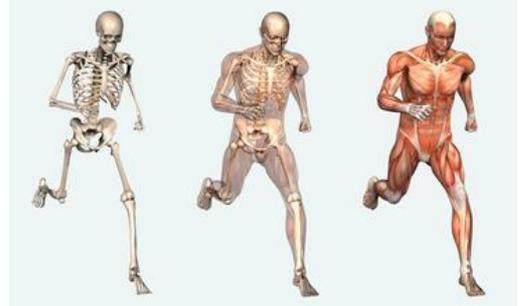


Human Locomotor System

1. Introduction

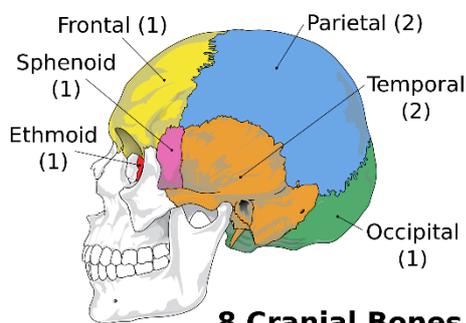
The **human musculoskeletal system** (also known as the **locomotor system**) is an organ system that gives humans the ability to move using their muscular and skeletal systems. The musculoskeletal system provides form, support, stability, and movement to the body.

This system describes **how bones are connected** to other bones and muscle fibers via connective tissue such as **tendons** and **ligaments**. The **bones provide stability** to the body. **Muscles keep bones in place and also play a role in the movement of bones**. To allow motion, different **bones are connected by joints**. **Cartilage** prevents the bone ends from rubbing directly onto each other. Muscles contract to move the bone attached at the joint.

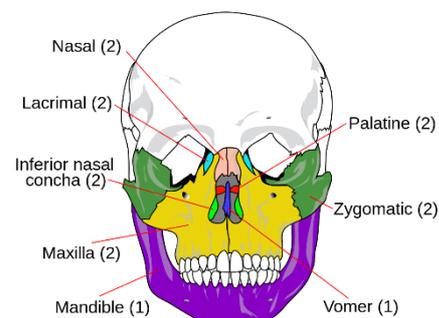


2. The skeleton and their most important bones

- ❖ **Skull:** The skull consists of 8 cranial bones and 14 facial bones. The cranial bones are: frontal, occipital, ethmoid, sphenoid, and one by side (left and right) parietal and temporal. The facial bones are: inferior nasal concha (2), lacrimal bones (2), mandible, maxilla (2), nasal bones (2), palatine bones (2), vomer; zygomatic bones (2)



