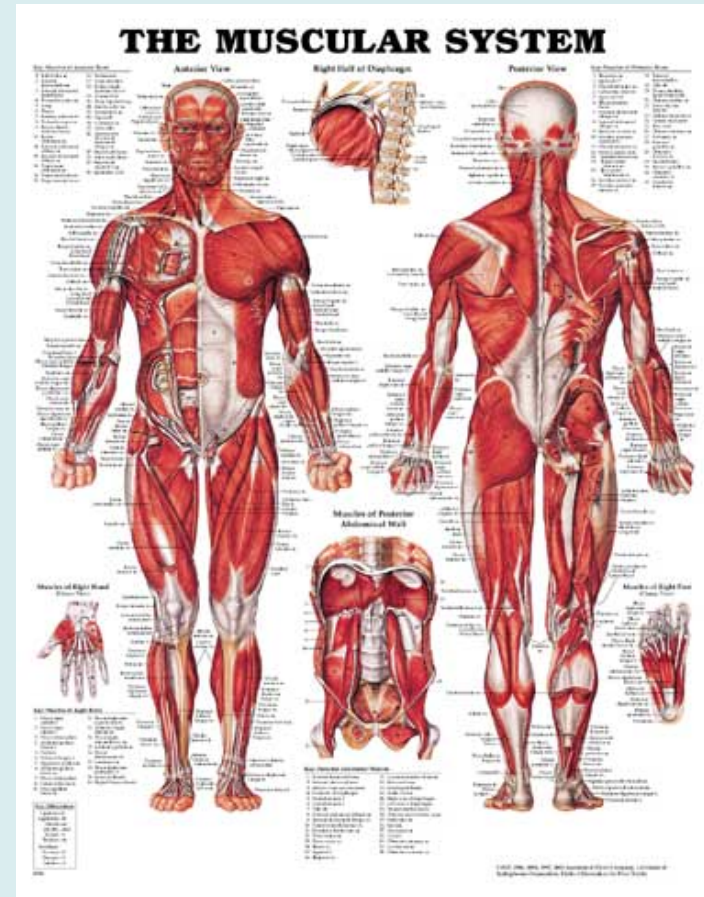
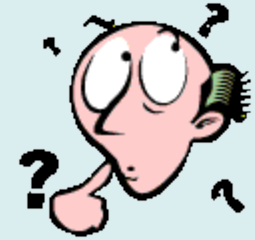


Locomotion

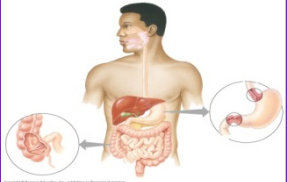
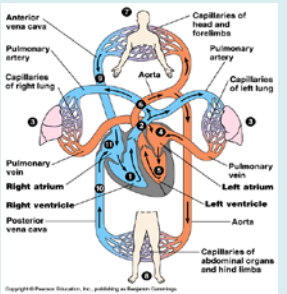
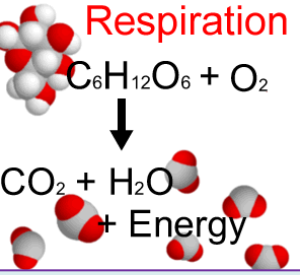
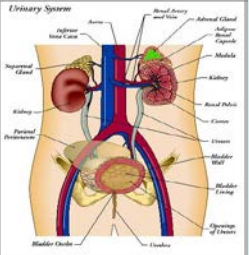
Skeletal & Muscular Systems



Do You Remember?

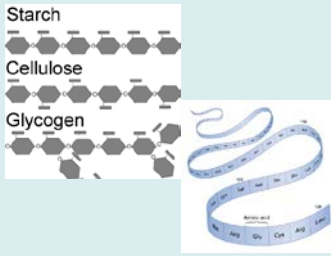


- All organisms need a way of moving .This is called **locomotion**
- Some **multicellular** organisms (complex) have developed specialized systems for this purpose, where other **unicellular** organisms (simple) have not.

	<i>Life Activity</i>	<i>Definition</i>
	NUTRITION	Organisms obtain and process food
	TRANSPORT	Circulation and absorption of nutrients
<p>Respiration</p> $C_6H_{12}O_6 + O_2 \rightarrow CO_2 + H_2O + \text{Energy}$ 	RESPIRATION	The release of energy from food
	EXCRETION	Removal of harmful cellular waste

Life Activity

Definition



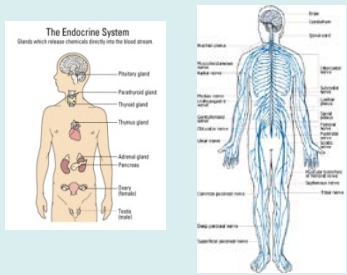
SYNTHESIS

Producing **complex** substances from **simple** substances



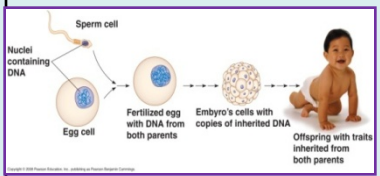
GROWTH

An **increase** in **size** and/or **number** of **cells** of an organism



REGULATION

Control and **coordination** of all activities in an organism



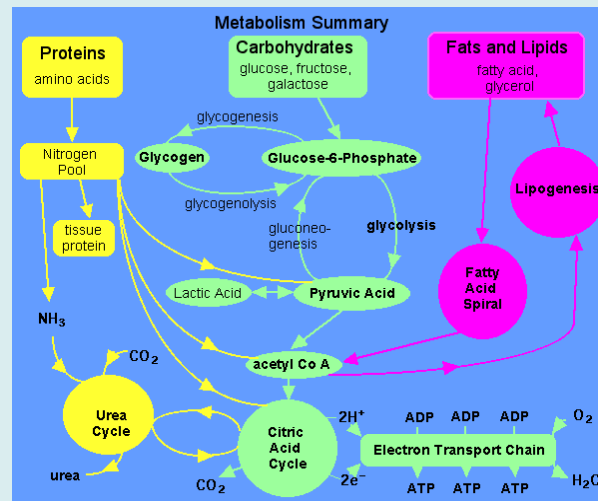
REPRODUCTION

The **production** of new **individuals**

Metabolism

Metabolism

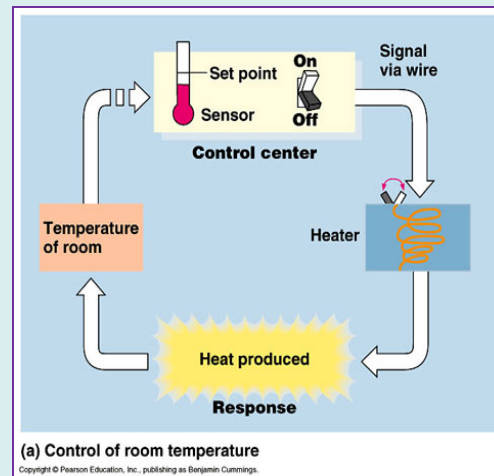
- **sum** total of all the chemical reactions occurring in an organism
- Controlled by **enzymes (organic catalysts)**



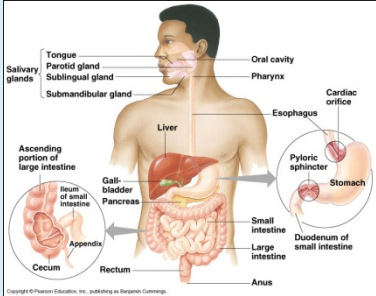
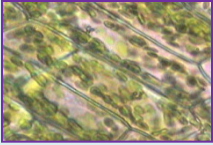
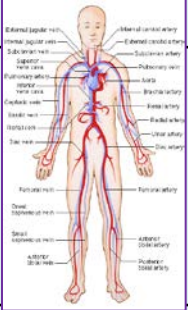
Homeostasis

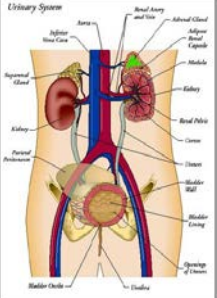
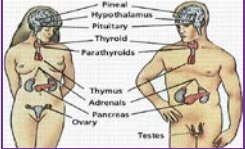
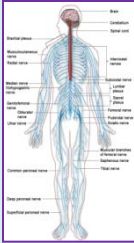
Homeostasis

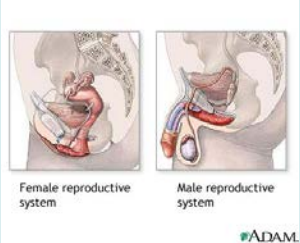
- State of **balance**
- Organisms maintain homeostasis by using **feedback**



How do single celled and multi-celled organisms perform these life functions?

