Surface Anatomy

Surface Anatomy:-It is a branch of gross anatomy that examines shapes and markings on the surface of the body as they are related to deeper structures or (the study of external anatomical features with out dissection).

-It is essential in locating and identifying anatomic structures prior to studying the internal gross anatomy.

-It helps to locate the affected organ / structure / region in disease process

Four techniques when examining surface anatomy:-

1-visual inspection

- Directly observe the stracture and markings of surface features.

2-Palpation

- feeling with firm pressure or perceiving by the sense of(touch).
- precisely locate and identify anatomic features under the skin.

3-Percussion

tap sharply on specific body sites to detect resonating vibrations

3-Auscultation

listen to sounds emitted from organs

Surface Anatomy of head:-

The head contains the brain and the special sense organs—the eyes, ears, nose, and mouth (taste buds). It also provides openings into the respiratory and digestive systems. The head is structurally and developmentally divided into the cranium and the face.

1-Cranium

The cranium, also known as the braincase, is covered by the scalp. The scalp is clinically important because of the dense connective tissue layer that supports nerves and vessels beneath the skin.

Cranium can be subdivided into three regions, each having prominent surface anatomy features.

- the frontal region of the cranium is the forehead covering the frontal region is the frontalis muscle which overlies the frontal bone
- the frontal region terminates at the Superciliary arches

2- Face

The face is divided into four regions: the ocular region, which includes the eye and associated structures; the auricular region, which includes the ear; the nasal region, which includes the external and internal structures of the nose; and the oral region, which includes the mouth and associated structures.

A-Orbital(ocular) region:

- Includes the eyeballs and associated structure.
- Surface features protect the eye.
- Eyebrows protect against sunlight and potential mechanical damage.
- Eyelids close reflexively to protect against objects moving near the eye.
- Eyelashes prevent airborne particals from contacting the eyeball.
- The superior palpebral fissure, or upper eyelid crease.
  - Asians do not have superior palpebral fissure

B- Auricular(ear) region:

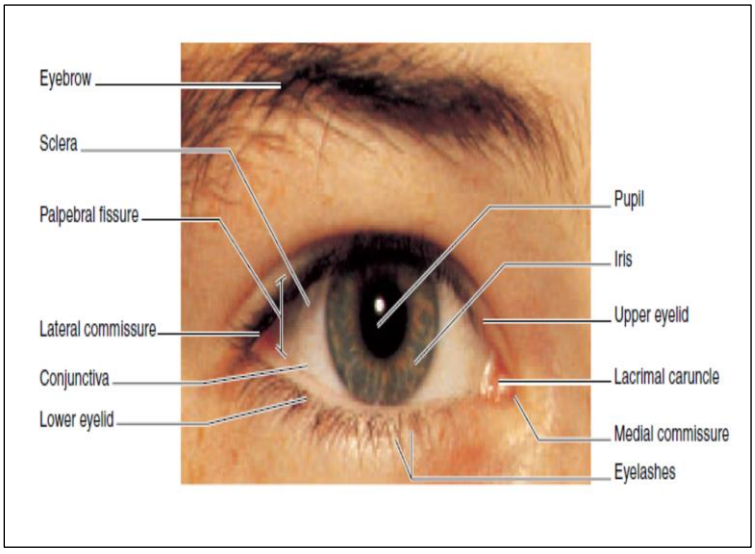
- Composed of the visible surface structures of the ear as well as the ear's internal organs, which function in hearing and maintaining equilibrium
- Auricle or pinna, is the fleshy part of the external ear.
- Within the auricle is a tubular opening into the middle ear called the external auditory canal.

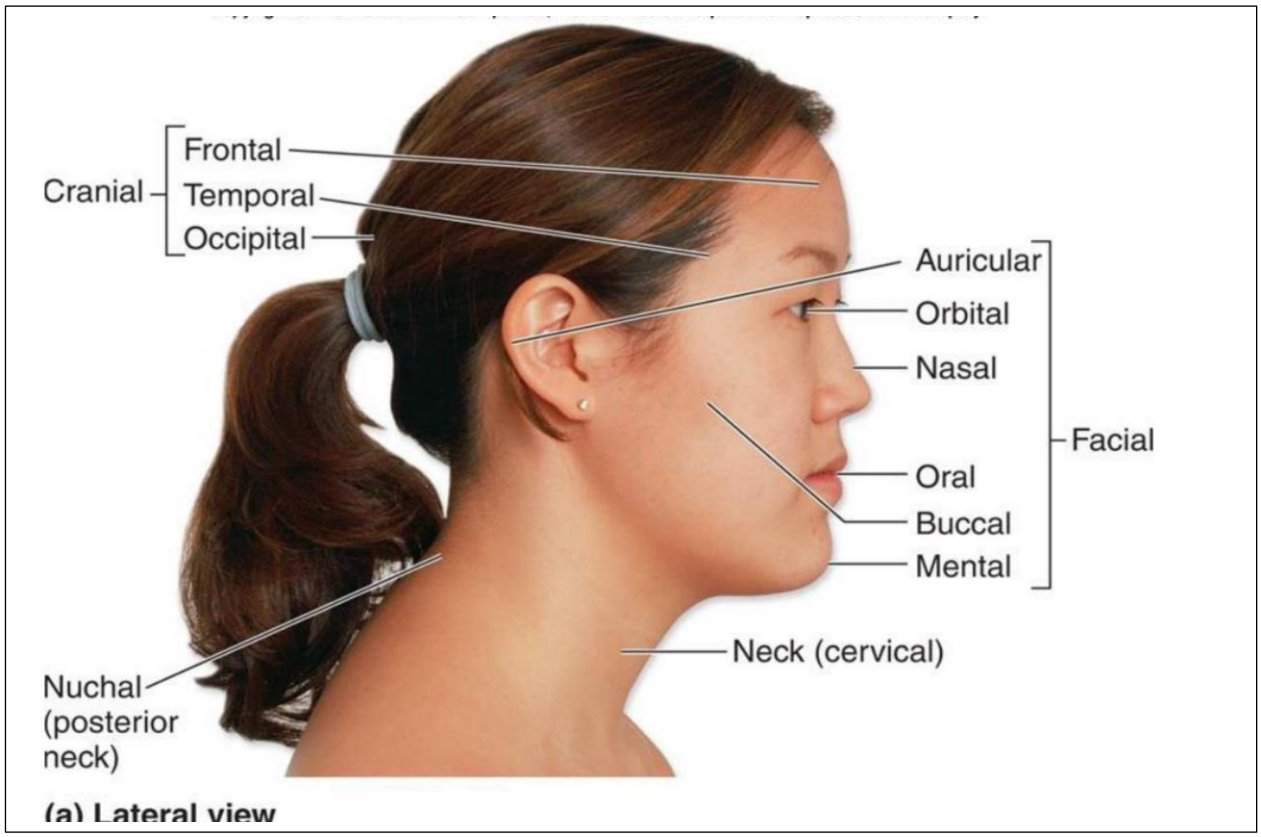
C-Nasal region:

- Contains the nose
  - The bridge: it is formed by the union of the nasal bones
- The tip of the nose is called the apex.
- Nostrils or external nares, are the paired openings into the nose.
- Ala nasi(wing of the nose) formed the flared lateral margin of each nostril.