8 Cranial Bones

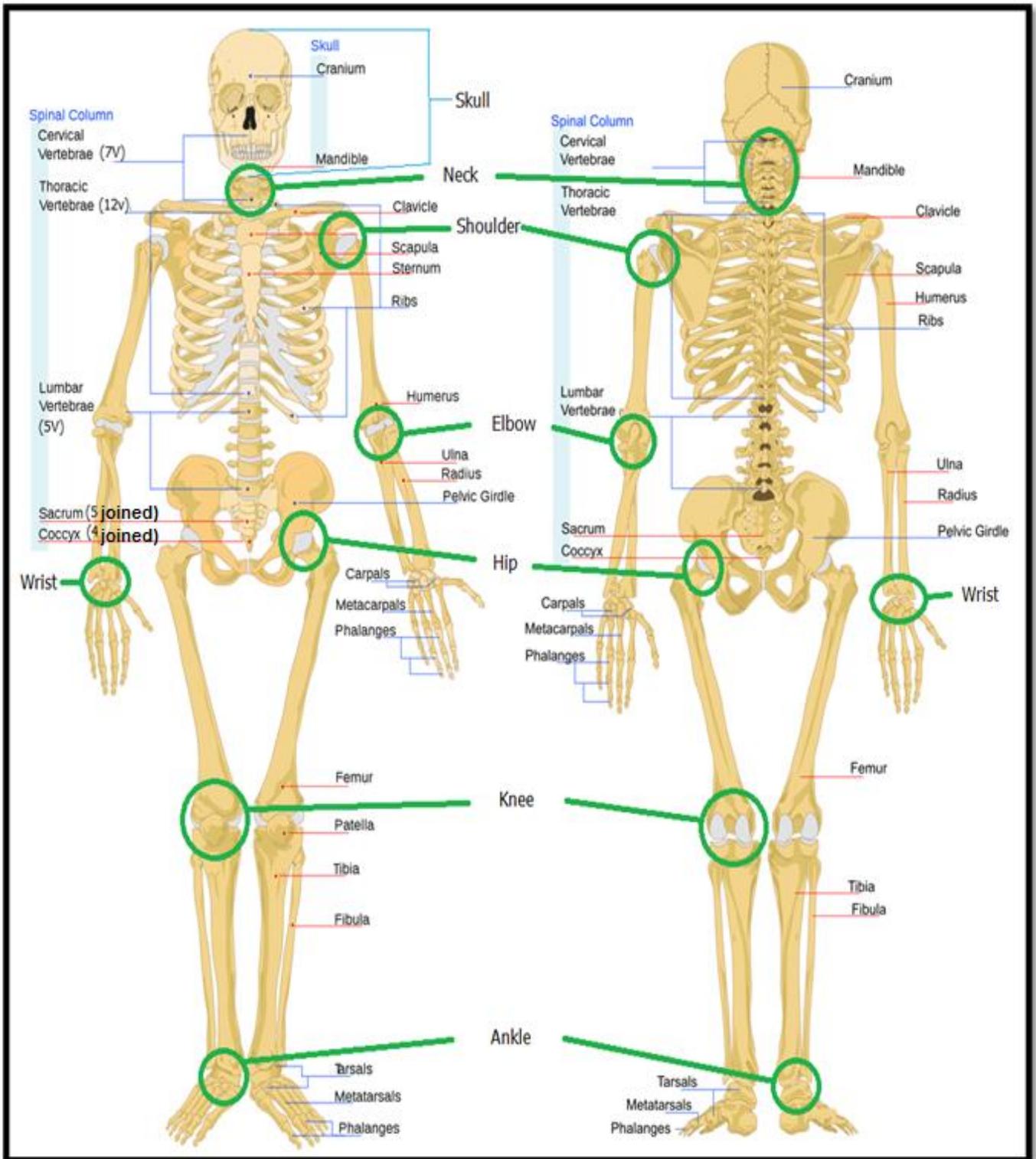


14 Facial Bones

- ❖ **Spinal column:** If you can stand upright, hold your head, bend or turn you it is thanks to the **spine**, made up of 33 bones called **vertebrae**. In the upper part, the **seven** beginning vertebrae are the cervical spine zone, named **neck**. In the middle part of the spine are **twelve thoracic** vertebrae. In the lower part, spine are composed by lumbar vertebrae (5

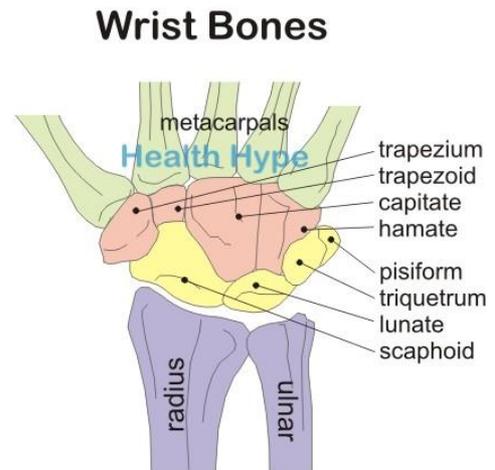
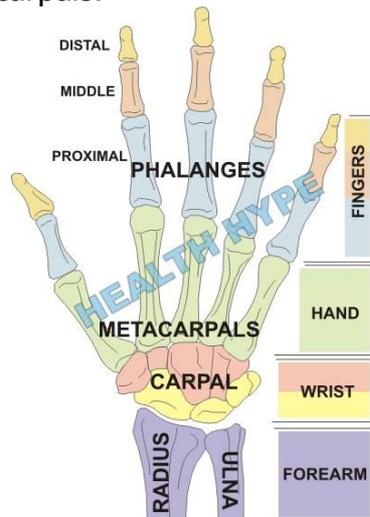
bones), sacrum (5 bones joined) and **coccyx** (3-4 small bones, a remnant of the mammal's tail). Between two vertebrae is the **intervertebral disc**.

