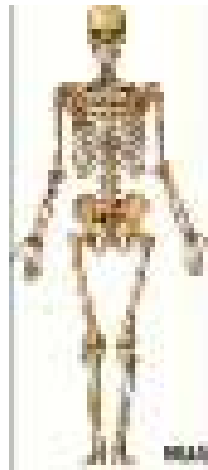
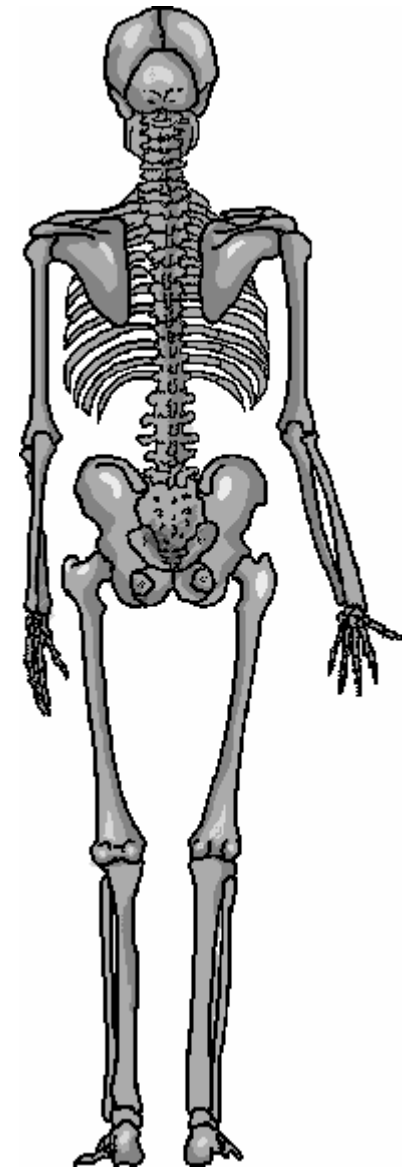
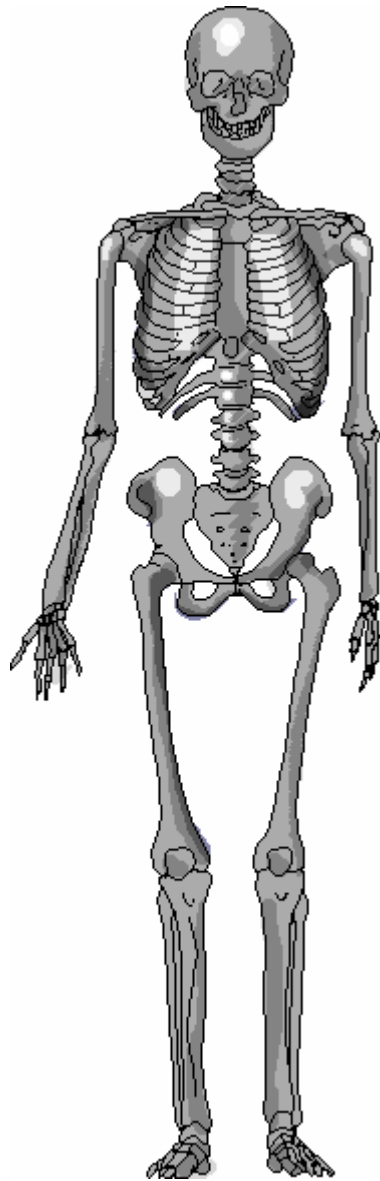


Skeletal & Muscular System





Body Cavities

- The body is divided into several cavities
- It is much easier to study and located organs if they are divided into different regions of the body

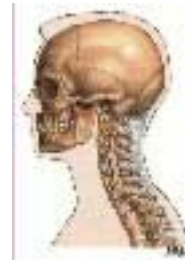
The human body contains:

1. The ventral cavity: (ventral means front)
 - Includes the thoracic cavity, abdominal cavity and the diaphragm
2. The thoracic cavity:
 - Includes the lungs, trachea, esophagus, and heart
3. Pericardial cavity: encloses the heart
4. Abdominal cavity:
 - Includes the stomach, liver, gall bladder, pancreas, intestines, kidneys, spleen, (and ovaries and uterus in females)



Body cavities cont.