Life Function	Single Celled Organism	Multi-cellular Organism
<p>Nutrition</p> <ul style="list-style-type: none"> • Ingestion • Digestion 	<p>Diffusion through the cell membrane</p> <p>Intracellular (within the cell)</p> <p>Extracellular (outside the cell)</p>	<p>Digestive system- Extracellular followed by intracellular digestion</p> 
<p>Transport</p>	<p>Cyclosis -movement or streaming of the cytoplasm</p> 	<p>Circulatory system</p> 

<i>Life Function</i>	<i>Single Celled Organism</i>	<i>Multi-cellular Organism</i>
Respiration	Diffusion through the cellular membrane	Respiratory system
Excretion	Diffusion out cellular membrane	Excretory system 
Regulation	Chemically responds to environment	Endocrine system  Nervous systems 

<i>Life Function</i>	<i>Single Celled Organism</i>	<i>Multi-cellular Organism</i>
Reproduction	Mitosis (Binary Fission)	Reproductive system  <p>The image contains two anatomical diagrams. The left diagram shows the female reproductive system, including the uterus, fallopian tubes, and ovaries. The right diagram shows the male reproductive system, including the testes, vas deferens, and ureters. Below the diagrams are the labels 'Female reproductive system' and 'Male reproductive system'. The ADAM logo is in the bottom right corner.</p>

LOCOMOTION

Locomotion is the ability to move from one place to another. It increases the probability of survival among organisms.

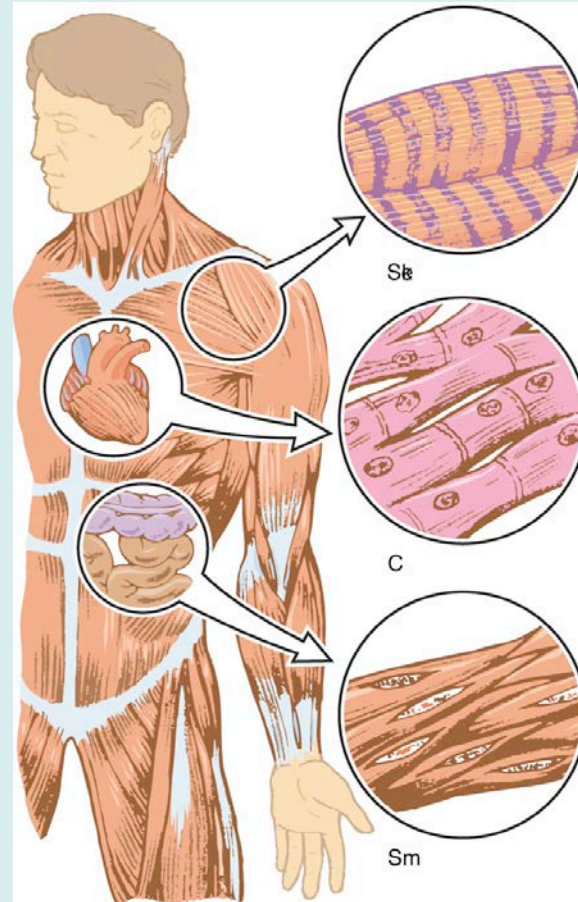
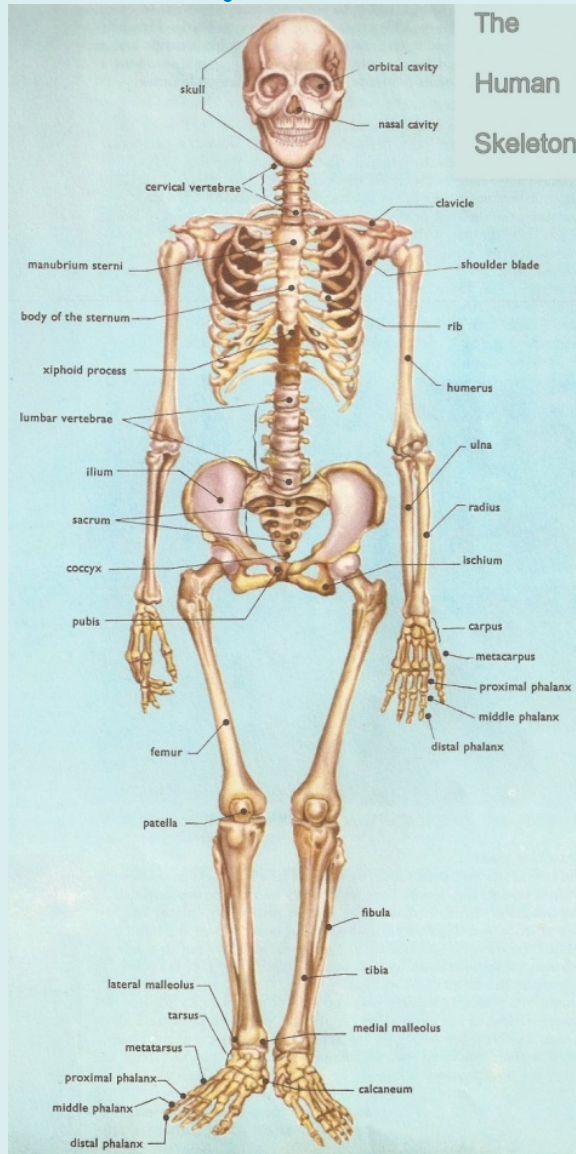
Some of the advantages of locomotion are:

- Increased opportunity to **obtain food**
- Increased ability to **seek shelter**
- Increased ability to **avoid predators**
- Increased ability to **move away from toxic waste**
- Increased opportunities to **find a mate**

LOCOMOTION Con't

Locomotion involves the interaction of multiple systems, including the, **skeletal system (bones), muscle** ,tendons, ligaments and joints.

Human Musculoskeletal System



Introduction to the Musculoskeletal system movie clip!!

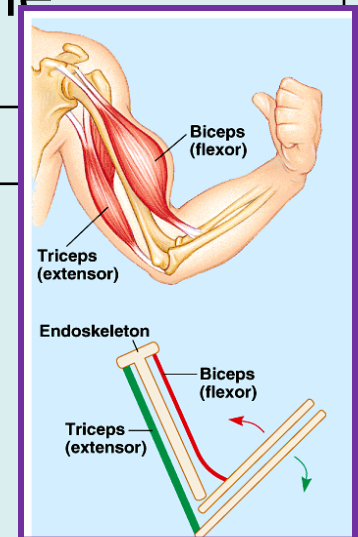
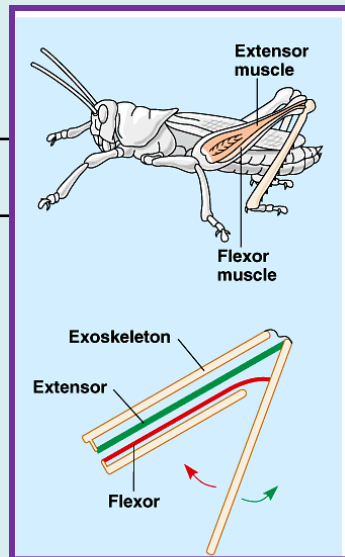
Skeletal System

What does the skeletal system do?

- **Support – your shape “stand up”**
- **Storage – calcium (milk) and phosphorous** to help build bone & for muscle movement
- **Protection – organs** (lung, heart, brain)
- **Movement – attachment of muscles**
- **Production – Red Blood Cells (RBC's), White Blood Cells (WBC's) and platelets**

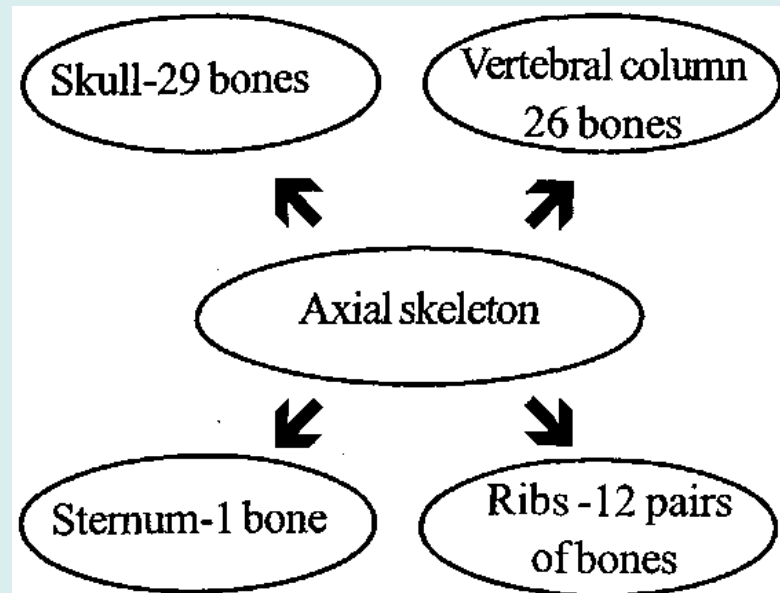
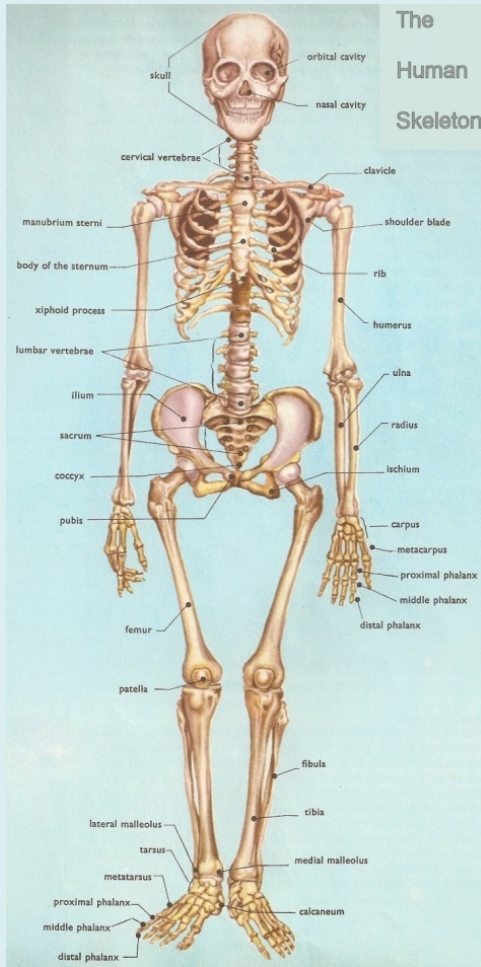
Types of Skeletal Systems