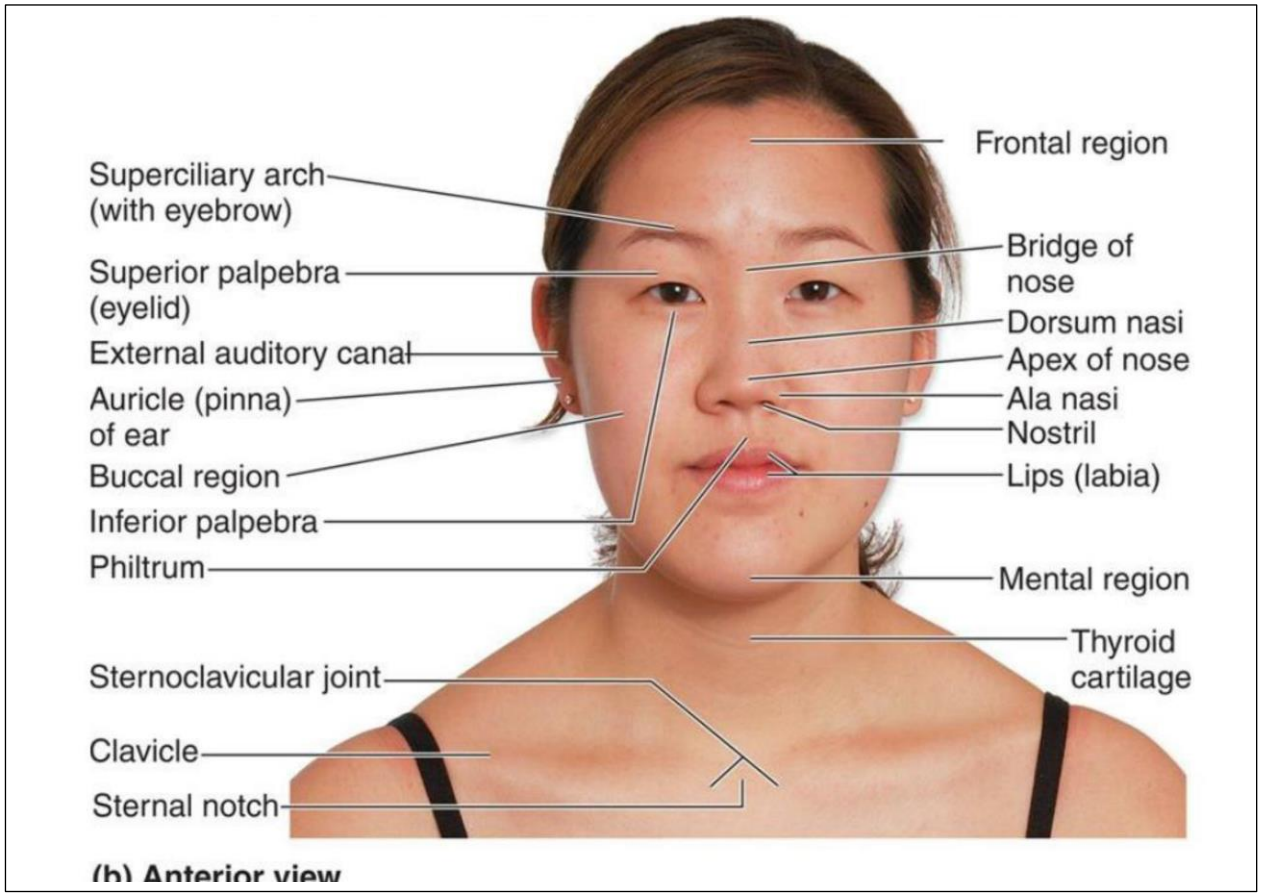
D- Oral region:

- Inferior to the nasal region
- Includes the buccal(check) region, the fleshy upper and lower lips(labia),
- The vertical depression between your nose and upper lip is called the **philtrrum.**





(a) Lateral view



(b) Anterior view

Surface Anatomy of Neck:-

The neck is a complex region of the body that connects the head to the thorax. The spinal cord, nerves, trachea, esophagus, and major vessels traverse this highly flexible area. The neck is divided into four regions: (1) an anterior region called the **cervix** that contains portions of the digestive and respiratory tracts, the larynx (voice box), vessels passing to and from the head, nerves, and the thyroid and parathyroid glands; (2) **right** and (3) **left lateral regions**, each composed of major neck muscles and cervical lymph nodes; and (4) a posterior region, referred to as the **nucha (nuchal)** which includes the spinal cord, cervical vertebrae, and associated structures.

Triangles of the Neck

The triangles of the neck, created by the arrangement of specific muscles and bones, are clinically important because of the specific structures included in each. The structures of the neck that are important in surface anatomy have already been described, however. Thus, the two major and six minor triangles are depicted in figure. The sternocleidomastoid muscle obliquely transects the neck, dividing it into an anterior cervical triangle and a posterior cervical triangle.

A-Anterior cervical triangle

1-Submental Anterior triangle

- The most superiorly placed of the four triangle.
- Inferior to the chain in the midline of the neck.
- Contains some cervical lymph nodes and tiny veins
- With illness these lymph nodes enlarge and become tender
- Palpation can determine if an infection is present

2-Submandibular Anterior triangle

- Inferior to the mandible and lateral to the submental triangle
- The submandibular gland is the bulge under the mandible

3-Carotid Anterior triangle

- Bounder by the sternocleidomastoid muscle, omohyoid muscle, and posterior digastric muscle
- The strong pulsation is the common carotid artery
- Contains the internal jugular vein and some cervical lymph nodes

4-Muscular Anterior triangle

- Most inferior of the four triangles.
- Contains the sternohyoid and sternothyroid muscle, as well as the lateral edges of the larynx and the thyroid gland.
- Also contain cervical lymph nodes which are present throughout the neck.

