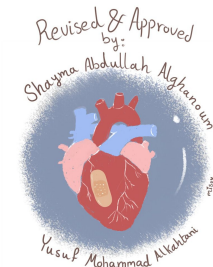


Lecture 2:

SKELETAL MUSCLES

- **Red** : important
- **Pink** : in girls slides only
- **Blue** : in male slides only
- **Green** : notes, Extra



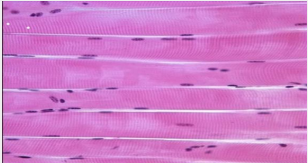
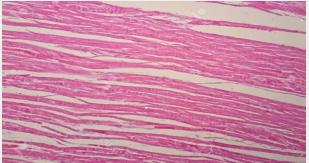
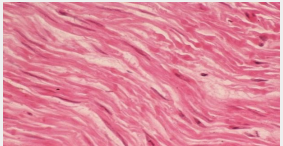


Objectives

At the end of the lecture, students should be able to:

- Describe the main criteria of skeletal muscles.
- Describe the attachments of skeletal muscles.
- Describe the different directions of skeletal muscle fibers.
- Describe the mode of action of skeletal muscles.
- Describe briefly the naming of skeletal muscles.
- Describe briefly the nerve supply of skeletal muscles

Classifications of Muscles:

	Skeletal	Cardiac	Smooth (Visceral)
Location	<u>Attached to bones</u> , or for some facial muscles, to skin	Wall of the <u>heart</u>	Mostly in <u>walls of hollow visceral organ</u> (Other than the heart) found in the stomach, intestines and urinary bladder
Action	<u>Voluntary muscles</u> Subject to conscious control Striated	<u>Involuntary muscles</u> Not under conscious control	
Microscopic Structure	<u>Striated</u> The muscle fibers show transverse striations e.g. Microscopic skeletal & cardiac muscles <div style="display: flex; justify-content: space-around; margin-top: 10px;">   </div>		<u>Non-striated</u> (smooth spindle shape) No striations e.g. visceral muscles <div style="text-align: center; margin-top: 10px;">  </div>



Main criteria of skeletal muscles :

- Voluntary
- Striated
- Attached to skeleton
- Produce movement of skeleton
- Supplied by **somatic nerves**

*The somatic nervous system is the part of the peripheral nervous system

Attachments of skeletal muscles

Number: (Mostly two)

Origin

- The **Proximal** end
- Mostly **Fleshy**
- **Least** movable

Insertion

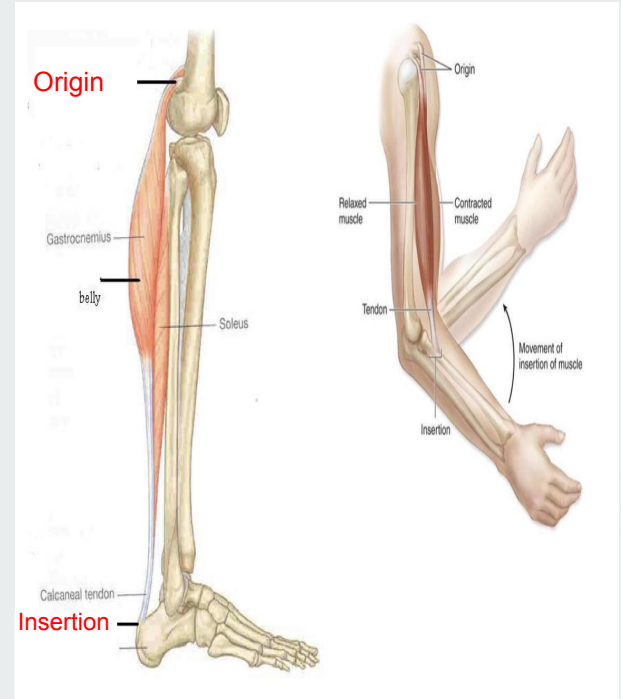
- The **Distal** end
- Mostly **Fibrous**
- **Most** movable

Med 438 notes:

Note :