- ❖ **The ribcage:** It protects important organs like the heart or lungs. Its main bones are **sternum** and **ribs** (12 ribs by side). Arms are connected to the trunk (ribcage) by **scapula** and **clavicle**.
- ❖ **Arm bones:** In the **forearm** you have two bones, the **ulna** and **radius** are joined by the top with the **humerus** is the arm bone. This bones are joined in the elbow. The humerus is connected to the scapula in the **shoulder**.

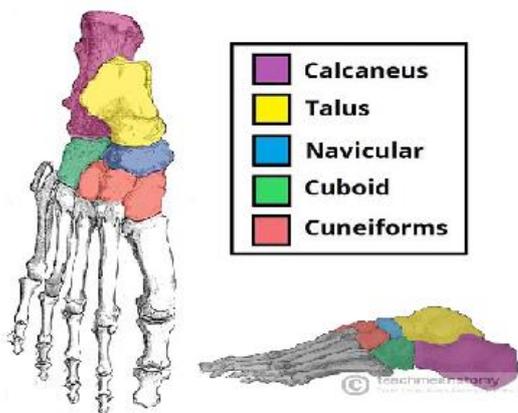


DID YOU KNOW? If between the vertebrae there were no intervertebral disc, that work as shock absorbers, the easiest jump will be enough to damage functions brain.

- ❖ **The hand bones:** The wrist itself is known as the carpus and is made up of eight carpal bones (**pisiform, triquetrum, lunate and scaphoid** form the proximal row of bones, next to the radius and ulna. The **hamate, capitate, trapezoid and trapezium** form the distal row). It also articulates with the hand bones known as the metacarpals of which there are five in the human hand. These metacarpals in turn articulate with the finger bones known as the phalanges. In the four fingers, excluding the thumb, there is three finger bones known as the proximal, middle and distal phalanges. The thumb has only two finger bones – the proximal and distal metacarpals.



- ❖ **The leg bones:** To connect the spine with legs is the **pelvis**. **Femur** is connected with the upper part of the body by the **hip**; this joint is formed by femur and pelvis. The lower extremities of the body beginning with the **femur** that link from the hip to the **knee**. Below the femur are the tibia and fibula that connect with the femur by the patella in the knee joint.
- ❖ **The foot bones:** The foot is made up of **tarsal** bones, **metatarsals** and **phalanges** of the foot. The union of the foot bones with leg occurs in the **ankle** joint.



The **proximal tarsal** bones are the **talus** and the **calcaneus**. They form the bony framework around the proximal ankle and heel area.

The **intermediate row** of tarsal bones contains one bone, the **navicular** (given its name because it is shaped like a boat).

In the **distal row**, there are **four** tarsal bones – the **cuboid** and the three **cuneiforms**. These bones articulate with the **metatarsals** of the foot.

The **metatarsals** are located in the midfoot, between the tarsals and phalanges. They are numbered I (**thumb**) to V.

The **phalanges** are the bones of the toes. Toes II to V toes have three phalanges – proximal, intermediate and distal. The great toe only has proximal and distal phalanges

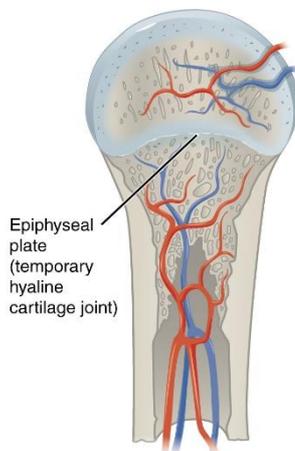
3. The joints.

The joints used to connect the bones that compose the skeleton. They are formed by cartilage and ligaments and allow you to bend the various extremities of your body. Surely, with the name of the joints you have no problem because we remember every day during the warm-up exercises, but you can find in the upper illustration inside of green circles.