B-Posterior cervical triangle.

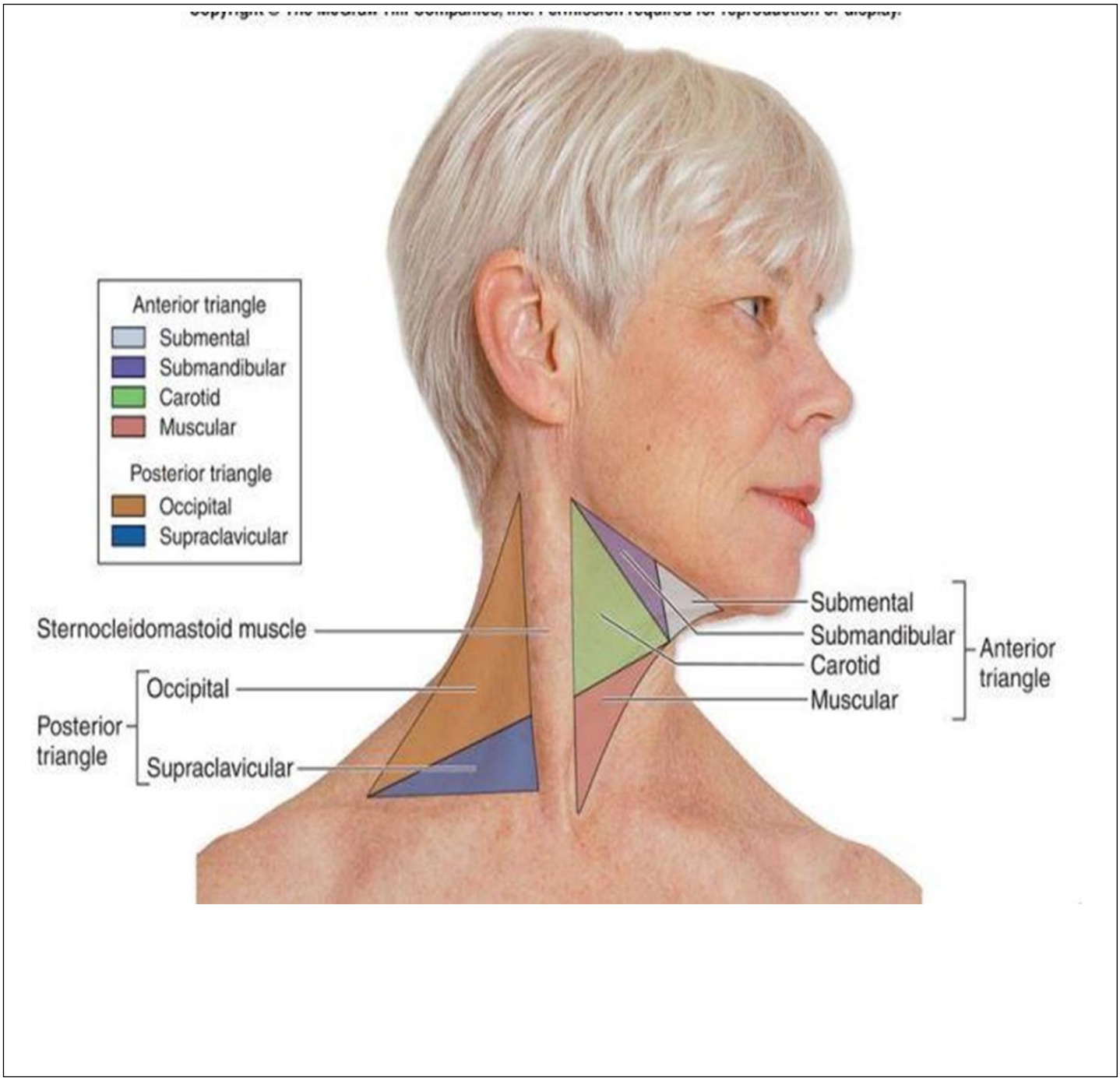
- Lateral region of the neck.
- Posterior to the sternocleidomastoid muscle.
- Superior to the clavicle.
- Anterior to the trapezius muscle.
- Subdivided into two smaller triangles.
    - The occipital triangle
    - Supraclavicular triangle

1-The occipital triangle

- Large and more posteriorly placed.
- Bounded by the omohyoid muscle, trapezius muscle, sternocleidomastoid muscle.
- Contains the external jugular vein, the accessory nerve, the brachial plexus , and some lymph nodes.

2-Supraclavicular triangle

- Also called omoclavicular and subclavian
- Bounded by the clavicle, omohyoid muscle, sternocleidomastoid muscle.
- Contains part of subclavian vein and artery as well as some lymph nodes


Anterior triangle
Submental
Submandibular
Carotid
Muscular
Posterior triangle
Occipital
Supraclavicular
Sternocleidomastoid muscle
Posterior triangle
Occipital
Supraclavicular
Submental
Submandibular
Carotid
Muscular
Anterior triangle

Surface Anatomy of trunk:-

The surface anatomy of the trunk is particularly important in determining the location and condition of the visceral organs. The trunk, or torso, is divided into the **back**, **thorax** (chest), **abdomen** (venter), and **pelvis**.

1-Back

a median furrow can be seen on the back, along with some of the spinous process of the vertebrae. The entire series of vertebral spines can be observed when the vertebral column is flexed. This position is important in determining defects of the vertebral column. The back of the scapula presents other important surface landmarks. The base of the spine of the scapula is level with the third thoracic vertebra, and the inferior angle of the scapula is even with the seventh thoracic vertebra.

The triangle of auscultation is bounded by the trapezius muscle, the latissimus dorsi muscle, and the medial border of the scapula. Because there is a space between the superficial back muscles in this area, heart and respiratory sounds are not muffled by the muscles when a stethoscope is placed here.