5. **Dorsal cavity: (means back)**
 - Includes brain and spinal cord
6. **Cranial cavity:**
 - Includes the brain
7. **Spinal cavity:**
 - Includes the spinal cord



The Skeletal System

- Includes two main parts
 - Axial skeleton: skull, vertebral column, sacrum, breastbone, and ribs
 - Appendicular skeleton: bones of the arms, legs, shoulder, and pelvic bone



Main Functions:

- ❑ Provide support and form
- ❑ Muscle attachment location
- ❑ Protection of delicate organs
- ❑ Storage of minerals
- ❑ Bone marrow produces blood cells

Formation of bone

- The formation of bone is called “ossification”
- There are two ways bones form
 1. Cartilage to bone (babies until 2 months)
 2. Membrane layers to bone (occurs in most flat bones)

Structure of Bone

- ❑ Periosteum: tough fibrous material covering the bone that contains blood vessels
- ❑ Compact bone: located on outer shafts of long bones; extremely hard
- ❑ Haversian canals: channels formed in long compact bone
- ❑ Osteocytes: bone cells
- ❑ Bone Marrow:
 - Red: found in flat bones and some ends of long bones, and vertebrae
 - ❑ Forms red corpuscles and most white corpuscles
 - Yellow: found in long bones, mostly fat cells
 - ❑ Only makes corpuscles in emergency situations

Types of bones

- There are 206 individual bones in the body
 - 4 different types:
 - Long bones: arms and legs
 - Short bones: wrist and ankle bones
 - Flat bones: shoulder and cranium
 - Irregular bones: vertebrae
 - Sesamoid bones – small round nodules that develop a tendon (example: patella)

Disorder of the Skeletal System

- ❑ Many disorders result from deficiencies in mineral supply or necessary vitamins or lack of hormones
- ❑ Osteomyelitis – general name for a range of infections of the bone
- ❑ Causes of many infections:
 - Invasion of bacteria (external or internal)
 - Injury to bone due to a hard blow

Joint Disorders

- Arthritis: disease of the joints
 - Osteoarthritis
 - Usually results from aging (25-50 years old)
 - Irritation of joints caused by wear or abrasion
 - Rheumatoid arthritis
 - Severe form of disease
 - 3x more common in females
 - Joints become swollen and painful due to inflammation of synovial membrane
 - Pain can cause muscle spasms which can cause deformity
 - Late stages – cartilage is destroyed and Calcium forms

Injuries of the Skeletal System

- ❑ Dislocation: bone is forced out of its proper position
- ❑ Sprain: joint is subjected to sudden, unnatural motion
 - tearing of tendons may occur
- ❑ Fractures:
 - Simple: bone breaks but doesn't protrude out of skin
 - Compound: broken ends of a fractured bone protrude out of the skin

Examples:



Broken
arm



X-ray of
spine



Dislocated
elbow



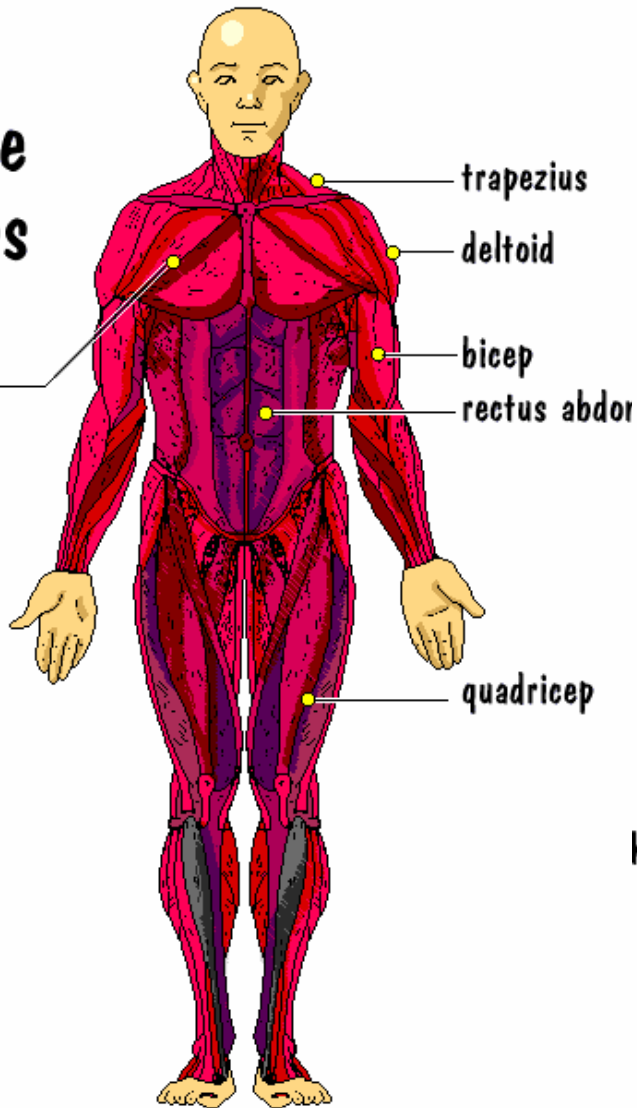
Broken
vertebrae

Muscular System

- Provides movement of the skeleton
- There are 600 different types of muscle
- This system makes up half your body weight