	Exoskeleton	Endoskeleton
Found	Skeleton is outside the muscle and the organisms	Skeleton is inside the muscle and the organism
Function	Covers and protects all tissue	Covers and protects essential tissue
Composition	Chitin is non-living and must be molted	Bone or cartilage is living material and grows with the organism
Example	Insects	Human



Human Skeletal System

Human Endoskeleton:

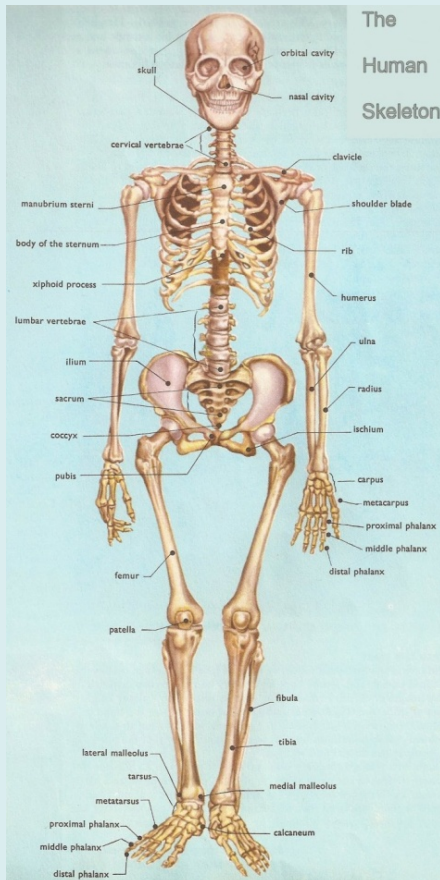


Human Skeletal System- Composition

Human
Endoskeleton:

Composition:

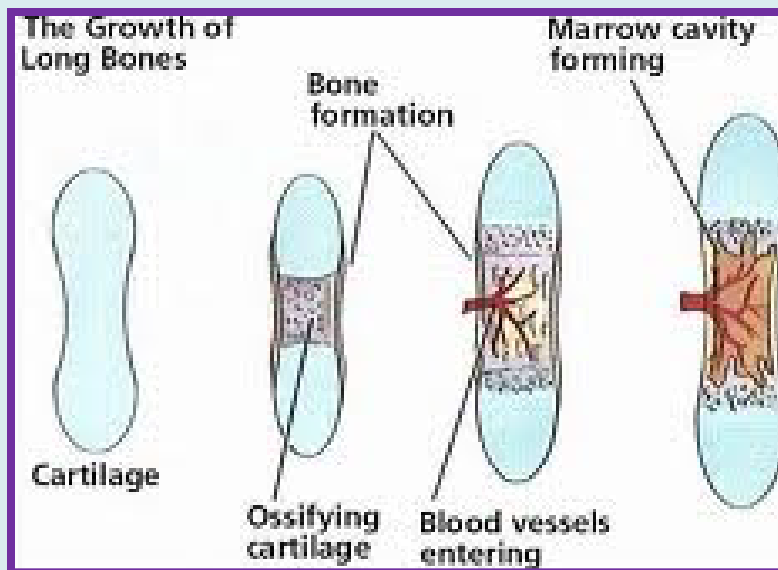
Our skeleton is made up of **bones** and **cartilage**. **Cartilage** is found at the end of our nose, ears, trachea and its branches, between joints, at the end of our ribs and between vertebrae. It functions as, bone **support**, **cushioning** and **flexibility**



Bone Growth?

How does our bone grow?

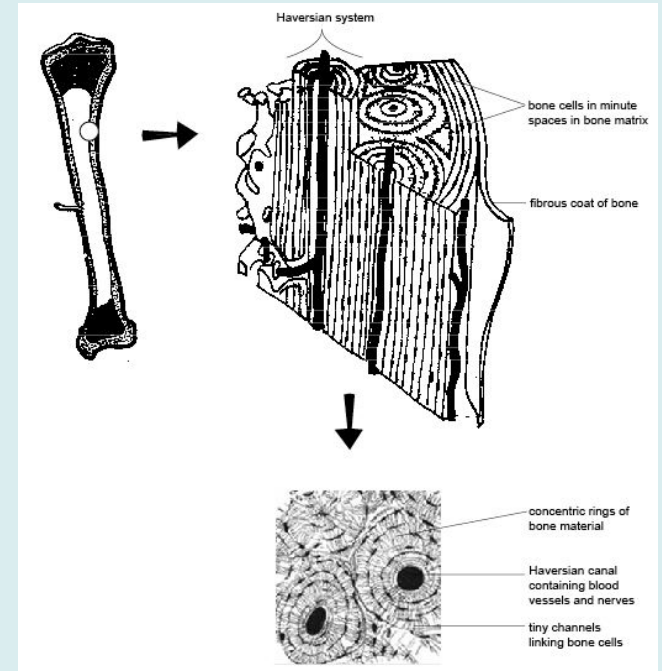
- It is first laid down as cartilage-first three months of development and replaced by bone (6- months bone replaces cartilage - **Ossification**)
- Bone growth stops-age 23 years



Bones Light and Strong Movie Clip!

Are Bones Alive?

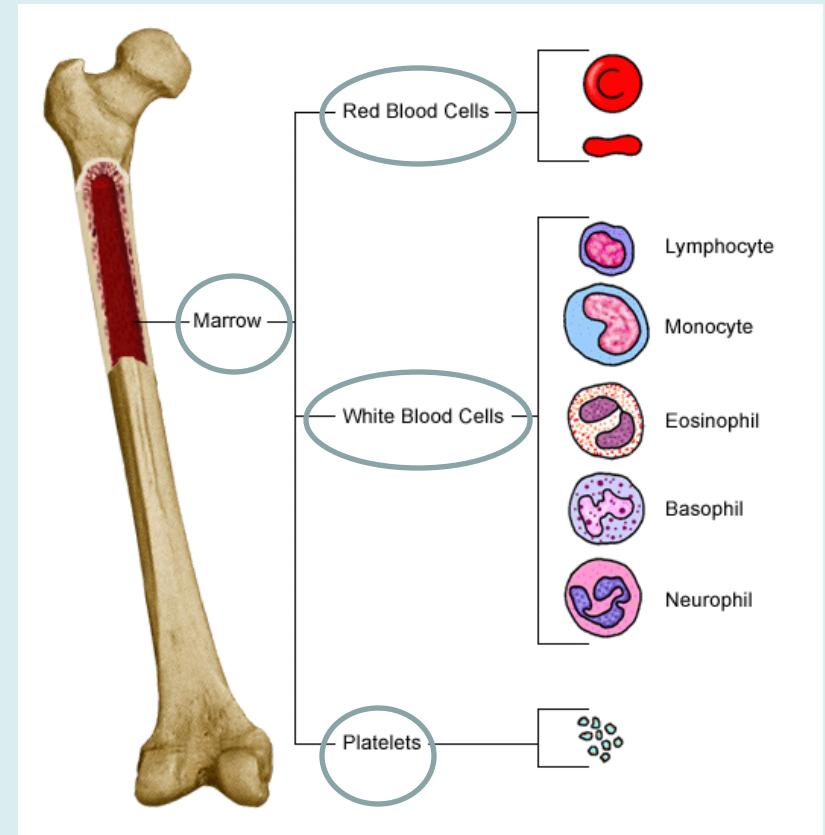
Yes –Bones need to **grow**,
repair, **make new cells**
and therefore require
nutrition. Bones are a solid
network of **living cells** and
protein fibers that are
surrounded by deposits of
calcium



**Bones, What's
Inside Them Movie
Clip!!**

Are Bones Alive? Con't

Within bones are cavities that contain soft tissue called **bone marrow**. The function of the **bone marrow** is to produce **RBC's** , **WBC's** and **platelets**

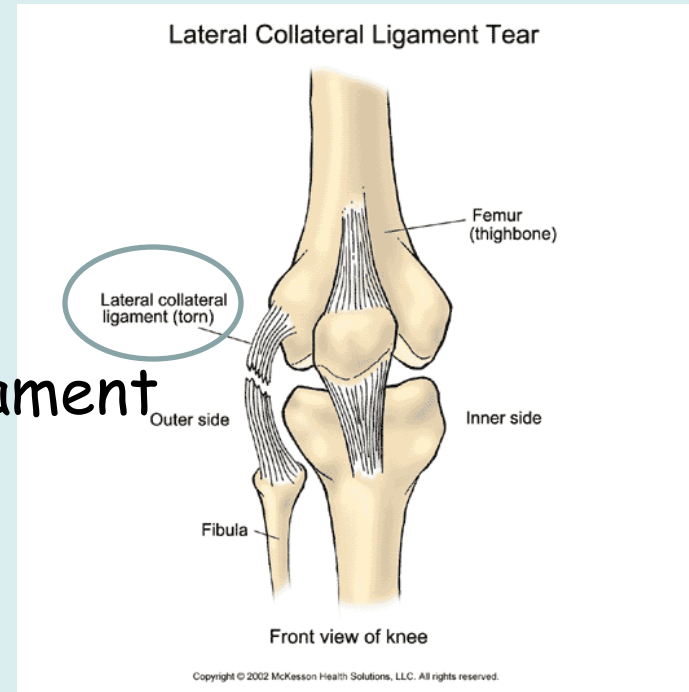


[Joints Movie Clip!!](#)

How Do Bones attach to Bones?