2-Thorax

- The superior portion of the trunk sandwiched between the neck superiorly and abdomen inferiorly.
- Consist of the chest and the upper back
- On the anterior surface of the chest are the two dominating surface features of the thorax.
    - The clavicles and the sternum

The clavicles

- Paired clavicles and the sternal (jugular) notch represent the border between the thorax and the neck.
- On the superior anterior surface where they extend between the base of the neck on the right and left sides laterally to the shoulder
- Left and right costal margins of the rib cage form the inferior boundary of the thorax.
- Costal angle (costal arch) is where costal margins join to form an inverted v at the xiphoid process
- On the thin person, many of the rib can be seen.
- Most of the ribs(with the exception of the first one)can be palpated

The sternum

- Palpated readily as the midline bony structure in the thorax.
- The sternum consist of **manubrium**, **body** and **xiphoid process**.
- Sternal angle can be also felt as an elevation between the manubrium and the body.
- Sternal angle is clinically important because it is at the level of the costal cartilage of the second ribs.
    - It is often used as landmark for counting the ribs

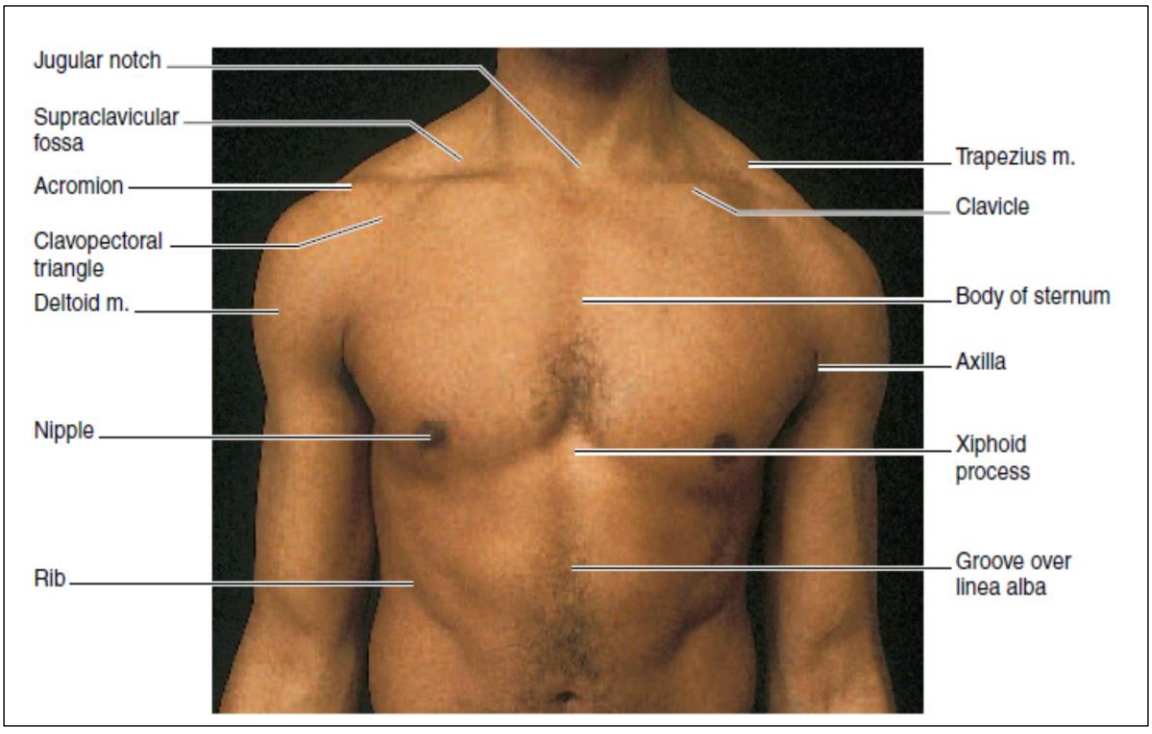
3-Abdomen

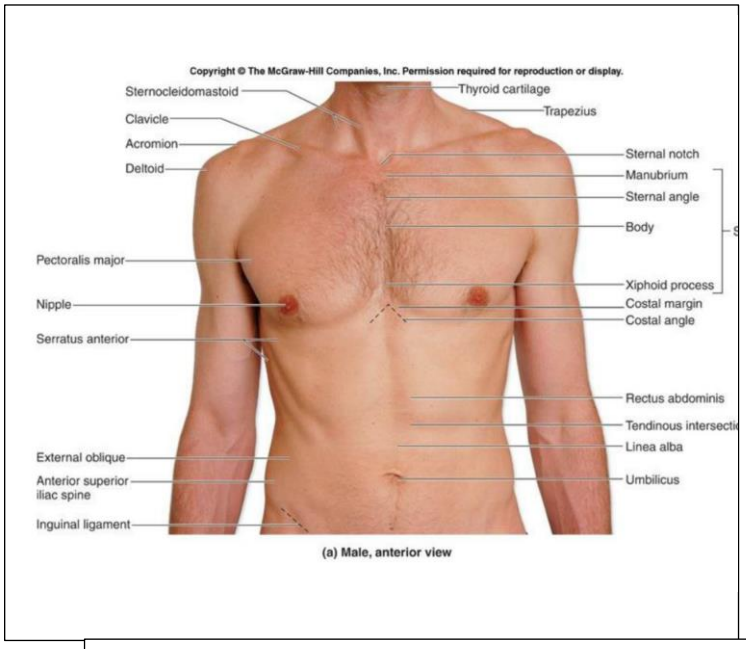
- The abdomen is the portion of the body between the diaphragm and the pelvis.
- On the anterior surface of the abdomen,the umbilicus(navel) is the prominent depression or projection in the midline of the abdominal wall
- In the midline of the abdominal anterior surface is the linea alba, a tendinous stracture that extends inferiorly from the xiphoid process to the pubic symphysis.
- The left and right rectus abdominis muscle and their tendinous insertions are refered to as" **six-pack abs**"
- The superior aspect of the ilium(iliac crest) terminates anteriorly at the anterior superior iliac spine
- Attached to the anterior superior iliac spine is the inguinal ligament, which forms the lower boundary of the abdominal wall.

