Osteology of the Skull
Work in pairs to examine a skull. The skull consists of a cranium and a mandible. The cranium can be thought of as having two major parts: the brain case enclosing and protecting the brain, and the facial skeleton. You will notice that, while the brain case is composed of fairly strong and thick bone, the parts of the facial skeleton are paper thin. For this reason great care must be taken when handling the skulls - NEVER HOLD THE SKULL BY THE EYE SOCKETS OR NASAL CAVITY. The safest way to handle a skull is with a finger in the foramen magnum. The skull is normally described from its anterior, superior, posterior, lateral, inferior and internal aspects (those features which you may be able to palpate are underlined).

There is a lot of information on the following pages. Do not try to memorise everything this week. Over the following weeks you should return to these pages to consolidate and complete your understanding of the Osteology of the skull

NORMA VERTICALIS
Examine a skull from the superior aspect. As you work through the list of features on the skull, try to identify the structures on your own head or that of a partner.

Draw and label the following features on the outline
- Frontal bone
  - Coronal suture
  - Bregma (anterior fontanelle in infants)
- Parietal bones
  - Sagittal suture
  - Parietal foramen
- Occipital bone (just visible posteriorly)
  - Lambda
  - Lambdoid suture

What soft tissues cover this part of the skull? _____________

NORMA OCCIPITALIS
Examine a skull from the posterior aspect. As you work through the list of features on the skull, try to identify the structures on your own head or that of a partner. Draw the posterior aspect of the skull and label the following features.

- Parietal bones
  - Lambdoid suture and lambda
- Occipital bone
  - Nuchal lines (what muscles attach here?)
  - External occipital protuberance (the inion)
  - Occipital condyles (for articulation with the vertebral column)
- Temporal bone
  - Mastoid process

What is the nuchal region ____________________________
NORMA FRONTALIS
Examine a skull from the anterior aspect. As you work through the list of features on the skull, try to identify the structures on your own head or that of a partner. Label extra features on the diagram of the norma frontalis.

Orbits
Nares

**Frontal bone:** (forms the forehead and the roofs of the orbits)
- Supraorbital foramen or notch (which do you have?)
- Glabella (prominence of bone just above the bridge of the nose)
- Superciliary ridges (prominences underlying the eyebrows)

**Nasal bones:**
Feel the difference between the bony and cartilagenous parts of your own nose

**Lachrymal bone** has the naso-lachrymal canal on the medial side of the orbits

**Zygomatic bone:**
These form your cheek bones:
- Temporal process (forms the anterior part of the zygomatic arch).
- Orbital margin (around the edge of the orbit the zygomatic bone joins the frontal bone laterally, and the maxilla along the lower margin of the orbit)

**Maxilla**
Forms the lower medial part of the orbital margin and articulates with the frontal bone medially
Forms most of the margin of the nares
- Anterior nasal spine
- Infraorbital foramen
- Alveolar process: forms the upper jaw and holds all the upper teeth
Maxillary sinus (large air space situated in the bone above the upper teeth)
- Palatine process (forms most of the roof of the mouth)

**Mandible**
- Mental protuberance (chin)
- Mental foramen
- Body of mandible
- Genial tubercles
- Mylohyoid line
- Submandibular fossa
- Angle of mandible

The regions of the head seen in the frontal view include:
1. Scalp
2. Face
3. Nose
4. Orbits
5. Mouth
6. Temporal region

Locate each region on the skull, and an X-ray and mark them on the diagram....
NORMA LATERALIS
Examine a skull from the lateral aspect. As you work through the list of features on the skull, try to identify the structures on your own head or that of a partner. Label extra features on the diagram of the norma lateralis.

**Parietal bone**
- Temporal lines and Temporal fossa

**Occipital bone**

**Frontal bone**
- Coronal suture
- Pterion (junction of frontal, parietal, temporal and sphenoid bones)
- Notice how thin the bone is in this region
- What muscle covers this area?