1. The origin is where muscle start and the insertion where it end

2. Muscles can have more than one origin but they must have **only one insertion**



Types of attachment:

Muscles are attached to bones, cartilage or ligaments through:

(1) Tendons:

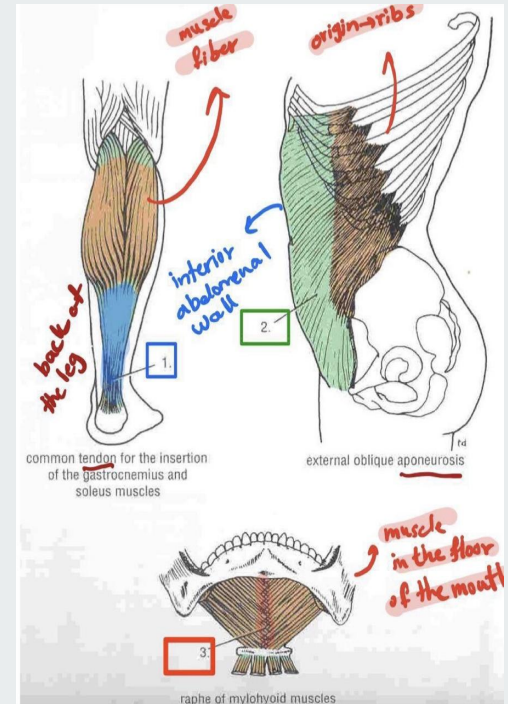
Cords of fibrous connective tissue that usually connects muscle to bone and is capable of withstanding tension.

(2) Aponeurosis:

A thin, broad and strong sheet of fibrous tissue , e.g. Scalp, interior abdominal wall (نفس المنديل العريض)

(3) Raphe:

An interdigitation of the tendinous ends of the flat muscles, e.g. Mylohyoid Raphe.



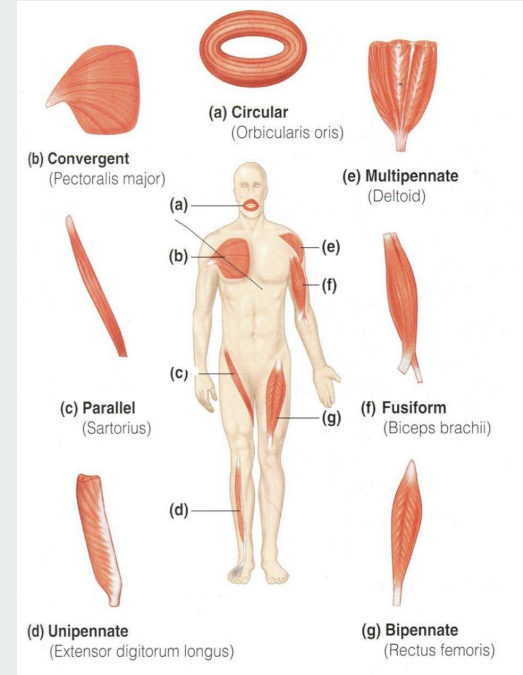
FUNCTIONS OF MUSCLES

- Movement of body and its parts (تساعد في الحركة)
- Maintain posture (تحافظ على قوام الجسد)
- Generate heat (تولد الحرارة)
- Stabilize joints (تعمل على تثبيت المفاصل)

Directions of muscle fibers:

The range of motion and the power of a muscle depends on the arrangement of its fascicles. It can be:

- **Circular** (موجوده حول العين وحول الفم)
- **Convergent** (تبدأ من مكان واسع "أكثر من نقطة" وبعدين تنتهي بنقطه وحده)
- **Fusiform** (شكل مغزلي)



Directions of muscle fibers:

Parallel to line

More range of movement, less powerful.

Pennate (oblique to line)

More powerful, less range of movement.

1-Unipennate

2-Bipennate

3-Multipennate

Fusiform

Spindle-shaped (round, thick belly, & tapered ends).

