bones and muscles.**

- Feeding on food rich in a balanced diet. - Doing regular physical body exercises.
- Eat food rich in calcium and phosphorus for strong bone formation.
- Going for regular medical checkups. Boiling water for drinking to prevent polio.

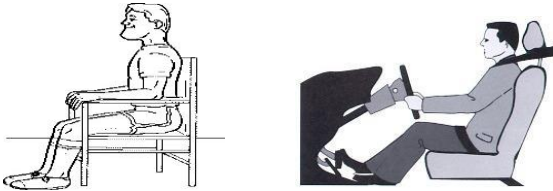



## **Posture**

- Posture is the position of the body in everything we do.
- Is the way a person positions his/her body when sitting, standing and walking.

**Examples of posture includes:** - Sitting posture. -Running posture. -Standing posture.

## **A good sitting posture.**

- Always sit upright without bending.
- Always tighten the ankle / knees during movement.
- Always place both feet on the floor during movement.
- Always put all body weight on both buttocks when sitting.

<b>good sitting posture</b>	<b>bad sitting posture</b>
	
<b>Good walking posture</b>	<b>Bad walking posture</b>
	

## **Advantages/importance of good posture.**

- Good posture promotes the proper growth of bones.
- Good posture promotes proper working of body organs.
- Good posture strengthens the muscles of the stomach, intestines and diaphragm.
- Good posture helps the skeletal system to develop straight and upright.
- Good posture prevents deformation of bones.
- Good posture helps to promote proper digestion of food.

## **Effects/Dangers of poor/bad posture**

- Bad posture leads to growth of deformed bones -Bad posture leads to indigestion.
- Bad posture leads to backaches. –It affects the body balance
- It makes it hard to digest food. – it makes breathing hard

## **Ways /Human health that helps to maintain/keep the proper functioning of the skeletal muscular system.**

- Have regular physical exercises. –Feeding on foodstuffs rich in a balanced diet.
- Immunize children against killer diseases. –Maintaining proper body posture.
- Having enough rest and sleep.

## **Advantages / importance of having regular physical exercises.**

- Physical exercises promote the proper functioning of the body organs.
- Physical exercises make the heart muscles to grow stronger.
- Physical exercises enable the joint to become flexible.
- Physical exercises reduce the amount of fats in the body.
- Physical exercises reduce risks of heart diseases.
- Physical exercises enable digestion of food to be carried out smoothly.
- Physical exercises make ligaments and tendons strong.



## **Assessment activity**

1. Name the deficiency disease of the skeleton that leads to bow shaped legs in children.
2. Give any two signs of the disease named in a) above.
3. State one way how the above disease can be prevented among children.
4. Name the germ that causes polio.
5. State two ways through which polio is spread.
6. Write down two signs and symptoms of polio.
7. Name the germ that causes tetanus.
8. Give one way how tetanus is spread.
9. Why are pregnant mothers immunize using tetanus toxoid vaccine?
10. Give any three signs and symptoms of tetanus.
11. Write down two ways how tetanus can be prevented.
12. Write down three ways how the skeletal system can be kept healthy.
13. State three importance of carrying out regular physical body exercises.
14. What is meant by the term posture?
15. Give two importance of good posture.
16. In which three ways does poor posture affect the body.





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- This book gives basic and applicable skills to pupils that are useful in your daily life when approaching questions.
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➤ This book also designed to equip teachers' and help them prepare children for the upcoming Examinations.

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The End