Bones are attached to each other by ligaments.

Torn ligament



The place where bones attach to one another is called a **joint**. These permit bones to move without damaging each other.

How Bones Work

Types of Joints



Pivot



Ball and Socket



Hinge



Saddle



Gliding



Conyloid



© LisaART

©2009 HowStuffWorks

Types of joints in the human body...each one has a different movement

Types of Joints

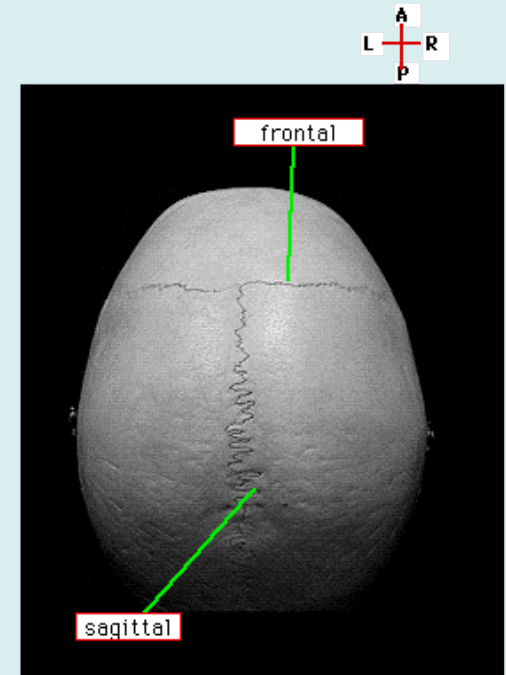
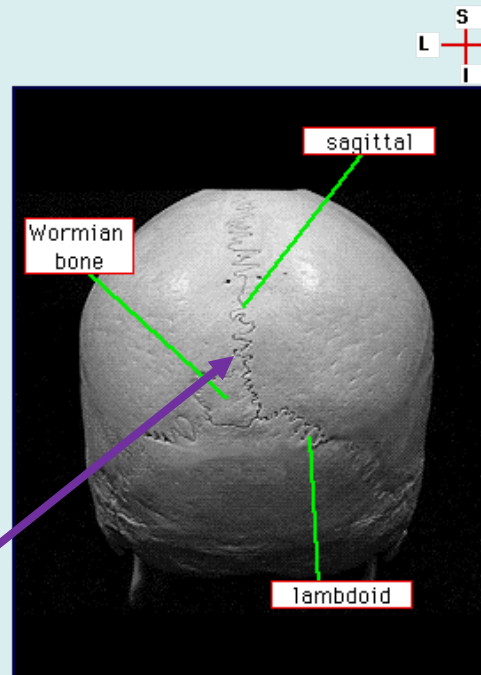
There are three (3) classes of joints:

1. **Immovable** – does not move (*suture lines*)

Example: skull

Ribs and Skull
Movie Clip!!

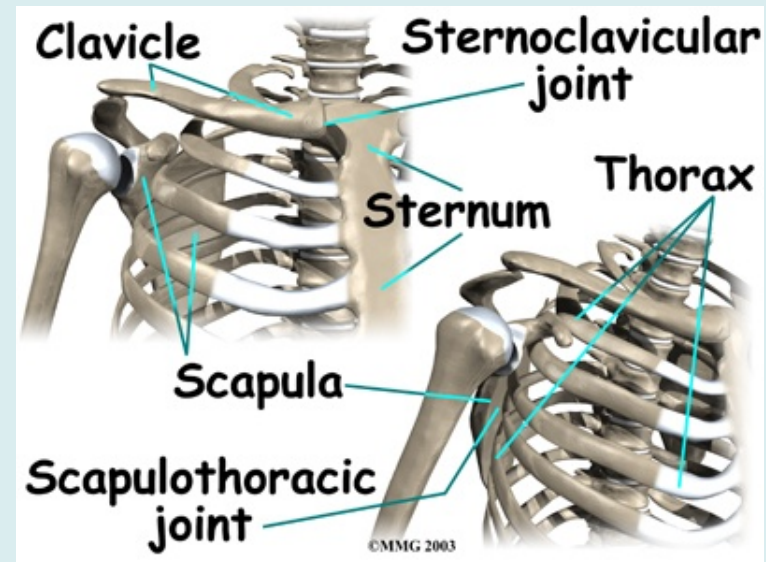
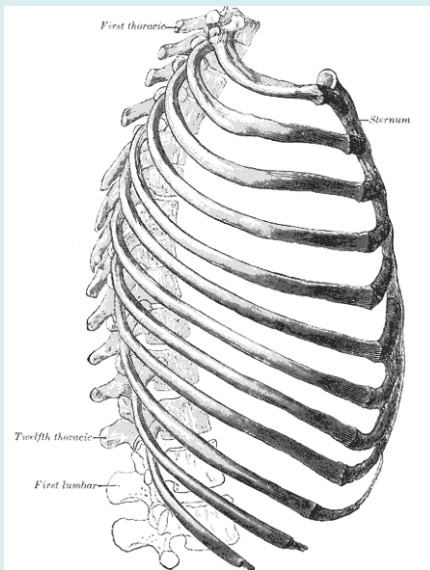
Suture Lines



Types of Joints-Gliding Joints

2. **Slightly moveable** – moves a little (*gliding joints*)

Example: ribs, vertebrae (backbone)

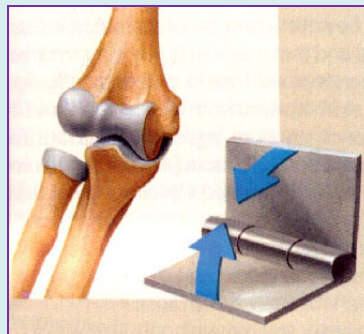
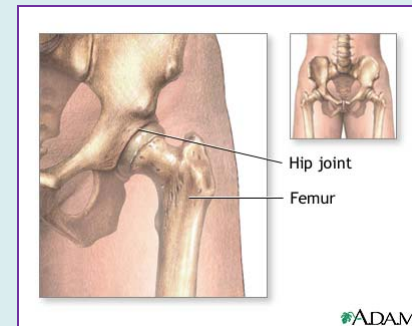
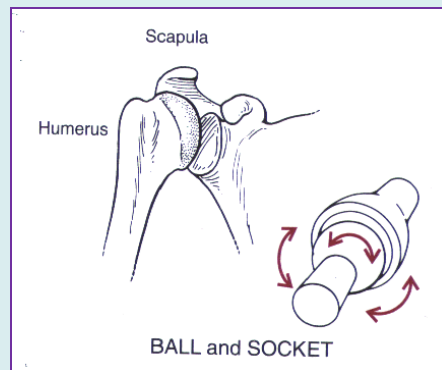
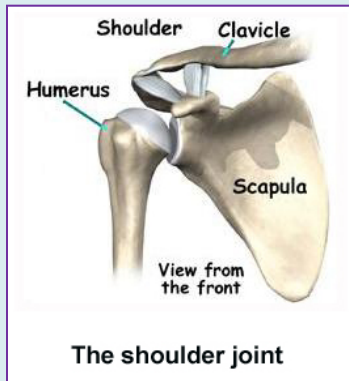


**Backbone Movie
Clip!!**

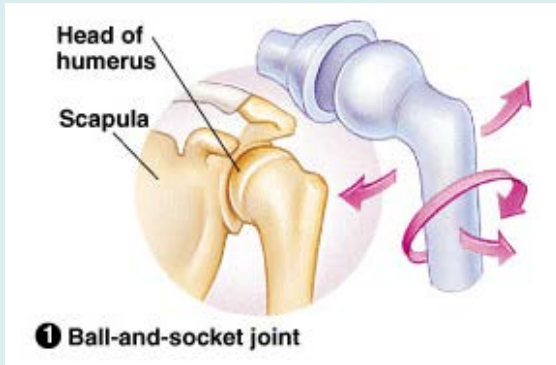
Types of Joints-Movable Joints

3.) **Freely moveable** – moves a lot (***hinge joint, ball and socket joint***)

- Example: wrist, shoulder, hip, elbow, ankle (hinge joint, ball and socket joint)