**Temporal bone**
- Squamous part
- Petrous part
- Mastoid process
- Styloid process
- Tympanic plate
- External acoustic meatus
- Zygoma (zygomatic process of temporal bone)
- Temporomandibular joint
  - (Mandibular fossa)
  - (Articular eminence)

**Sphenoid Bone**
- Greater wing
- Pterygoid plates
- Pterygomaxillary fissure

**Maxilla**
- Alveolar process
- Nares
- Maxillary sinus

**Zygomatic bone**
- Orbital margin

**Mandible**
- Angle
- Body
- Ramus
- Coronoid process
- Condyloid process
- (head of mandible)

The regions of the head seen in the lateral view include all those seen from the front plus:
1. Parotid region
2. Nuchal region

Locate each region on the skull, and an X-ray and mark them on the diagram....
NORMA BASALIS The main features on the inferior aspect of the skull are the palate the choana (posterior nasal aperture), the foramen magnum and other foramina on the base of the skull.

**Occipital bone**
- Foramen magnum
- Squamous part
- Basiocciput
- Occipital condyles
- Jugular foramen
- Hypoglossal canal

**Temporal bone**
- Petrous part
- Tympanic part
- Zygoma
- Styloid process
- Mastoid process
- Stylo-mastoid foramen
- Carotid canal

**Sphenoid bone**
- Greater wing
- Foramen ovale
- For. spinosum
- Foramen lacerum
- Pterygoid plates
- Pterygoid hamulus (2 small hooks of bone at the back of the hard palate)

**Palatine bone**
- Posterior part of the palate
- Greater and lesser palatine foramina

**Maxilla**
- Palatine plates
- Dental arch of the alveolar processes
- Incisive canal

Look at a lateral and an anterior X-ray of the skull – You should be able to find all the underlined features. Look some CT scans as well – see how many features and regions you can identify.
INSIDE THE CRANIAL CAVITY
The floor of the cranial cavity is divided into three levels or cranial fossae:

1. **Anterior cranial fossa**
   Orbital plates of the frontal bone
   **Ethmoid bone**
   - Cribriform plate
   - Crista galli
   Lesser wings of the sphenoid bone

2. **Middle cranial fossa**
   Sphenoid bone
   - Body of sphenoid
   - Pituitary fossa (sella turcica)
   - Dorsum sellae
   - Tuberculum sellae
   - Anterior clinoid processes
   - Posterior clinoid processes
   Greater wing of the sphenoid bone
   - Foramen rotundum
   - Foramen ovale
   - Foramen spinosum
   - Foramen lacerum
   - Carotid canal
   **Temporal bone**
   - Petrosum temporal
   - (middle and inner ear)

3. **Posterior cranial fossa**
   Occipital bone
   - Clivus = Basiocciput + basisphenoid
   - Squamous part of occipital bone
   - Foramen magnum
   - Hypoglossal canal
   **Temporal bone**
   - Internal acoustic meatus

Look at a lateral and anterior X-ray of the skull – You should be able to find all the underlined features
Look some CT scans as well – see how many features and regions you can identify
THE NECK
Superficially the neck can be described in anterior and posterior triangles which are separated by the sternomastoid muscle

TRIANGLES OF THE NECK
Revise the posterior triangle of the neck:
Boundaries:

_______
Muscles in the floor

_______
_______
_______
_______
_______

Brachial plexus
Which muscles does it emerge between?
Subclavian artery and vein
Accessory nerve
What does it supply

The anterior triangle
Use the diagram and a wet specimen to outline the boundaries of the anterior triangle (midline, mandible, and the anterior border of the sternocleidomastoid). The anterior triangle is further subdivided into three smaller triangles by three muscles:
1. Anterior belly of digastric
2. Posterior belly of digastric

A) Submandibular or digastric triangle
(Between the mandible and the two bellies of digastric) contains the submandibular gland and the facial artery. Feel the submandibular gland and lymph nodes below the body of the mandible. You can feel the facial artery pulse as it crosses about halfway along the body of the mandible.