Major Muscle Groups

pectoralis major



trapezius

deltoid

bicep

rectus abdominis

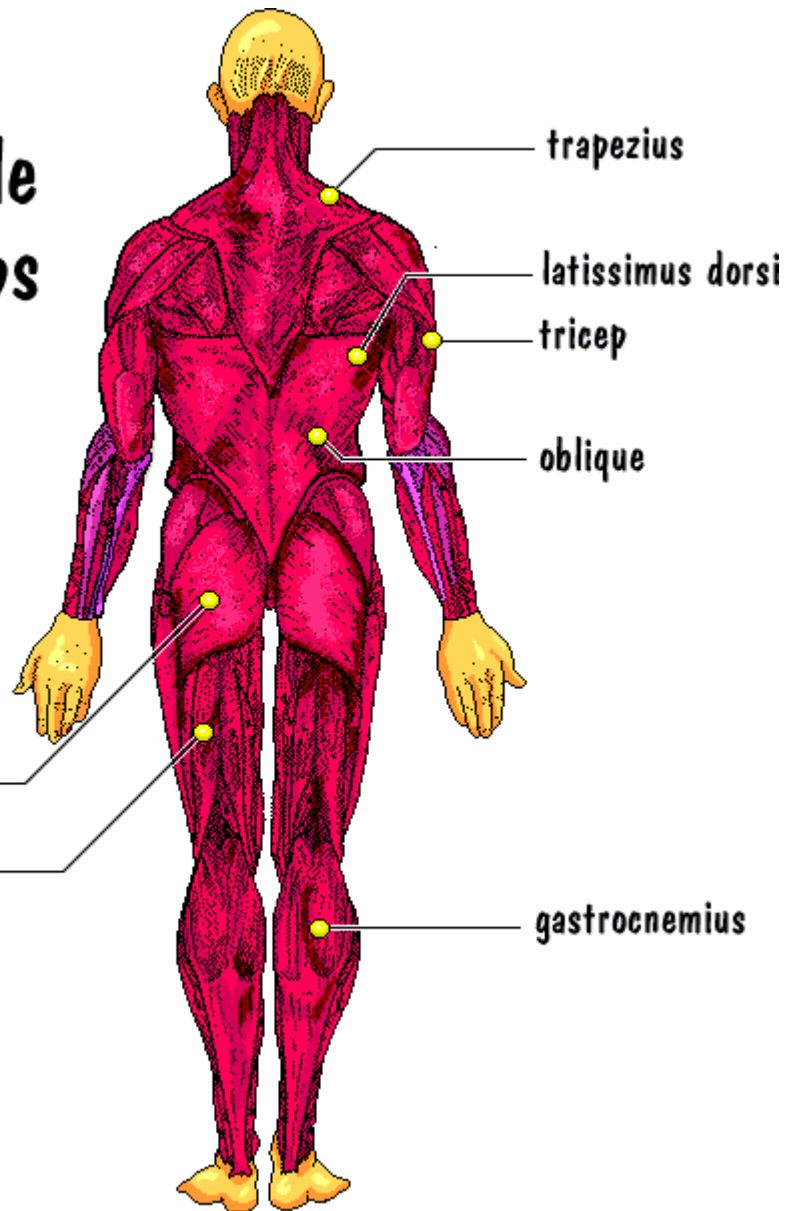
quadriceps

Major Muscle Groups

gluteus

hamstring

gastrocnemius



trapezius

latissimus dorsi

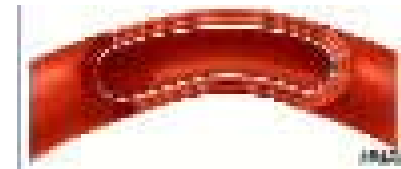
triceps

oblique

gastrocnemius

Types of Muscles

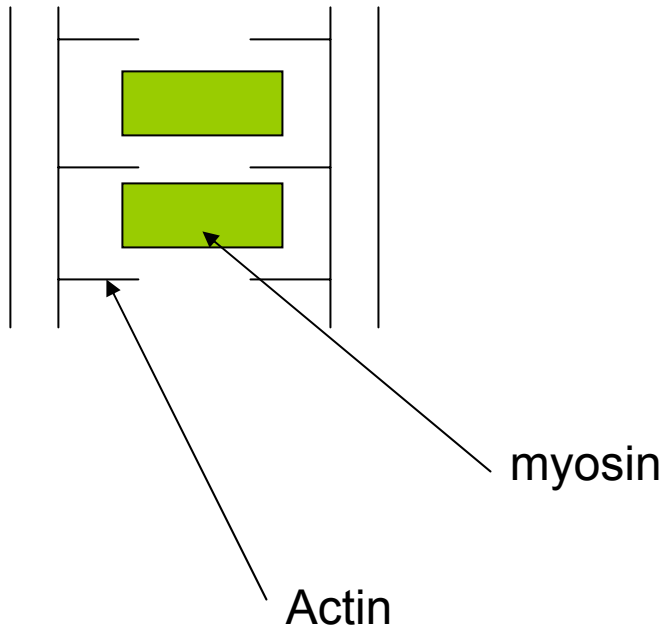
1. **Skeletal:** attached to bones to move parts of the skeleton
 - Voluntary and striated (looks striped under a microscope)
2. **Visceral:** found in the walls of blood vessels, stomach, intestines, and internal organs
 - No striations and is involuntary
 - Also called smooth muscle
3. **Cardiac:** found in the heart
 - Striated and involuntary



The make up of skeletal muscle

- Muscles are made up of fibers
 - 1-80mm in length
 - Each fiber contains myofibrils (which run the length of the fiber)
 - Myofibrils are bundles of 2 kinds of protein
 - Myosin filaments: thick (10mm)
 - Actin filaments: thin (5mm)