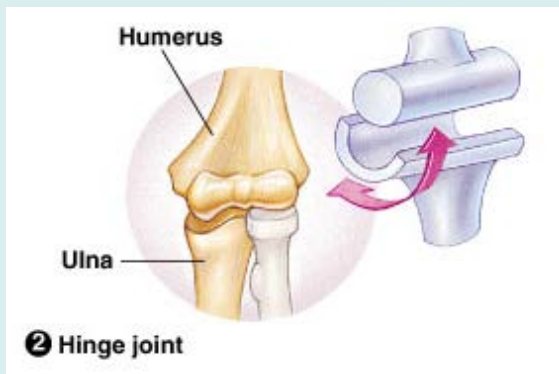


Types of Joints-Movable Joints



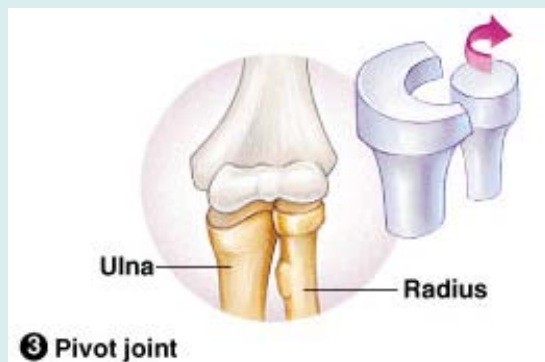
Ball and Socket Joint

Allows for movement over a range of directions ex. Shoulder and hip



Hinge Joint

Allows for movement in two directions Ex. elbow



Pivot Joint

Allows for rotational movement Ex. rotation of the lower arm

[Legs Movie Clip!!](#)

Human Muscular System

- How do muscles attach to bone?

Tendons

Remember

Bone to Bone: Ligament

Muscle to Bone: Tendon



Human Muscles

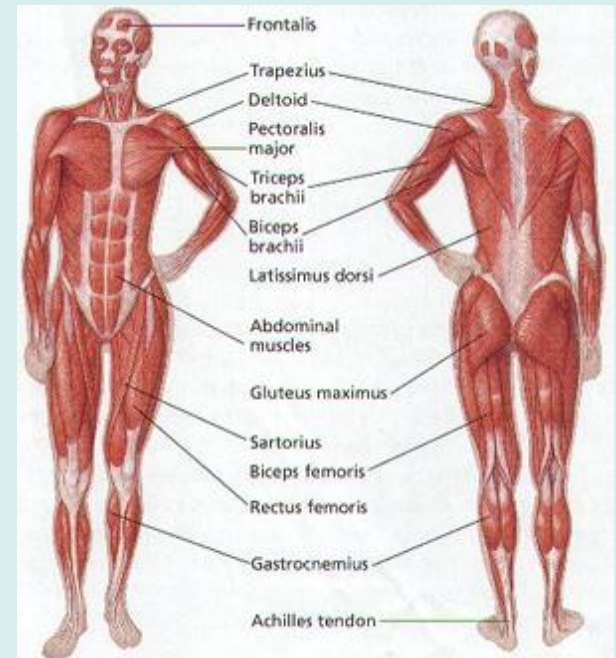


There are over **650** muscles in the human body.

**Muscular System
Movie Clip!!**

What do muscles do?

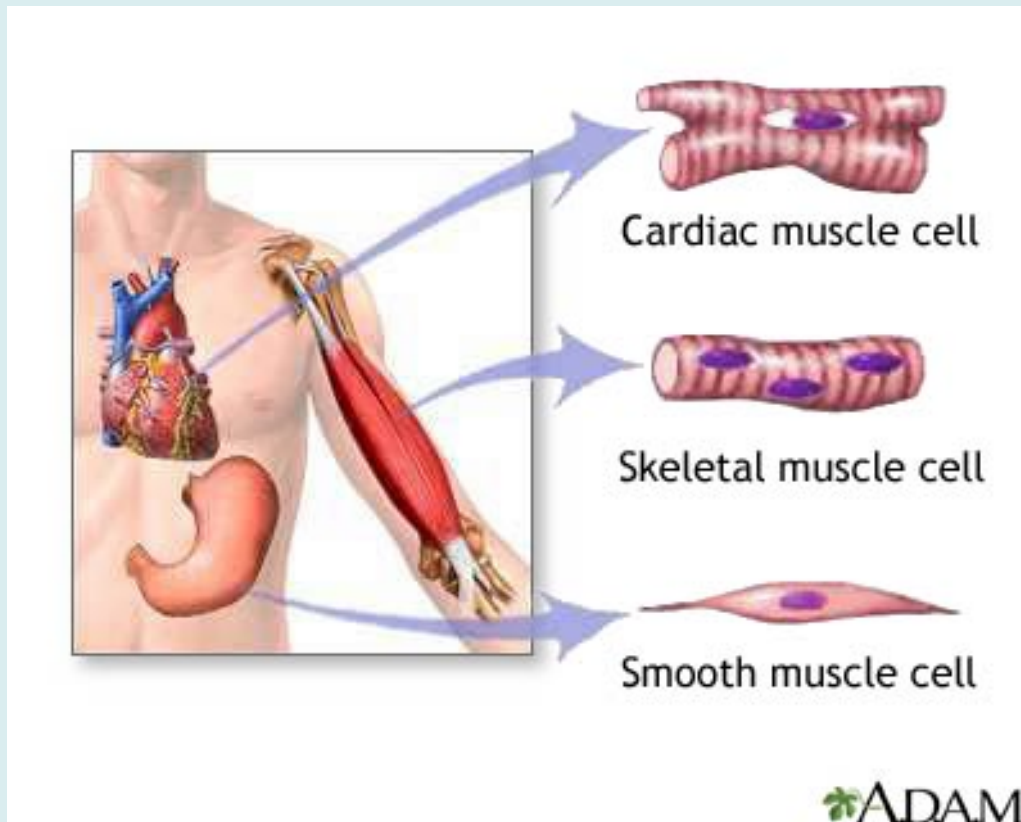
- Move body
- Voluntary movement – skeletal
- Involuntary movement – digestive tract
- Pump blood-heart
- Contract/Relax- (all muscles)
- Dilate/Constrict (vessels)



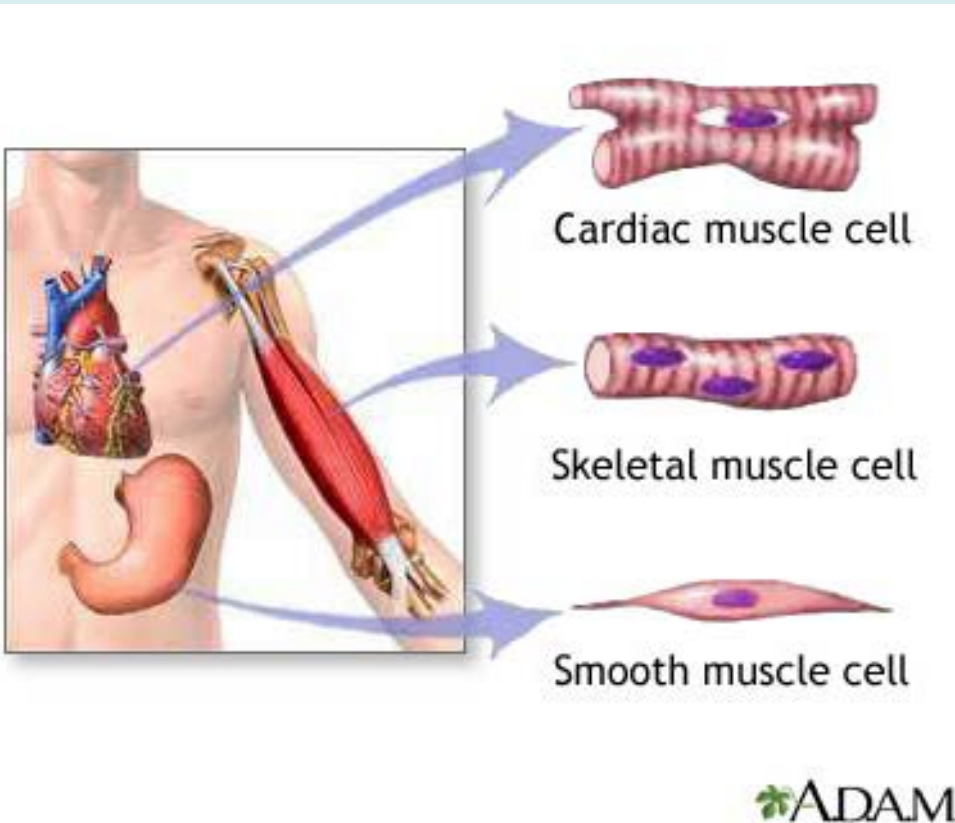
Types of Muscles

Are all muscles the same? **NO**

There are three (3) different types of muscles:



Types of Muscles



Cardiac muscle cell

Skeletal muscle cell

Smooth muscle cell

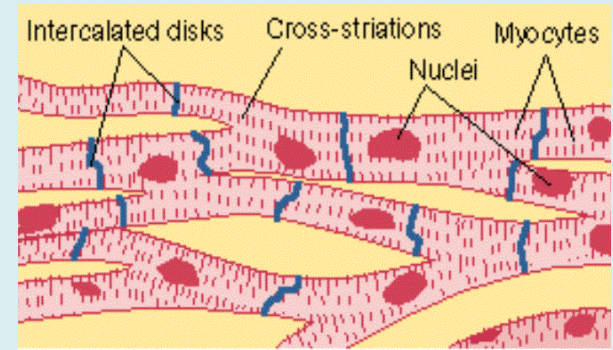
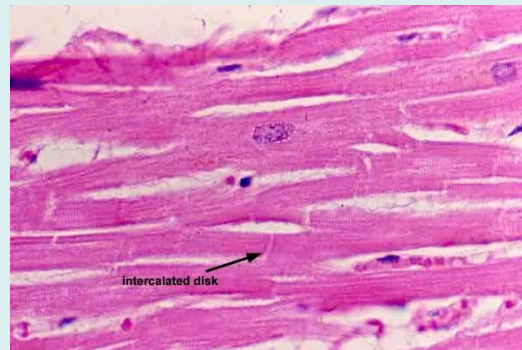
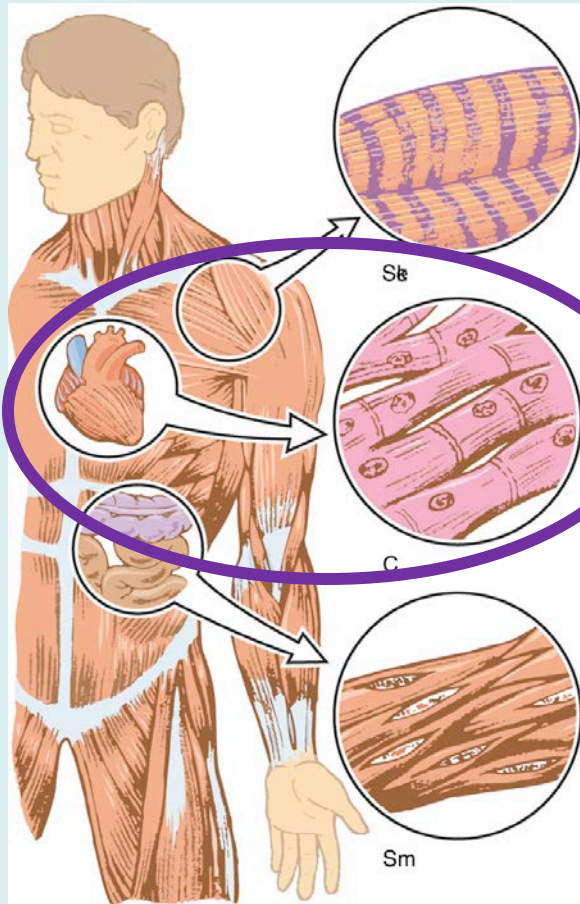
Cardiac Muscle is involuntary and has a striated (striped) appearance

Skeletal Muscle is voluntary and has a striated (striped) appearance

Smooth (Visceral) Muscle is involuntary and has a smooth appearance

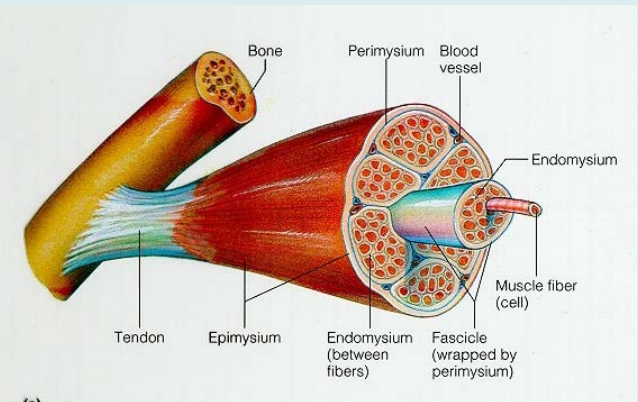
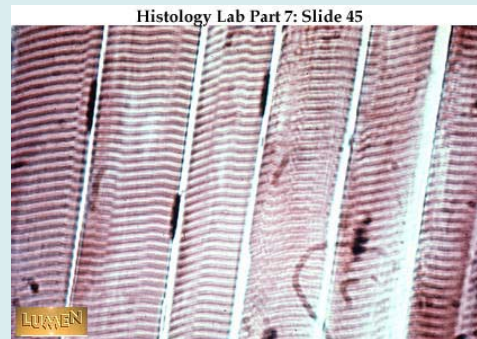
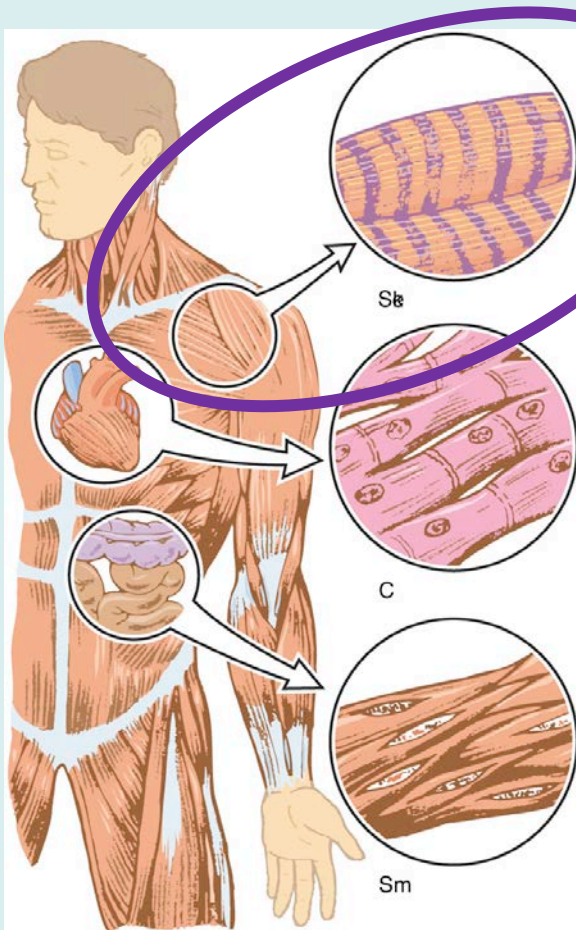
Types of Muscles-Cardiac

1. **Cardiac** muscles are found in the **heart**. They are considered **involuntary** because you do not have conscience control over their function.



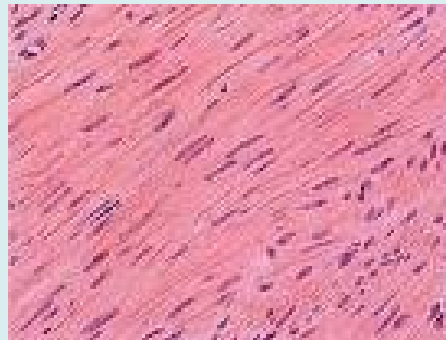
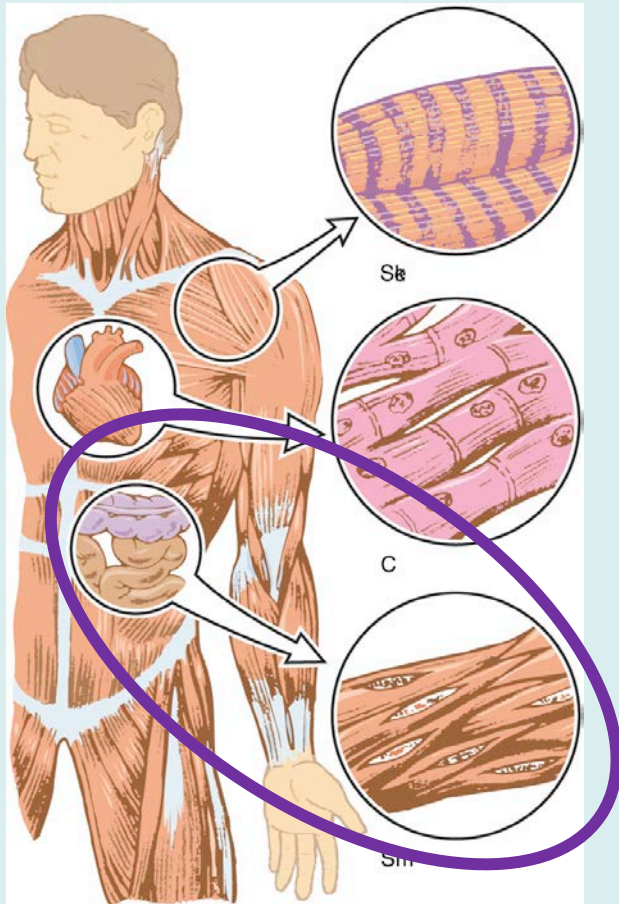
Types of Muscle-Skeletal

2. Skeletal muscles are attached to **bones** by **tendons**. These are responsible for all of our **movement**. They are considered **voluntary** because you do have conscience control over their function.