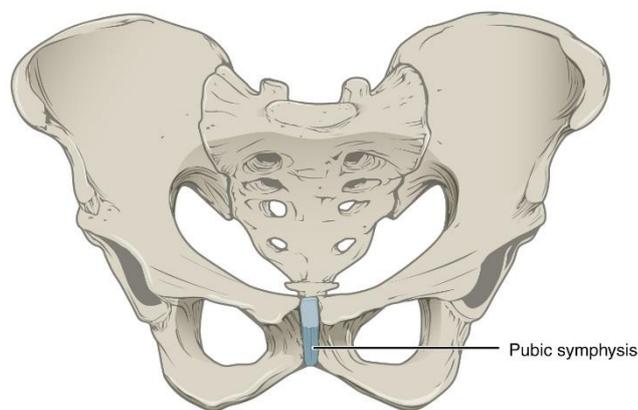
There are three main types of joints; **Fibrous** (immovable), **Cartilaginous** (partially moveable) and the **Synovial** (freely moveable) joint.

Cartilage: thin layer overlying the bone extreme to avoid friction.
Ligament: soft and tough tissue that

- Fibrous joints (synarthrodial): This type of joint is held together by only a ligament. Examples are where the teeth are held to their bony sockets and at cranial bones (see de picture above).
- Cartilaginous (synchondrosis and symphysis): These joints occur where the connection between the articulating bones is made up of cartilage for example between two vertebrae in the spine (picture right) or pubic symphysis (picture below (b))



(a)

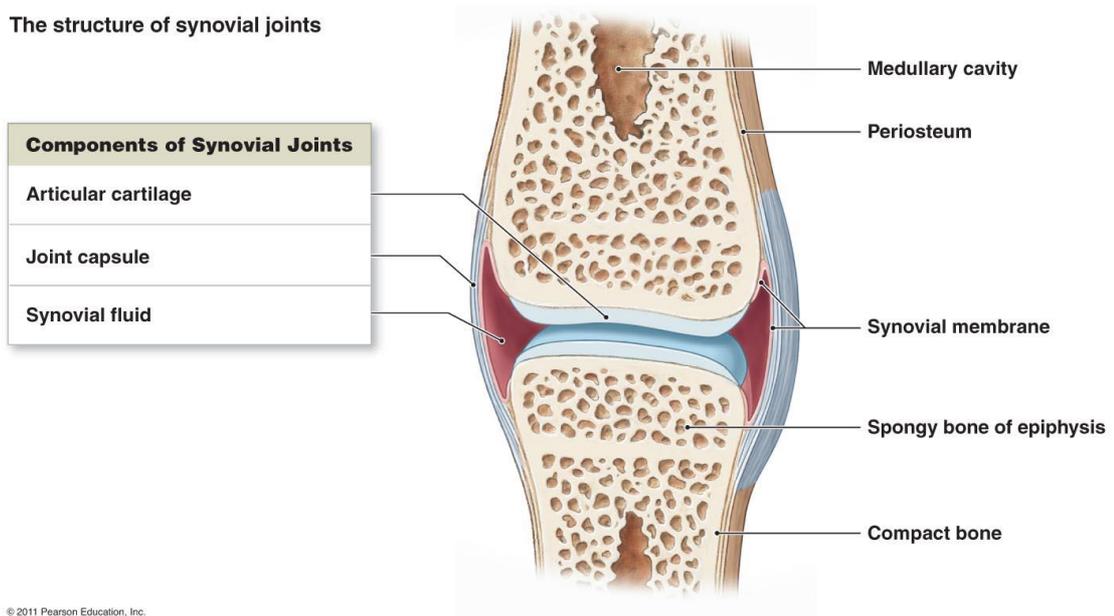


(b)

Synchondrosis ((a) picture above) are temporary joints that are only present in children, up until the end of puberty. For example the **epiphyseal plates** in long bones. Symphysis joints are permanent cartilaginous joints, for example the pubic symphysis.

- c. Synovial Joints (diarthrosis): Synovial joints are by far the most common classification of joint within the human body. They are highly moveable and all have a synovial capsule (collagenous structure) surrounding the entire joint, a synovial membrane (the inner layer of the capsule) which secretes synovial fluid (a lubricating liquid) and cartilage known as hyaline cartilage which pads the ends of the articulating bones.