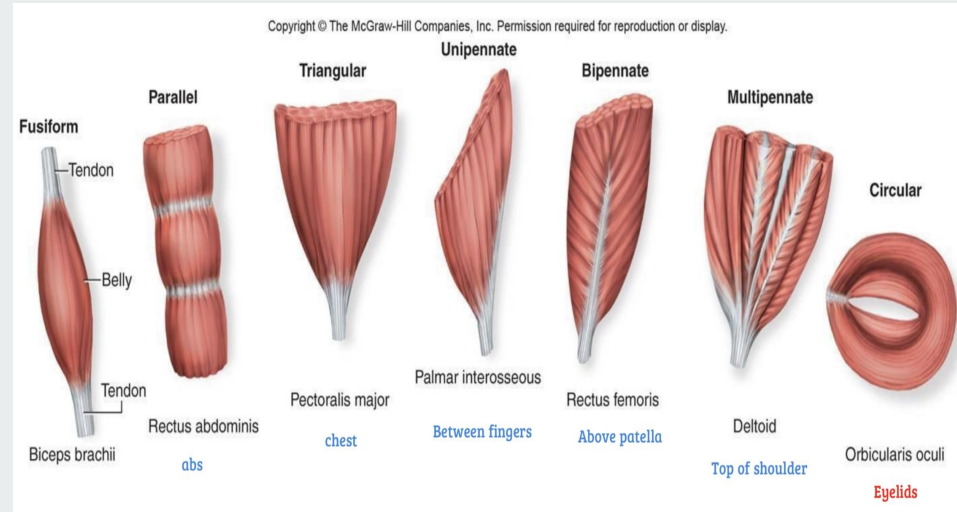
Circular

Surround a body opening or orifice, constricting it when contracted.

Triangular

Have a broad attachment from which the fascicles converge to a single tendon.

صورة توضح أشكال العضلات مع أبرز أسمائها*

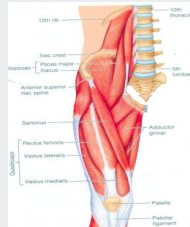


Mode Of Action (Mechanism)

● Agonist (Prime mover)

- It is the chief muscle responsible for a particular movement

- **E.x : 1- Quadriceps Femoris** is the prime mover for extension of the knee joint.



Quadriceps Femoris

- 2- **Biceps Brachii** is the prime mover for flexion of the elbow joint and forearm.



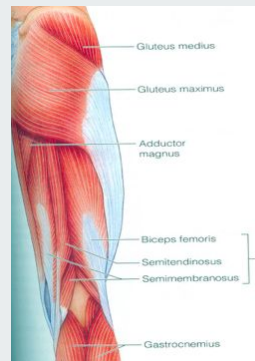
Biceps & Triceps Brachii

● Antagonist

- It **opposes** the action of the prime mover. Before contraction of prime mover, the antagonist must be **relaxed**.

- **E.x : 1- Biceps Femoris** (Flexor of knee) It opposes the action of quadriceps when the knee joint is extended.

- 2- **Triceps Brachii** is the antagonist for prime mover for extension of the elbow joint and forearm.



Biceps Femoris

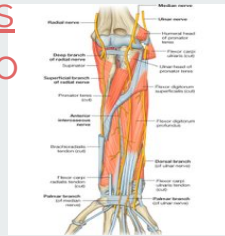
Note : each muscle can be both agonist & antagonist

Mode Of Action (Mechanism)

● Synergist

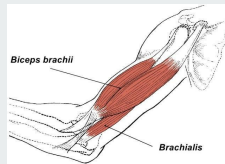
- Prevents unwanted movement in an intermediate joint crossed by the Prime Mover.

- E.x : 1- Flexors and Extensors of wrist joint They contract to fix wrist joint in order that flexors and extensors of fingers work efficiently.



جريوا flexion للاصابع مع flexion للمعصم ويتلاحظون انه اصعب من
contract المعصم لما يكون

2- Brachialis muscle for Biceps prime mover muscle.



● Fixator

- Its contraction does not produce movement by itself but it stabilizes the origin of the prime mover so that it can act efficiently.

- E.x : Muscles attaching the shoulder girdle to the trunk contract to fix shoulder girdle, allowing deltoid muscle (taking origin from shoulder girdle) to move shoulder joint (humerus).