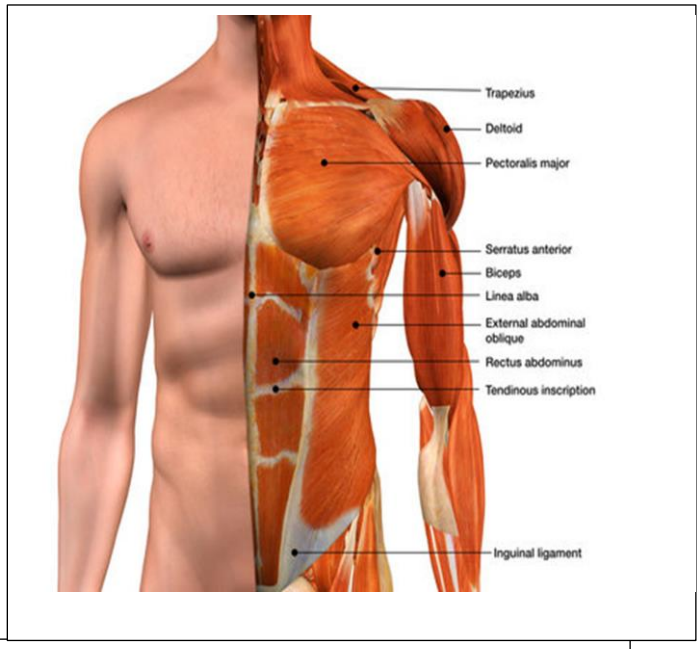
4-Pelvis and Perinum

The pelvic region are important primarily to identify reproductive organs and clinical problems of these organs. The important bony structures of the pelvis include the crest of the ilium and the symphysis pubis, located anteriorly, and the ischium and coccyx, which are palpable posteriorly. An inguinal ligament extends from the anterior superior iliac spine to the symphysis pubis and is clinically important because hernias may occur along it. Although the inguinal ligament cannot be seen, an oblique groove overlying the ligament is an apparent surface feature.

The perineum is the region that contains the external sex organs and the anal opening. The surface anatomy of the perineum of a female becomes particularly important during parturition.







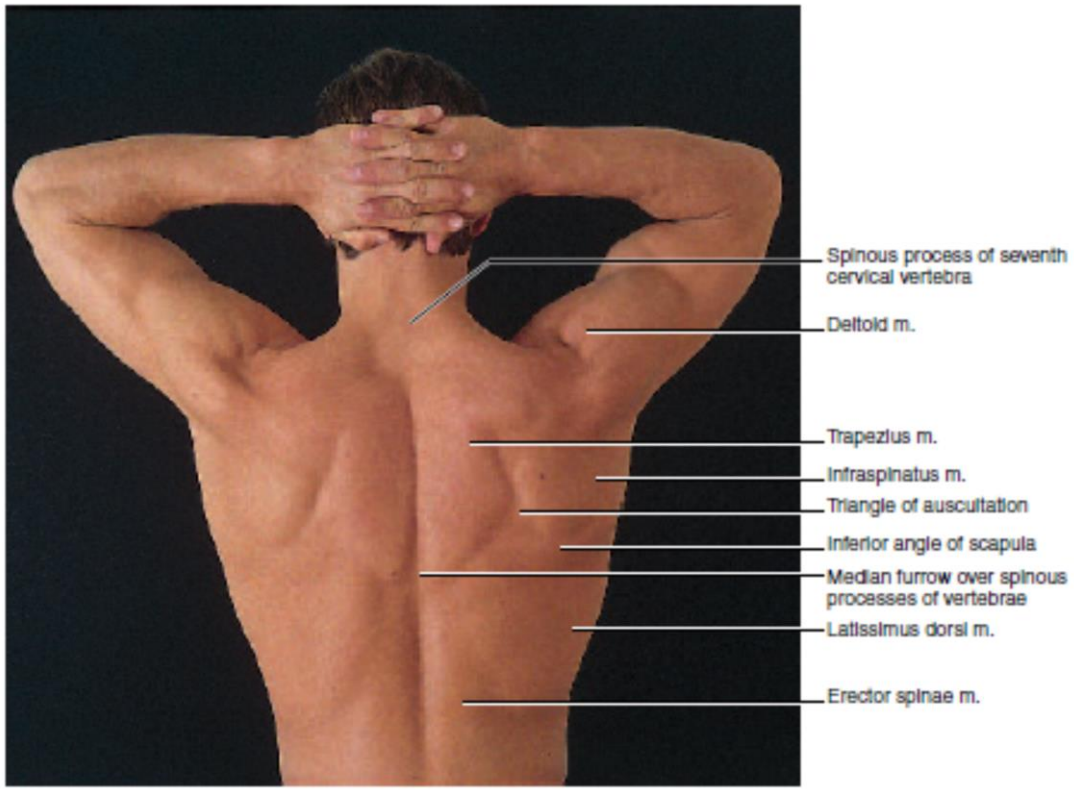


FIGURE 10.18 The surface anatomy of the back during abduction of the shoulder joints and flexion of the elbow joints.

Surface Anatomy of the shoulder and upper limbs:-

The anatomy of the shoulder and upper extremity is of clinical importance because of frequent trauma to these body regions. In addition, vessels of the upper extremity are used as pressure points and as sites for venipuncture for drawing blood, providing nutrients and fluids, and administering medicine.

Shoulder

- The scapula, clavicle, and proximal portion of the humerus collectively form shoulder, the acromion are subcutaneous and easily located.
- The rounded curve of the shoulder is formed by the thick deltoid muscle, which is frequently a site for intramuscular injections.

Axilla

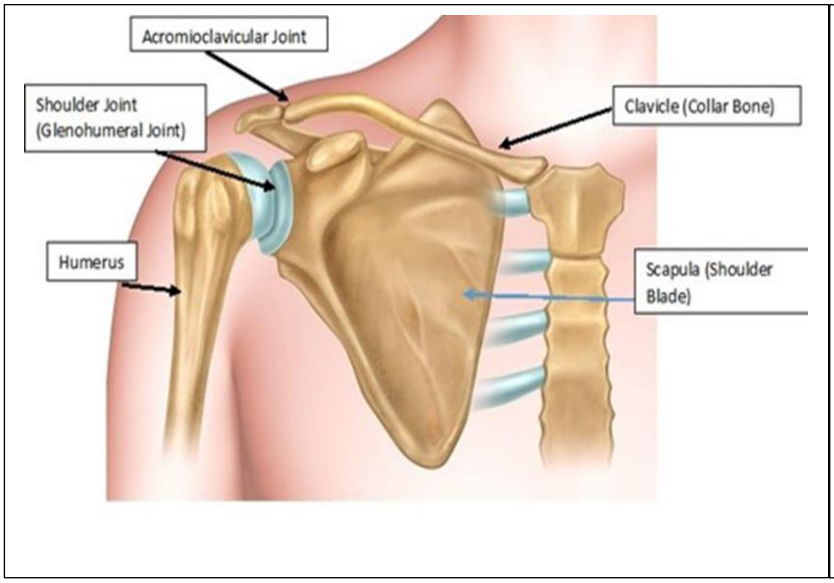
- The axilla is commonly called the armpit. is clinically important because of the subcutaneous position of vessels, nerves, and lymph nodes in this region.
- pectoralis major muscle forms the anterior axillary fold.
- the latissimus dorsi muscle it extends from the lumbar vertebrae to the humerus forms the posterior axillary fold.