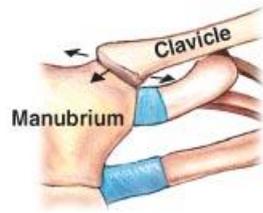
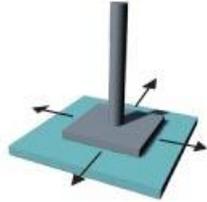
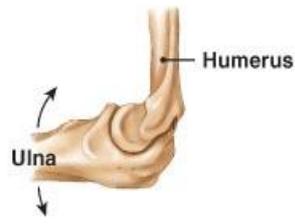
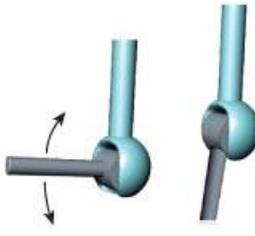
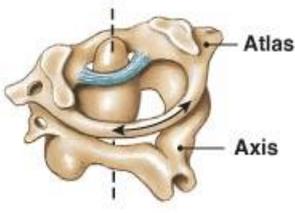
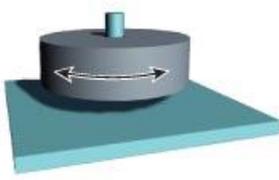
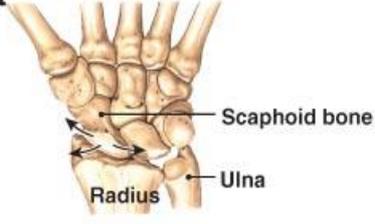
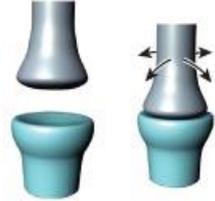
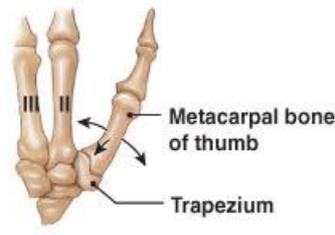
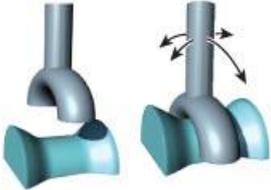
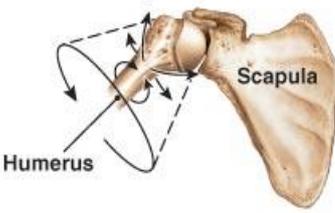
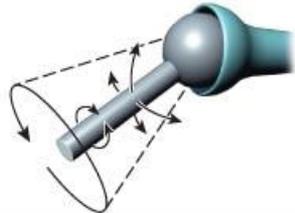
The structure of synovial joints



There are 6 types of synovial joints which are classified by the shape of the joint and the movement available.

- Gliding - intercarpal and intertarsal
- Hinge - elbow
- Pivot - head of radius in radial notch
- Condylod - metacarpophalangeal
- Saddle - carpometacarpal
- Ball-and-socket - shoulder