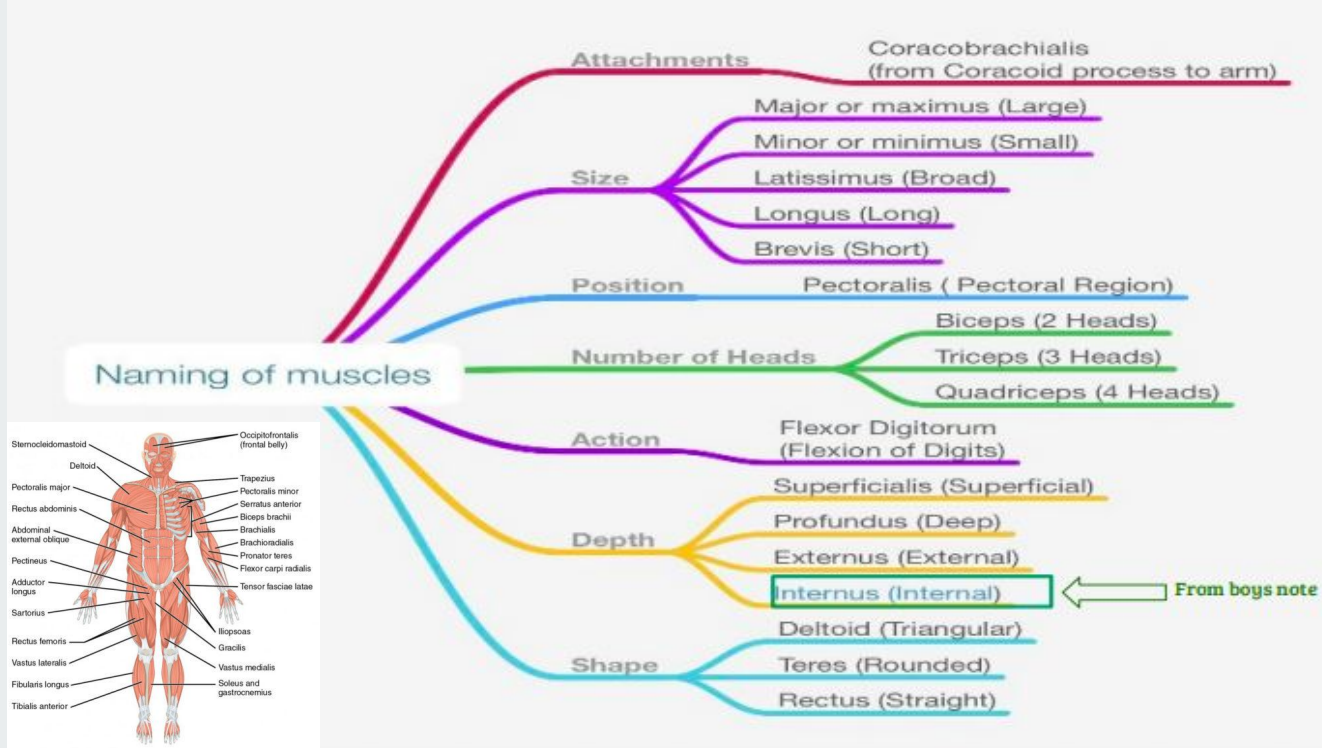
(Deltoid muscle for Biceps prime mover muscle.)



Naming Of Muscles

ببساطة العلماء القدماء كانوا يسمون العضلات عن طريق وصف اللي يشوفون
و لفهم اكثر لأسماء العضلات لازم تقسمون الكلمة و تعرفون معنى كل جزء فيها
هذولي موقعين راح يساعدونكم مع المصطلحات

https://en.m.wikipedia.org/wiki/List_of_medical_roots_suffixes_and_prefixes
<https://globalrh.com/medterm/a>



Coracoid = اسم عظمة موجودة بالكف ، brachi = arm

Pector = chest

Bi = two , ceps = head

Tri = three , ceps = head

Quadr = four , ceps = head

Flexor = نوع الحركة , digit = finger

Super = above; beyond

Pro = before; forward

Ex = out

Inter = between

Nerve Supply of Skeletal Muscles

The nerves supplying the skeletal muscles are **Mixed**:

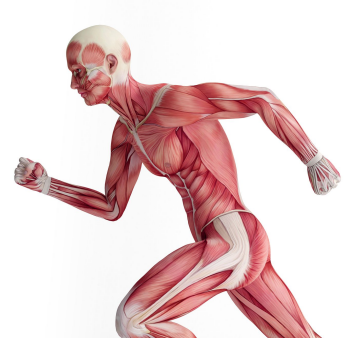
- 60% are **Motor** , carries information from the brain and the spinal cord to the muscles
- 40% are **Sensory** , carries information from the nerves to the central nervous system

It has some Autonomic fibers (**Sympathetic**) for its blood vessels.

The nerve enters the muscle at about the **middle point** of its deep surface.

Effect of Exercise on Muscles

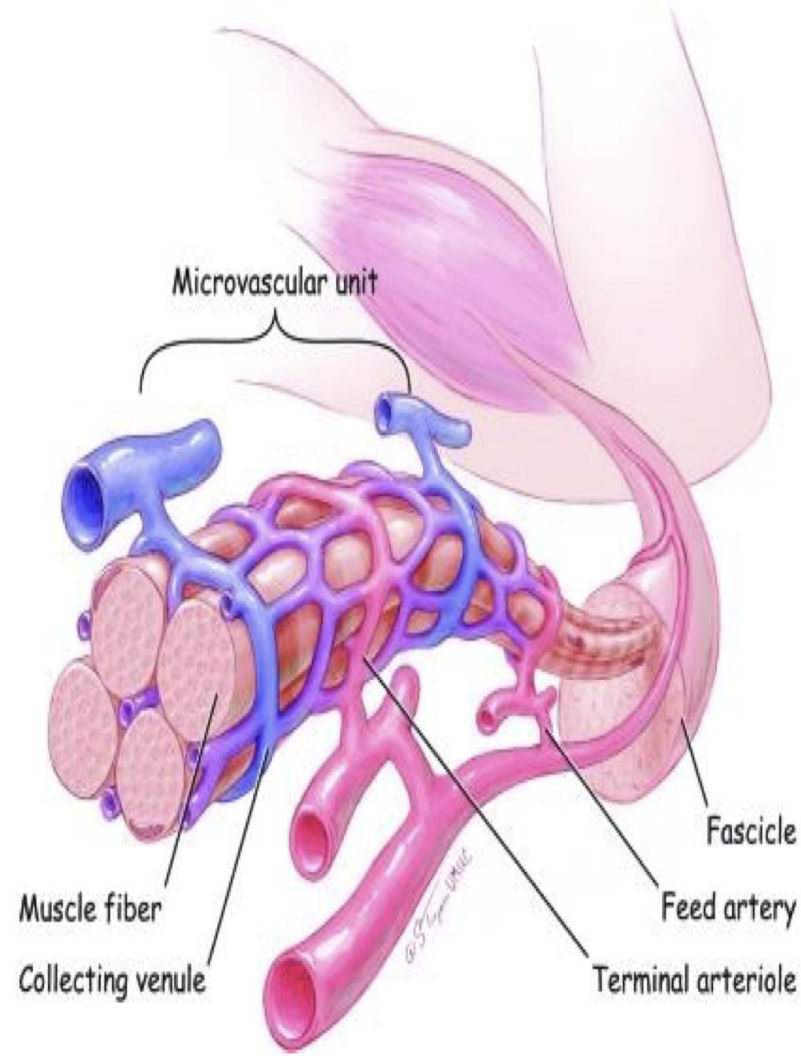
- The amount of work done by a muscle is reflected in changes in the muscle itself
- Muscle inactivity leads to muscle weakness and wasting
- Regular exercise increases muscle size, strength and endurance



Blood supply

During extreme physical exertion, more than 80% of cardiac output can be directed to contracting muscles.