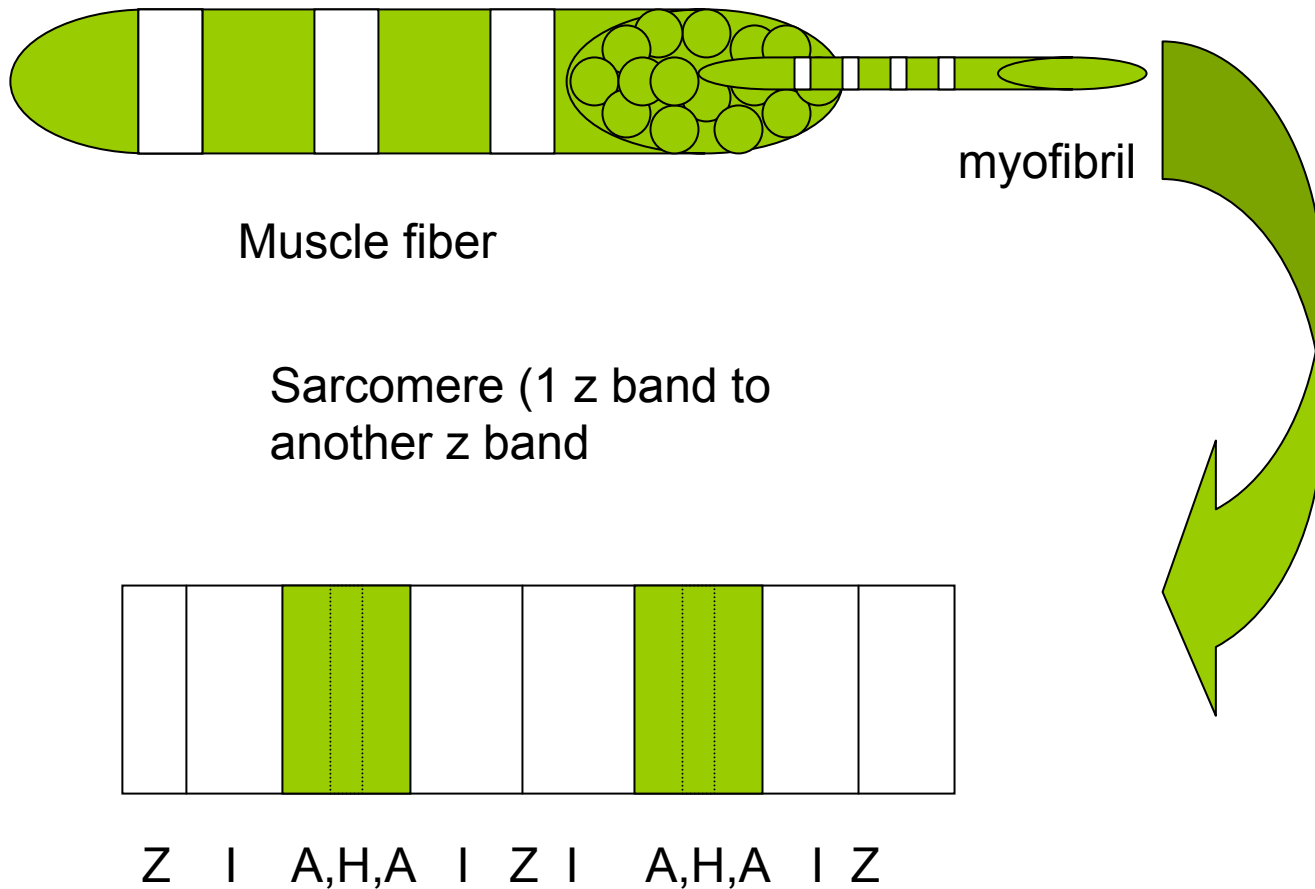
(see the Inside Story pg. 938)



The muscle fiber works by a contraction and relaxation action

The contraction is triggered by Calcium (calcium pump)