The anatomical types of synovial joints, with joint models and examples

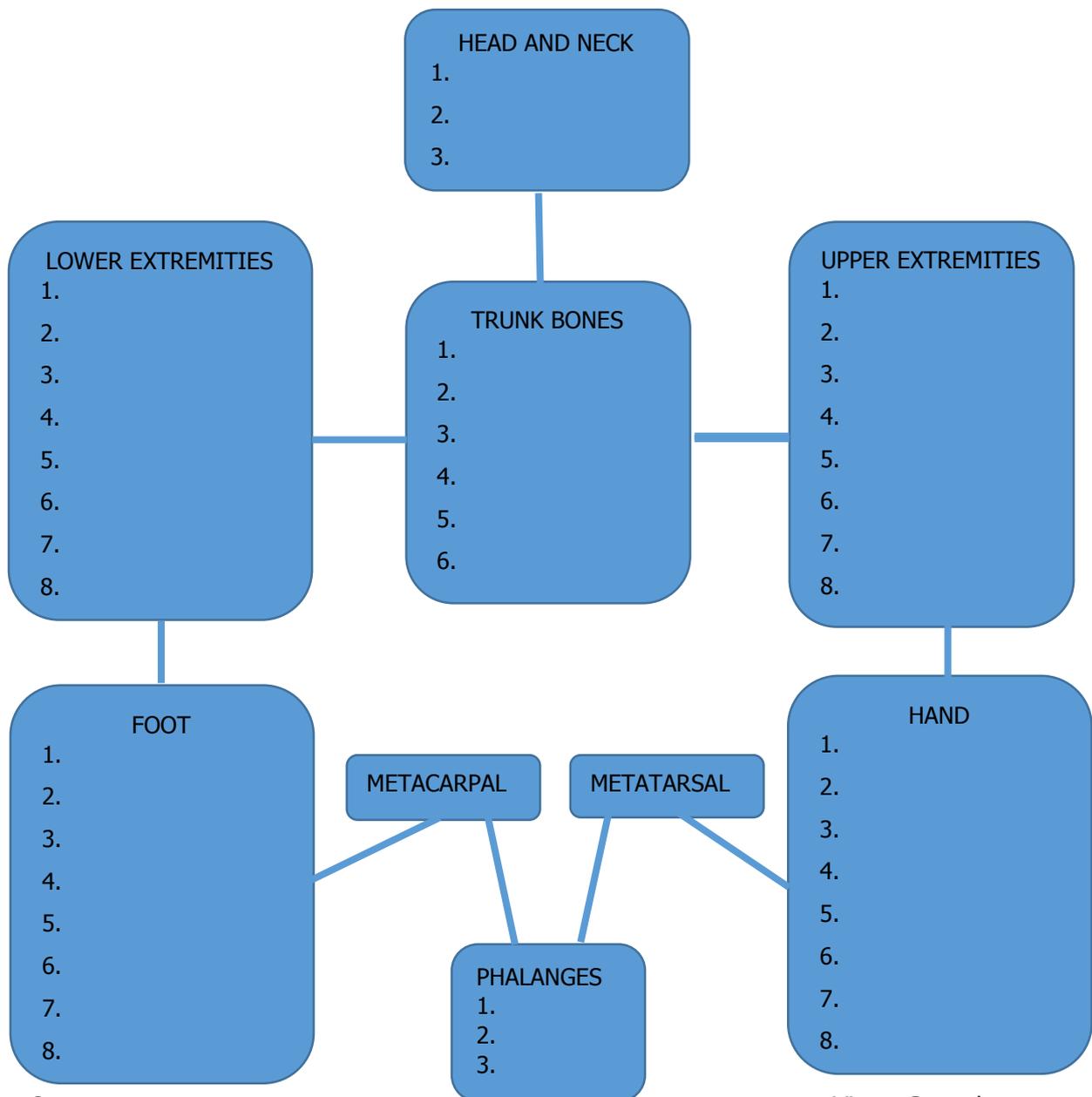
Types of Synovial Joints	Models of Joint Motion	Examples
<p>Gliding joint</p> 		<ul style="list-style-type: none"> • Acromioclavicular and sternoclavicular joints • Intercarpal and intertarsal joints • Vertebrocostal joints • Sacro-iliac joints
<p>Hinge joint</p> 		<ul style="list-style-type: none"> • Elbow joints • Knee joints • Ankle joints • Interphalangeal joints
<p>Pivot joint</p> 		<ul style="list-style-type: none"> • Atlas/axis • Proximal radio-ulnar joints
<p>Ellipsoid joint</p> 		<ul style="list-style-type: none"> • Radiocarpal joints • Metacarpophalangeal joints 2-5 • Metatarsophalangeal joints
<p>Saddle joint</p> 		<ul style="list-style-type: none"> • First carpometacarpal joints
<p>Ball-and-socket joint</p> 		<ul style="list-style-type: none"> • Shoulder joints • Hip joints