- o The vascular inflow to skeletal muscles is provided by **primary arteries**, which represent the last branches of the arterial supply that arise before entry into the tissue.
- o The primary arteries are appropriately distributed along the long axis of the muscle and give rise to feed arteries that course toward the epimysium of the muscle at right or oblique angles to the primary arteries.



MUSCLE DISEASE & INJURIES

Muscle diseases and injuries are common, especially in sports activities.

A severe muscle injury can keep you from participating in the activities that you love and enjoy for living.

Muscle diseases and injuries could be one of the major factors that threat someone's professional career(s).

o Muscular Dystrophy: A genetic disease that cause a damage of muscle fibers.

o Muscle Cramps: can occur suddenly and involuntarily in one or more muscles.

o Sprains and Strains: Twist or pull in the muscles or tendons which can either be sudden or over a period of time, with or without tearing of the muscle

o Contusions: often caused by a direct trauma or repeated blow to the muscle. In some cases, the condition can be caused by falling on a hard surface.



MUSCLE TREATMENT



Minor muscle injuries may be treated with simple home remedies, such as rest, applying ice, using compression bandage, and elevating your injured limb.

Anti-inflammatory medication.

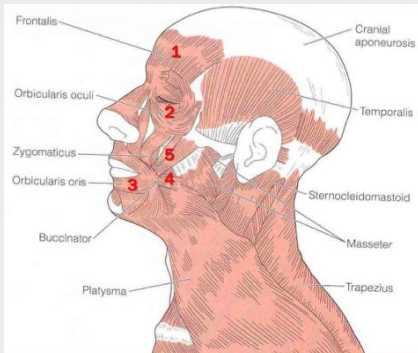
o Physiotherapy

- o Severe muscle injuries need to be checked by a qualified health care provider.**
- o A torn muscle or tendon may need to be surgically repaired.**

Main muscles

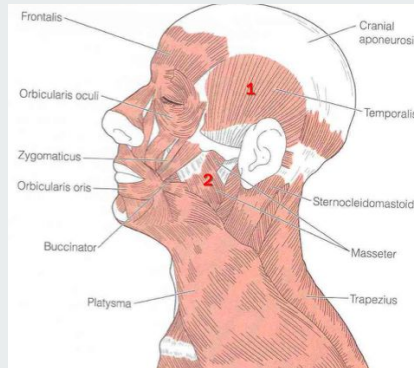
A) Facial muscles

- 1- frontalis
- 2- orbicularis oculi
- 3- orbicularis oris
- 4- buccinator
- 5- zygomaticus



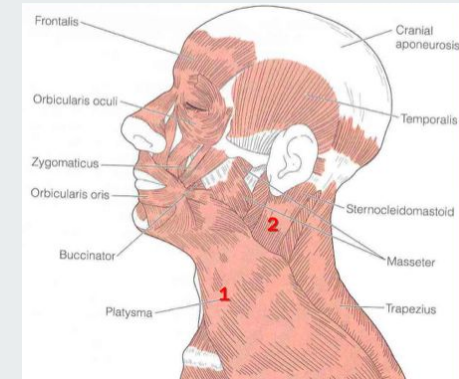
B) Muscles of mastication

- 1- temporalis
 - 2- Masseter
 - 3- Lateral pterygoid
 - 4- Medial pterygoid
- (3,4 are deep muscles, not shown in the diagram)