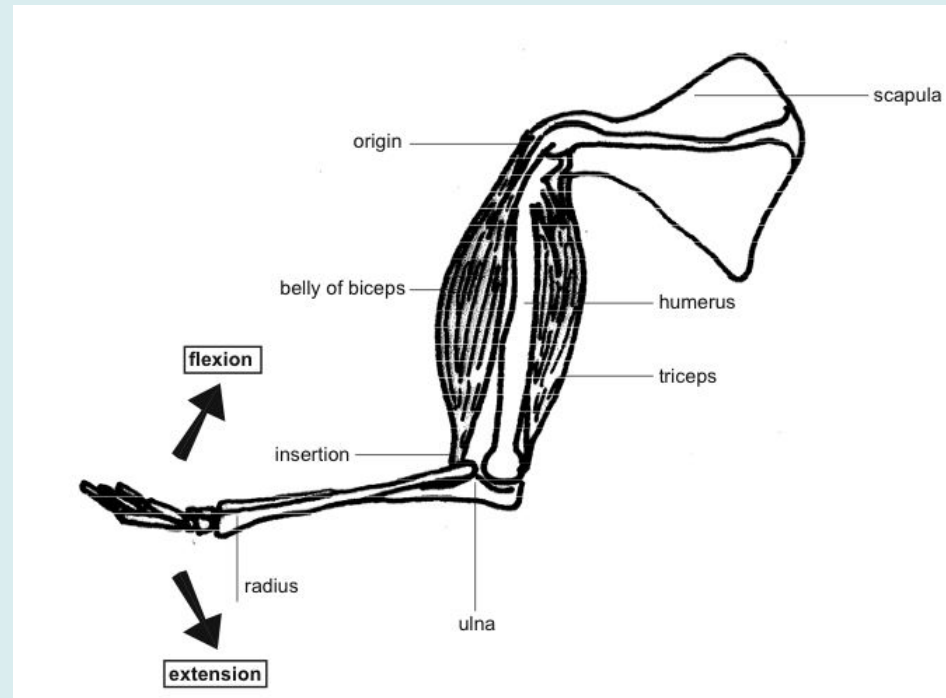
Types of Muscles-Smooth

3. **Smooth** muscles are found in the **digestive** track, **arteries** and **veins** of the circulatory system. These muscles help to move material through their respective systems. They are considered **involuntary** because you **do not** have conscience control over their movements.



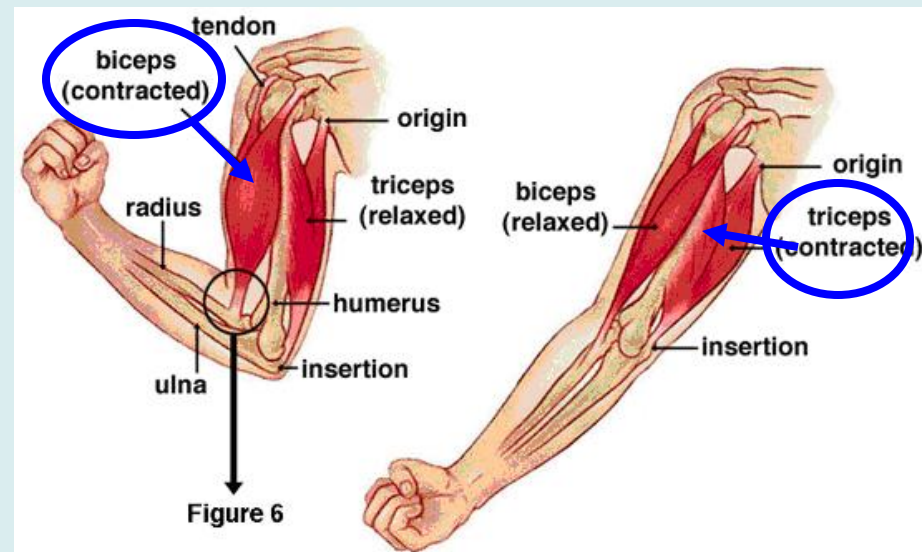
How do Muscles Work?

- Muscle tissue is unique because it only **contracts** , or tightens up or it **relaxes** or loosens up.



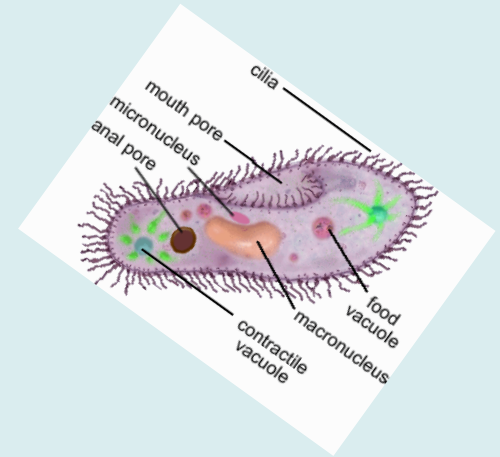
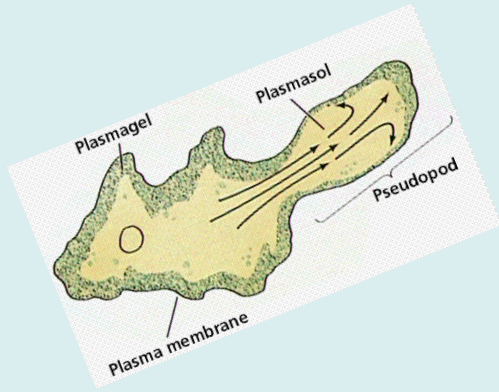
Muscles-Antagonistic Pairs

- Muscles work opposite each other.
- This movement is called **antagonistic**. We are able to move our arm back and forth because as one muscle is **contracting** the other is **relaxing**. The muscle that bends the joint is called the **flexor** (biceps) and the muscle that straightens the joint is called the **extensor** (triceps).

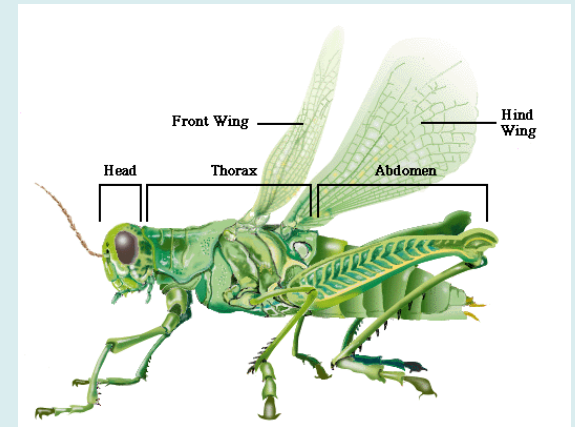
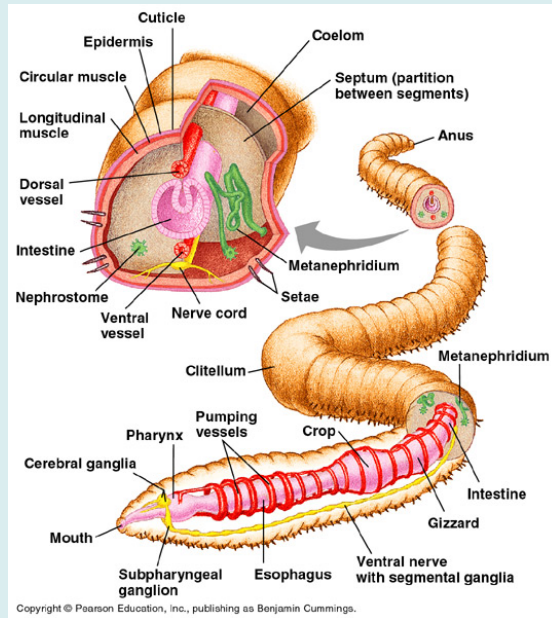
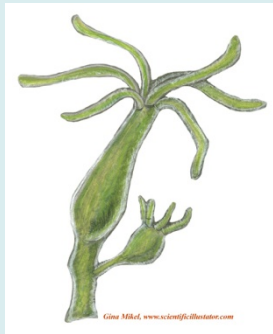


Muscle Bone Disorders

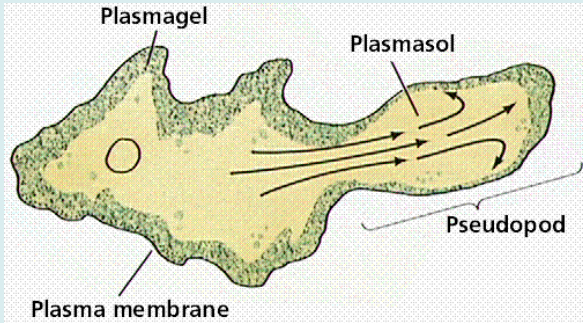
Disorder	Malfunction
Fracture	Broken Bone A simple fracture the ends of the broken bones stay under the skin. A compound fracture the ends of the broken bone stick out through the skin.
Sprain	Tearing or stretching of the ligaments holding bone together
Tendonitis	Inflammation of a tendon holding the muscle to the bone
Arthritis	Inflammation of a joint.
Hernia	Organ or tissue that sticks out through a weak area in a muscle.