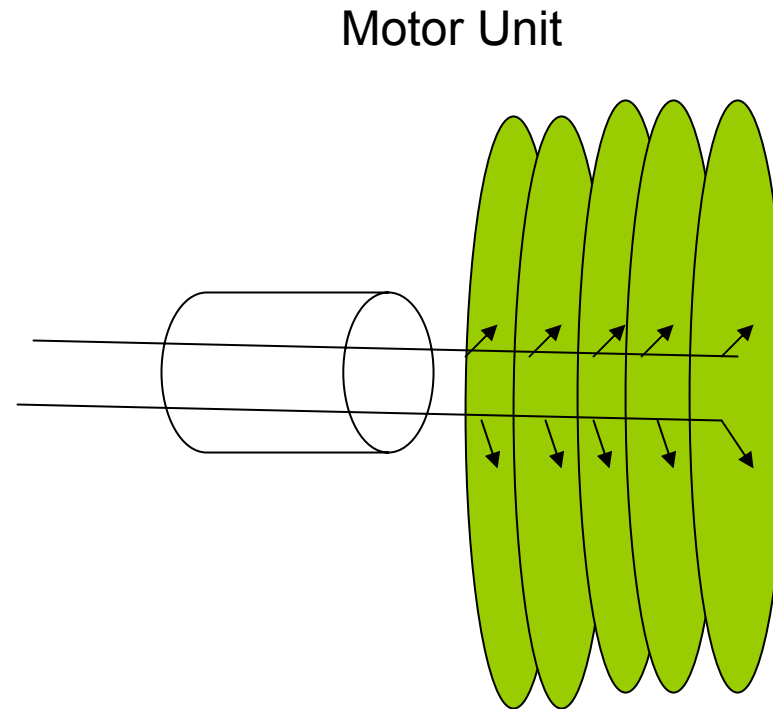
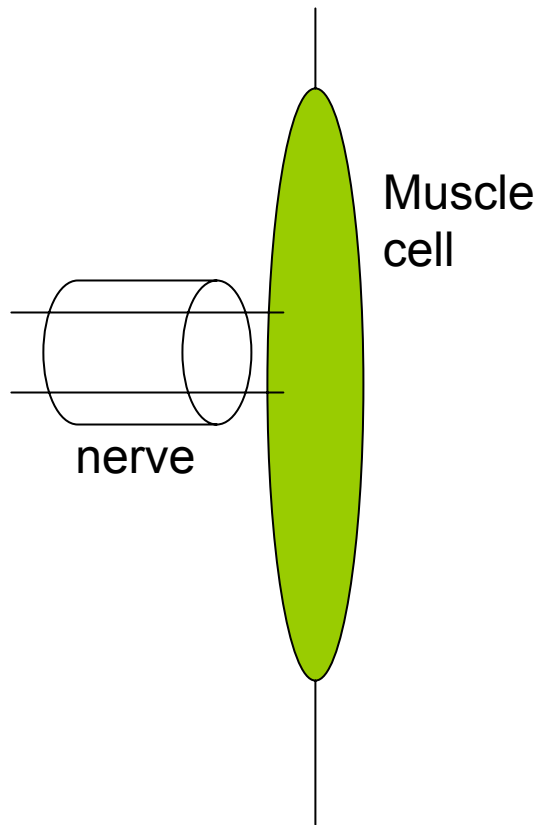
How muscles are put together



How does the muscle work?

- When ATP is supplied to a muscle through an activation of a nerve impulse – contraction occurs
- Nerve contacts to muscles are branched and stimulate many muscle fibers at once
 - Nerve cells + Muscle cells = MOTOR UNIT
- When a motor unit is activated is considered “all or none”
 - Strength depends on how many motor units are activated (1 unit will always contract to the same strength every time)

How muscles work (more detail)



Muscle Actions

- Muscles attach to bone in two places
 - Point of origin: attachment to stationary part
 - Point of insertion: attachment to moveable part
- Movement of the trunk or limbs are done in pairs

Types of Muscles

1. Flexors: bend joints (ex. Biceps)
2. Extensors: straighten joints (ex. Triceps)
3. Abductors: moves a limb away from body
4. Adductors: move limb toward body

Types of Contractions

- Isometric: constant length, no shortening occurs
 - Weight lifter with weight above head
- Isotonic: constant force, length changes
 - Moving weights

Disorders

- Seldom involved with infectious disease
- Usually injured from an external source
 - Over exercise
 - Injury

Types of disorders

- ❑ Pulled tendons
 - Tendon separates from muscle
- ❑ Contusions
 - Blood vessels break due to severe blow
 - Discolored, painful, and swelling
 - Contraction of muscle is painful
- ❑ Hernia
 - Organ protrudes through the wall of muscle tissue in which it is housed (usually the abdomen)
- ❑ Muscle pull/strain
 - Muscle fibers overstretched or separated