5. Activities.

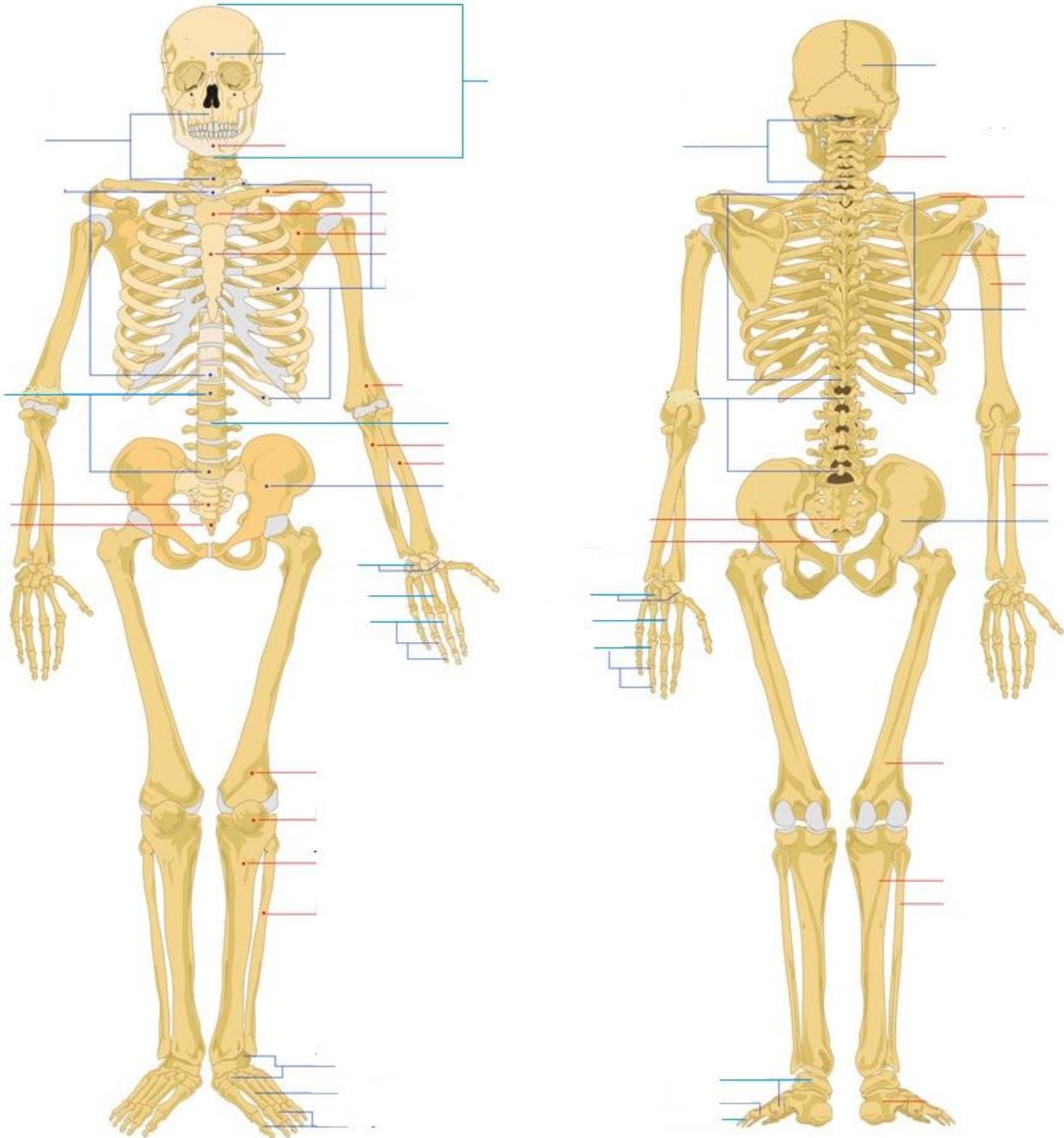
1. A good trick to store and organize what we have learned, is to make an outline. Organizes the bones of the body that we have learned in groups. Put each of them in the correct box. To avoid mistakes, fill it first to other paper, and when you are reliable, complete the diagram. If in doubt, you can help Internet or any book you have on hand.

Here you have all the bones that we have learned:

Cranium – mandible - cervical vertebrae - thoracic vertebrae - lumbar vertebrae – sacrum – coccyx - pelvic glide – sternum – ribs – clavicle – humerus – ulna – radius – carpal (specify) – metacarpal (specify) – phalanges – femur – patella – tibia – fibula – tarsal - metatarsal.



2. Fill the bones picture with the correct bones names. If you have any question, check the picture above.



3. Now, write a list with all body joints, and include whose are the bones that compose them.

Shoulder: humerus, scapula and clavicle.

...

6. Information Resources.

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