C) Neck muscles

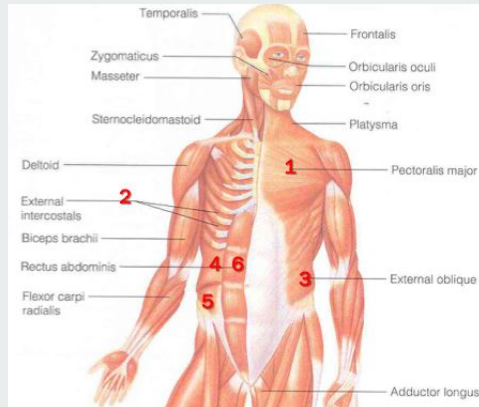
- 1- Platysma
- 2- Sternomastoid



Main muscles

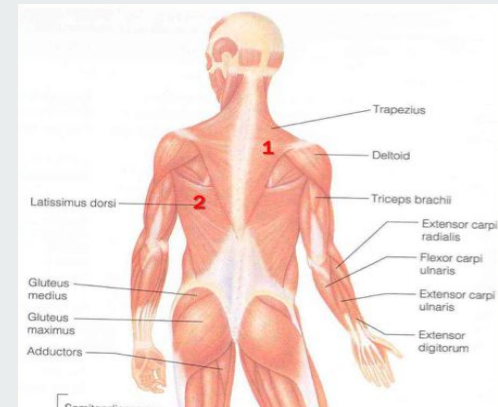
D) Trunk Muscles: Front

- 1- Pectoralis major
- 2- Intercostals
- 3- External oblique
- 4- Internal oblique
- 5- Transversus abdominis
- 6- Rectus abdominis



E) Trunk Muscles: Back

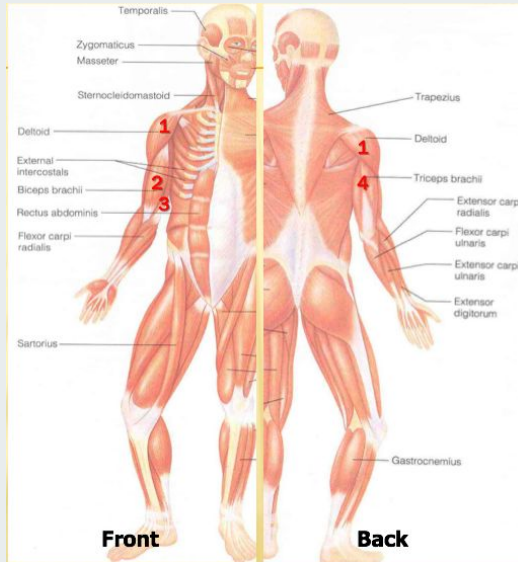
- 1- Trapezius
- 2- Latissimus dorsi



Main muscles

F) Upper Limb Muscles

- 1- Deltoid
- 2- Biceps
- 3- Brachialis
- 4- Triceps



G) Lower Limb Muscles

- 1- Quadriceps femoris
- 2- Sartorius
- 3- Tibialis anterior
- 4- Gluteus maximus
- 5- Gluteus medius
- 6- Hamstrings
- 7- Gastrocnemius



MCQ:

1) Skeletal muscles are attached to?

a) Bones

b) Bones, and skin for facial muscles

c) Walls of visceral organ

d) Wall of the heart

2) Somatic nerves supply?

a) cardiac

b) skeletal

c) visceral

3) Which of these is called smooth muscles?

a) Cardiac

b) Skeletal

c) facial muscles

d) visceral

4) Prevents unwanted movement in an intermediate joint crossed by the Prime Mover ?

a) Fixator

b) Agonist

c) Antagonist

d) Synergist

5) Muscle inactivity leads to ?

a) increases muscle size

b) increases muscle strength

c) muscle weakness and wasting

d) decreases muscle strength

6) Pectoralis major classified under ?

a) Trunk Muscles: Front

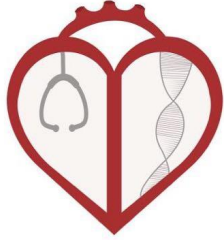
b) Lower Limb Muscles

c) Muscles of mastication

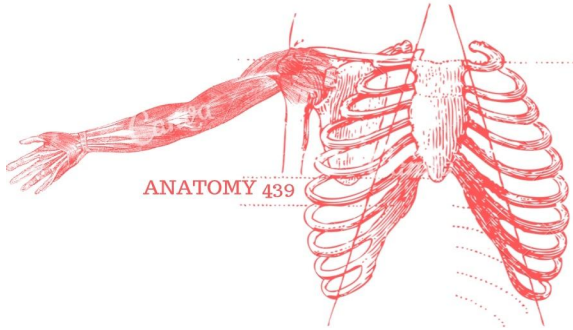
d) Trunk Muscles: Back

Answers

1	b
2	b
3	d
4	d
5	c
6	a



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