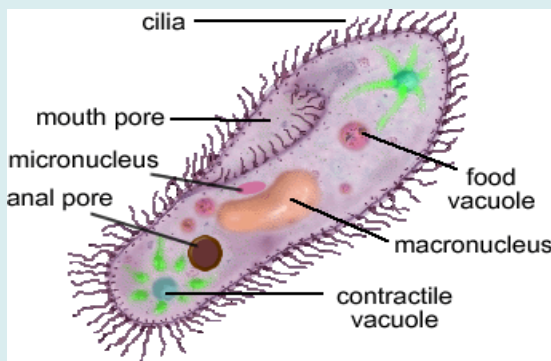
Representative Organisms



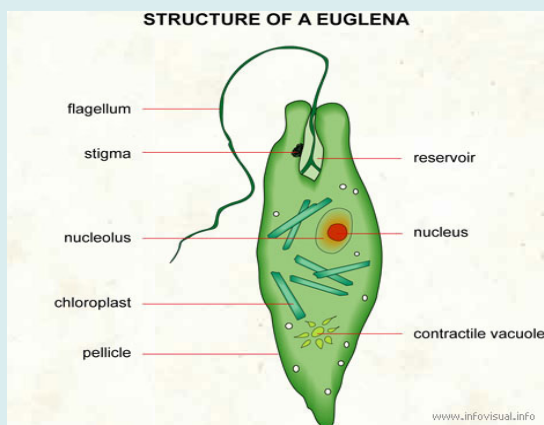
Single Celled Organisms



Amoeba have **pseudopods** or “false feet”. These organisms move when the cytoplasm flows into or out of the pseudopod (cyclosis)



Paramecia have **cilia** (short hair projections) which beat and move the organism through the water.



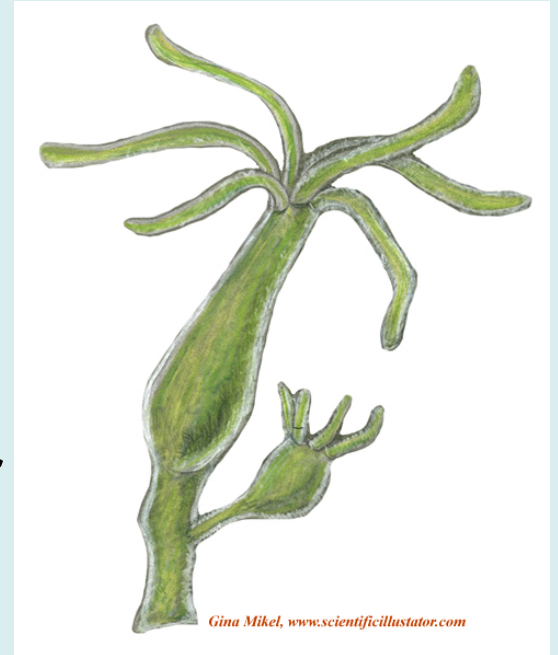
Euglena have **flagella** which are long whip-like projections that provide locomotion.

Simple Multicellular Organisms

Hydra

Hydra have specialized cells for contraction. They are mostly **sessile** (stays in one place).

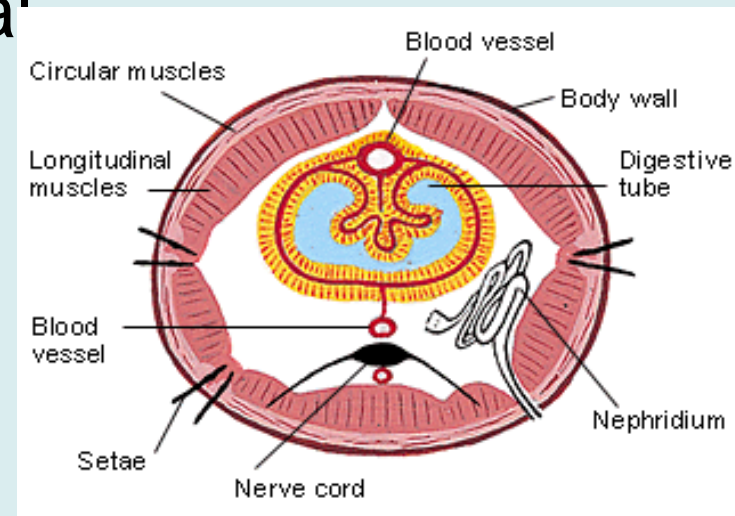
They may glide along on its base or they may somersault head over base or they may pull themselves using their tentacles.



Complex Multicellular Organisms

Earthworm

Earthworm uses muscles to burrow into the soil. It has two (2) layers of muscles (**outer**) circular and (**inner**) longitudinal which work together to pull the worm through the soil. On almost all of the earthworm's segments, there are four (4) **setae** (hair-like hooks) which anchor the worm into the ground while moving.



[earthworm](#)

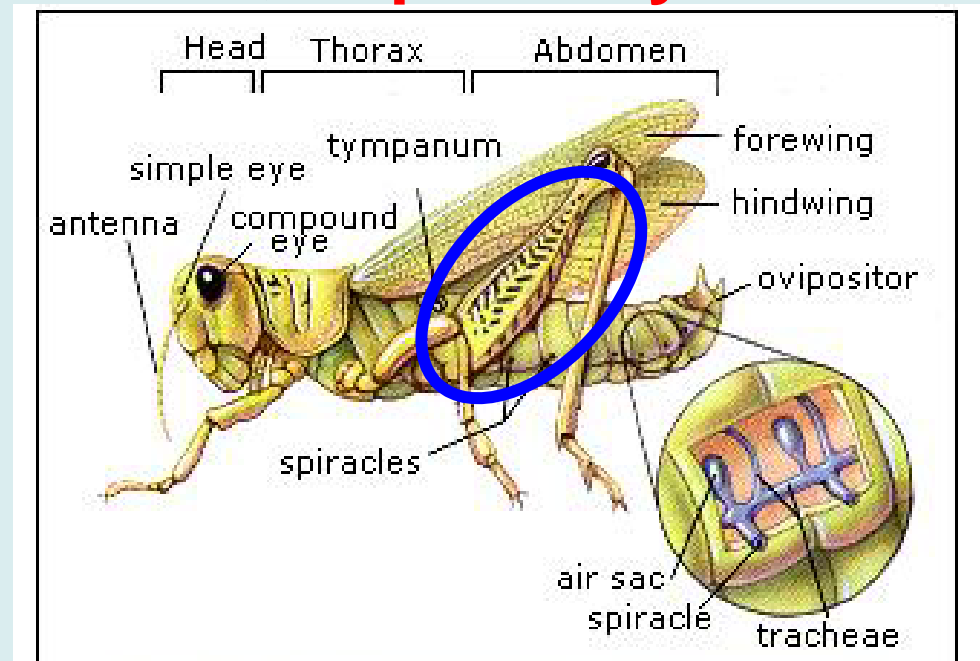
[movement://www.youtube.com/watch?v=_xs1smi_ftk&NR=1](https://www.youtube.com/watch?v=_xs1smi_ftk&NR=1)

Complex Multicellular Organisms

Grasshopper

- The body is covered by an **exoskeleton** made of **chitin**. Grasshoppers **walk, hop** and **fly**

Remember: Since the grasshopper has an open circulatory system, the hopping, walking and flying help to circulate the body fluid and replenish fresh nutrients to areas of the body.



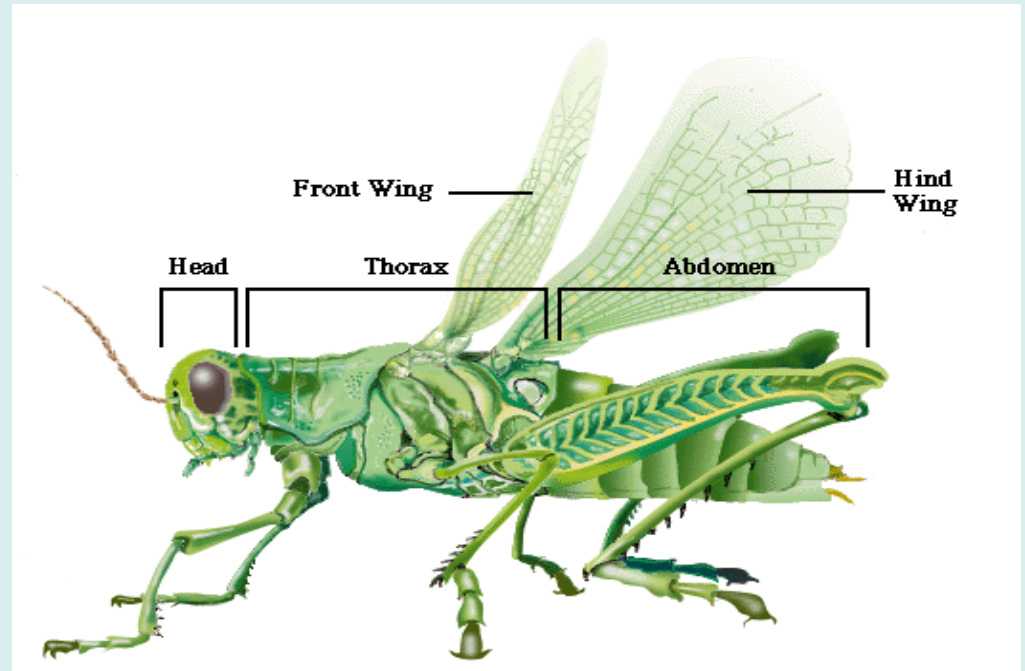
Complex Multicellular Organisms

Grasshopper

The body of a grasshopper has three divisions: head, abdomen and thorax.

The thorax has

- Three pairs of jointed legs: The 1st two pairs are used for walking and the third hind pair is used for jumping (the grasshopper can jump more than 20 times its body length)



- Two pairs of wings which are used in flying.