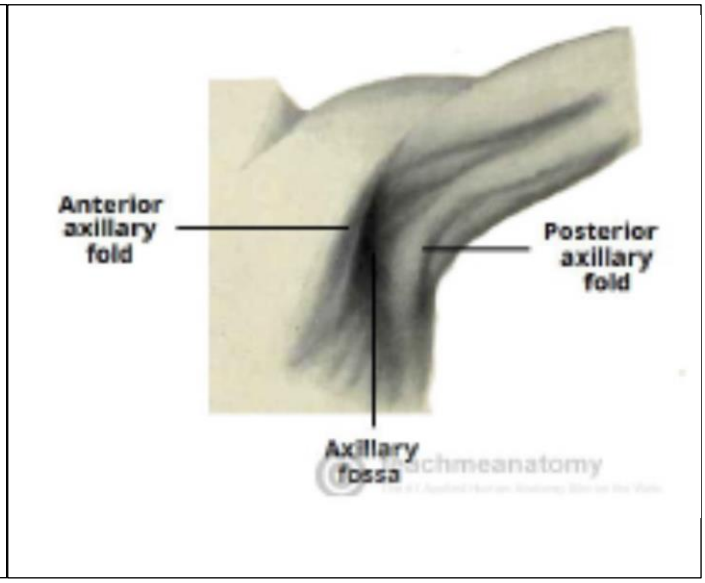
Arm(Brachium)

- The brachium which extends from the shoulder to the elbow on the upper limb.
- On the anterior side of the arm, the cephalic vein is evident in muscular individuals as it travers along the lateral border of the entire upper limb
- This vein originates in a small surface depression, bordered by the deltoid muscle and pectoralis major muscle called the **clavipectoral triangle**.
- The basilica vein is sometimes evident along the medial side of the upper limb.
- Brachial artery becomes subcutaneous along the medial side of the brachium, and it is pulse may be detected here.
- Clinically important in measuring blood pressure.
- The **cubital fossa** is the depression on the anterior surface of the elbow region, where the median cubital vein links the cephalic and basilic veins. These veins are subcutaneous and become more conspicuous when a proximal compression is applied. For this reason, they are an important location (particularly the median cubital) for the removal of venous blood for analyses and transfusions or for intravenous therapy

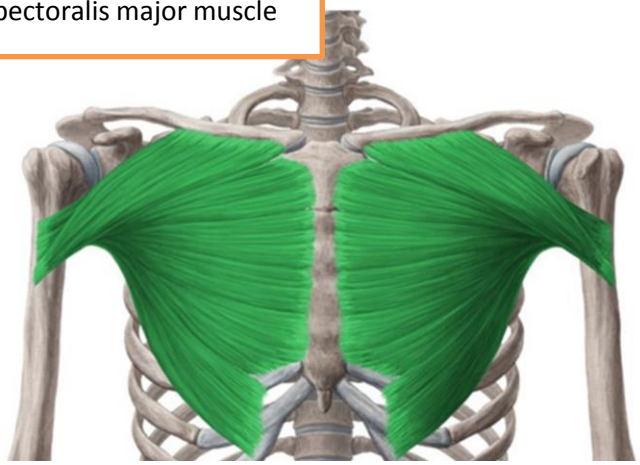
Forearm(Antebrachium)

- The radius, the ulna, and the muscles that control hand movements from the forearm, or antebrachium.
- Proximal part of the forearm is bulkier, due to the fleshy bellies of the forearm muscle
- Distally the forearm becomes thinner as you are palpating the tendon of these muscle.
- The styloid processes of the radius and ulna are readily palpable as the lateral and medial bump.