Find the attachments of the digastric muscle on the mandible and temporal bone.

B) Carotid triangle
(between the sternomastoid muscle, posterior belly of digastric and the omohyoid) contains the carotid sheath (carotid artery, internal jugular vein, vagus nerve) In the upper lateral part of the anterior triangle you’ll be able to feel the carotid artery pulse in the hollow in front of SCM.

C) Muscular triangle
(between the midline and the omohyoid muscle) contains the infrahyoid strap muscles (sternothyroid, sternohyoid, thyrohyoid, omohyoid)
Surface anatomy
Find your sternomastoid and trapezius muscles, and the anterior and posterior triangles
Feel down the midline at the front of your neck and locate the: hyoid bone thyroid cartilage, cricoid cartilage, and the tracheal rings. The thyroid gland is the soft mass beside and below the lower half of the thyroid cartilage.

BONES AND CARTILAGES IN THE NECK
Examine models of the larynx and loose examples of these bones and cartilages to identify the following (many of which can also be felt in your neck).
Hyoid bone
- Body
- Greater horns
- Lesser horns
Feel the hyoid bone in your own neck (just below the mandible).
Move your tongue and feel how the hyoid moves

Thyroid cartilage
- Laminae
- Prominence
- Notch
- Superior horns
- Inferior horns

Cricoid cartilage
- Arch
- Lamina
Feel the small gap between the thyroid and cricoid cartilages filled by the cricothyroid membrane. This gap can be opened (by qualified people) to provide an emergency airway.

Fascia in the neck
Use the diagram to identify the layers of fascia in the neck:
1. Prevertebral fascia surrounds the vertebral column and its muscles
2. The carotid sheath surrounds the carotid artery, internal jugular vein and vagus nerve
3. Visceral fascia surrounds the pharynx, larynx, trachea, oesophagus and thyroid gland
4. The deep/investing fascial of the neck surrounds the whole neck and contains the sternomastoid and trapezius muscles.
Tutorial sheet  

REGIONS OF THE HEAD

Using a skull, X-rays and CT scans to locate each of the following regions of the skull. Label these regions and parts of the head on their respective diagrams.

SAGITTAL SECTION - Midline regions
1. Cranial cavity
   a. Anterior cranial fossa
   b. Middle cranial fossa
   c. Posterior cranial fossa
2. Scalp – Top of skull (Skin, CT, Aponeurosis, Loose CT, Periosteum)
3. Face
4. Nose – Nasal cavity
5. Palate
6. Mouth – Oral cavity
7. Pharynx – Behind the nose and mouth
8. Suboccipital / nuchal

Bilateral regions
9. Orbit – Eye socket
10. Temporal region – side of skull where temporalis muscle is
    Temporalis
11. Infratemporal – Lateral to the pharynx, medial to the mandibular ramus
    Pterygoid muscles (of mastication)
12. Petrous temporal – Middle and inner ear

HORIZONTAL SECTION
Posterior cranial fossa
Pharynx
Nose
Face
Maxillary sinus
Temporal
Body of sphenoid
Petrous temporal
Infratemporal
Auditory tube

CORONAL SECTION
Anterior cranial fossa
Nose
Palate
Mouth
Orbits
Face
Sinuses
1. ethmoid
2. maxillary
Practical anatomy checklist

**Osteology**

**The skull**
Don’t try to know all the parts of the skull this week. But learn some of it and build up your detailed knowledge over the next few weeks – There will be a viva on the osteology of the skull next week.

**Triangles of the neck**
- Posterior
- Anterior
- Submandibular
- Carotid
- Muscular

**Bones and cartilages of the neck**
- Hyoid
- Thyroid
- Cricoid
- Trachea

**Regions of the head and neck**
Have a general idea about the names and locations of the regions.

*Figure 38.3. The skull (on coronal section).*