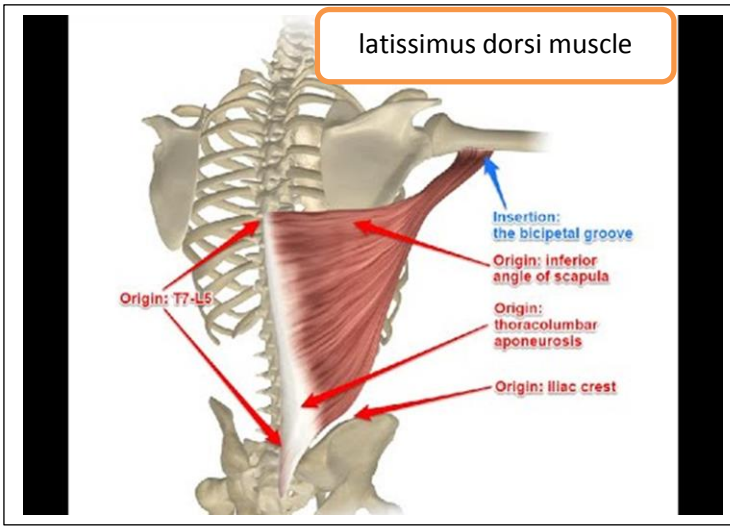




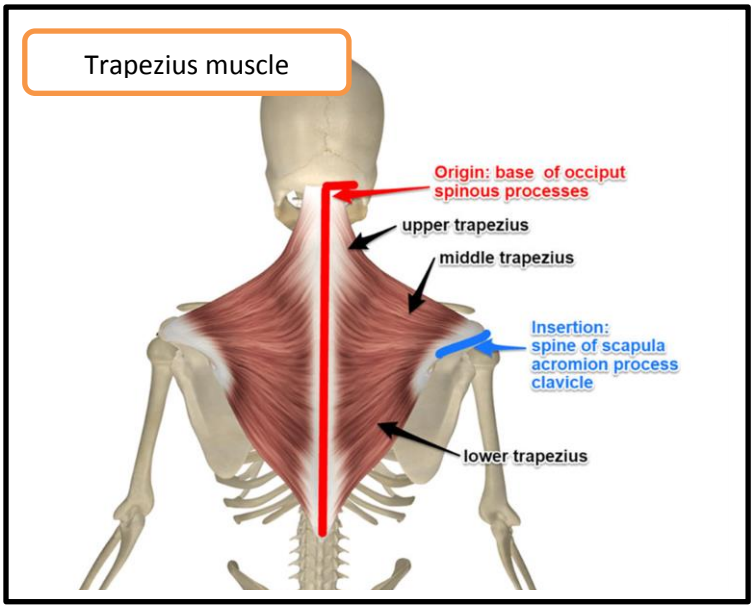
pectoralis major muscle

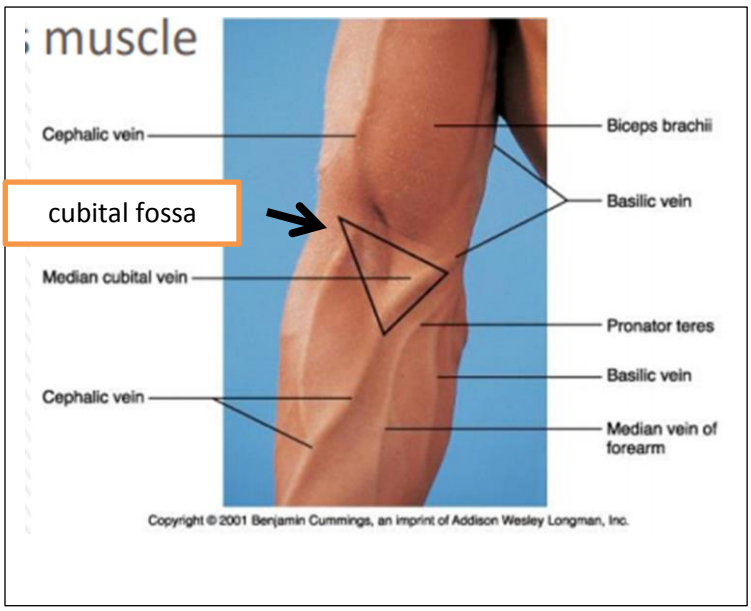


latissimus dorsi muscle



Trapezius muscle





Surface Anatomy of Buttock and Lower limbs:-

Buttock(Gluteal region)

- The superior borders of the buttocks, or gluteal region, are formed by the iliac crests
- **the natal cleft** (gluteal cleft) extends vertically to separate the buttocks into two prominences, each formed by pads of fat and by the massive gluteal muscles.
- **sciatic nerve**, which is the major nerve to the lower extremity, lies deep to the gluteus maximus muscle.
- The inferior border of the gluteus maximus muscle forms the **fold of the buttock**.

Thigh

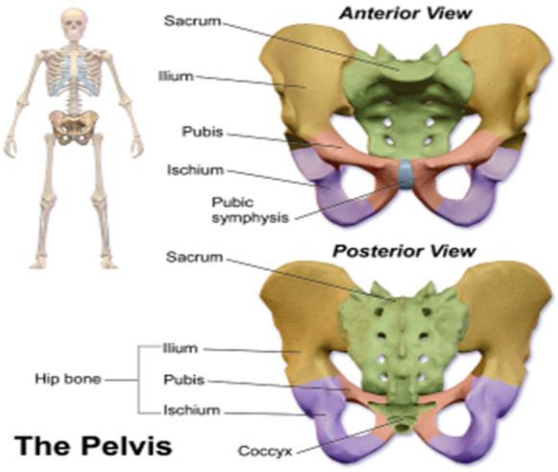
- The femur is the only bone of the thigh, but there are three groups of thigh muscles. The anterior group of muscles, referred to as the quadriceps femoris, extends the knee joint when it is contracted
- The femoral triangle can be seen as a depression inferior to the location of the inguinal ligament on the anteromedial surface in the upper part of the thigh.
- The major vessels of the lower extremity, as well as the femoral nerve, traverse this region.
- The depression on the posterior aspect of the knee joint is referred to as the **popliteal fossa**. This area becomes clinically important in elderly people who suffer degenerative conditions.

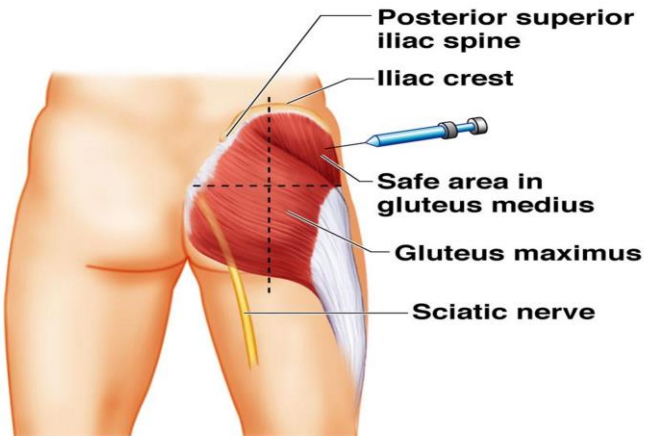
Leg

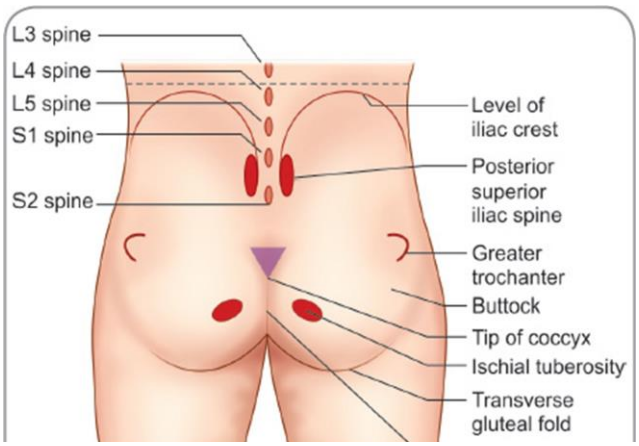
- the tibia and fibula, the bones of the leg
- At the ankle, the medial malleolus of the tibia and the lateral malleolus of the fibula are easy to observe as prominent eminences
- **Achilles tendon** (tendo calcaneus) is the strong, cordlike tendon that attaches to the calcaneus from the calf of the leg.
- Pulsations from the posterior tibial artery can be detected by palpating between the medial malleolus and the calcaneus.

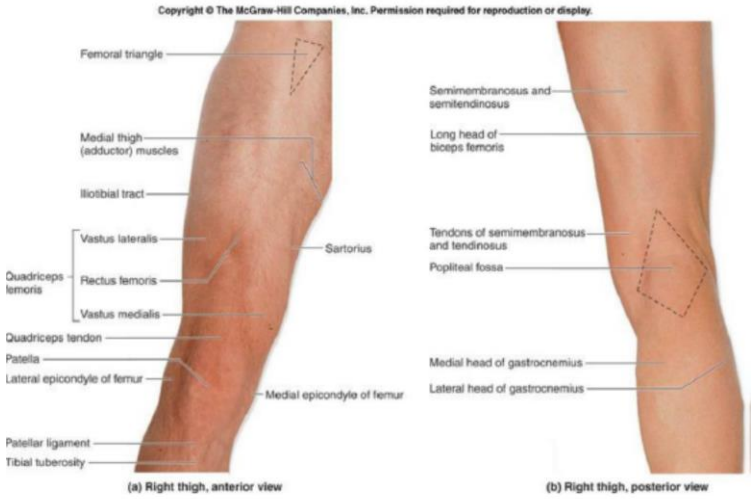
Foot

- The feet are adapted to support the weight of the body, to maintain balance, and to function mechanically during locomotion.
- The longitudinal arch of the foot, located on the medial portion of the plantar surface. provides a spring effect when locomoting.


Anterior View
Sacrum
Ilium
Pubis
Ischium
Pubic symphysis
Posterior View
Sacrum
Ilium
Hip bone
Pubis
Ischium
Coccyx
The Pelvis


Posterior superior iliac spine
Iliac crest
Safe area in gluteus medius
Gluteus maximus
Sciatic nerve


L3 spine
L4 spine
L5 spine
S1 spine
S2 spine
Level of iliac crest
Posterior superior iliac spine
Greater trochanter
Buttock
Tip of coccyx
Ischial tuberosity
Transverse gluteal fold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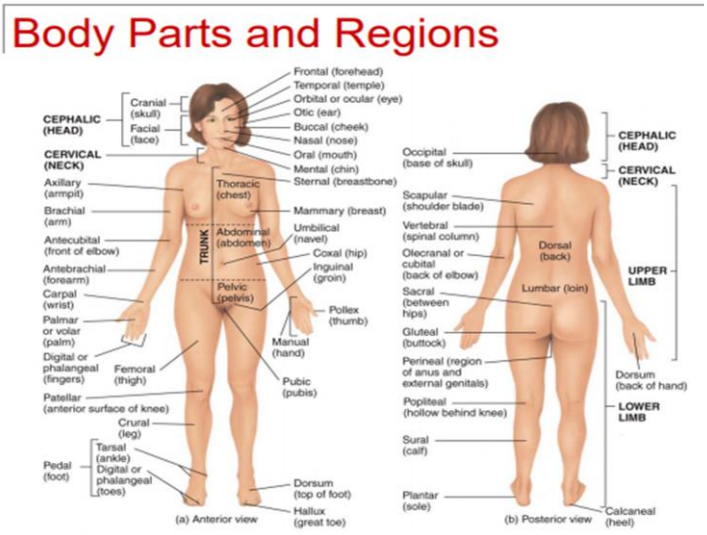
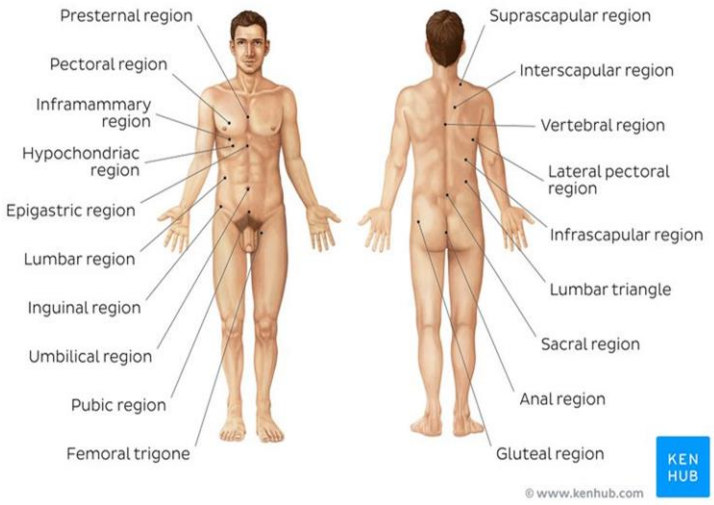
Femoral triangle
Medial thigh (adductor) muscles
Iliotibial tract
Vastus lateralis
Sartorius
Quadriceps femoris
Rectus femoris
Vastus medialis
Quadriceps tendon
Patella
Lateral epicondyle of femur
Medial epicondyle of femur
Patellar ligament
Tibial tuberosity
(a) Right thigh, anterior view
Semimembranosus and semitendinosus
Long head of biceps femoris
Tendons of semimembranosus and tendinosus
Popliteal fossa
Medial head of gastrocnemius
Lateral head of gastrocnemius
(b) Right thigh, posterior view


Body Parts and Regions
CEPHALIC (HEAD)
Cranial (skull)
Facial (face)
CERVICAL (NECK)
Axillary (armpit)
Brachial (arm)
Antecubital (front of elbow)
Antebrachial (forearm)
Carpal (wrist)
Palmar or volar (palm)
Digital or phalangeal (fingers)
Patellar (anterior surface of knee)
Crural (leg)
Pedal (foot)
Tarsal (ankle)
Digital or phalangeal (toes)
TRUNK
Thoracic (chest)
Abdominal (abdomen)
Pelvic (pelvis)
Femoral (thigh)
Frontal (forehead)
Temporal (temple)
Orbital or ocular (eye)
Otic (ear)
Buccal (cheek)
Nasal (nose)
Oral (mouth)
Mental (chin)
Sternal (breastbone)
Mammary (breast)
Umbilical (navel)
Coxal (hip)
Inguinal (groin)
Manual (hand)
Pollex (thumb)
Pubic (pubis)
Dorsum (top of foot)
Hallux (great toe)
(a) Anterior view
Occipital (base of skull)
Scapular (shoulder blade)
Vertebral (spinal column)
Olecranal or cubital (back of elbow)
Sacral (between hips)
Gluteal (buttock)
Perineal (region of anus and external genitals)
Popliteal (hollow behind knee)
Sural (calf)
Plantar (sole)
Dorsal (back)
Lumbar (loin)
Dorsum (back of hand)
Calcaneal (heel)
(b) Posterior view


Presternal region
Pectoral region
Inframammary region
Hypochondriac region
Epigastric region
Lumbar region
Inguinal region
Umbilical region
Pubic region
Femoral trigone
Suprascapular region
Interscapular region
Vertebral region
Lateral pectoral region
Infrascapular region
Lumbar triangle
Sacral region
Anal region
Gluteal region
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