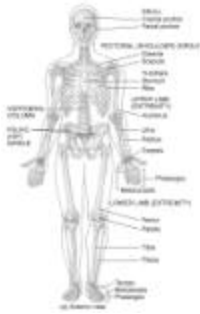


Chapter 7

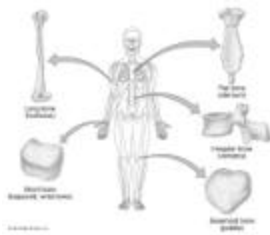
The Skeletal System: The Axial Skeleton

- Axial Skeleton
 - 80 bones
 - lie along longitudinal axis
 - skull, hyoid, vertebrae, ribs, sternum, ear ossicles
- Appendicular Skeleton
 - 126 bones
 - upper & lower limbs and pelvic & pectoral girdles



Types of Bones

- 5 basic types of bones:
 - long = compact
 - short = spongy except surface
 - flat = plates of compact enclosing spongy
 - irregular = variable
 - sesamoid = develop in tendons or ligaments (patella)
- Sutural bones = in joint between skull bones



Bone Surface Markings

- Surface features-- rough area, groove, openings, process
- Specific functions
 - passageway for blood vessels and nerves
 - joint formation
 - muscle attachment & contraction

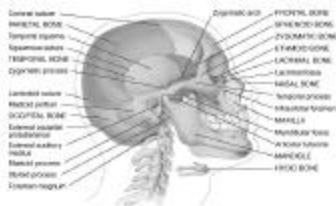


Bone Surface Markings from Table 7.2

- Foramen = opening
- Fossa = shallow depression
- Sulcus = groove
- Meatus = tubelike passageway or canal
- Condyle = large, round protuberance
- Facet = smooth flat articular surface
- Trochanter = very large projection
- Tuberosity = large, rounded, roughened projection
- Learning the terms found in this Table will simplify your study of the skeleton.

7-4

The Skull



- 8 Cranial bones
 - protect brain & house ear ossicles
 - muscle attachment for jaw, neck & facial muscles
- 14 Facial bones
 - protect delicate sense organs -- smell, taste, vision
 - support entrances to digestive and respiratory systems

7-5

The 8 Cranial Bones

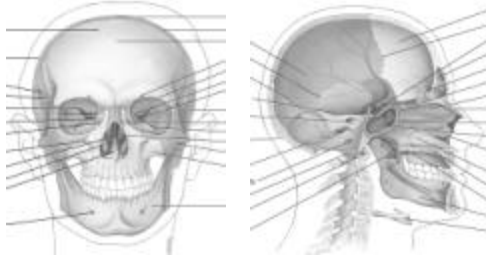


Frontal
Parietal (2)
Temporal (2)
Occipital

Sphenoid
Ethmoid

7-6

Frontal Bone

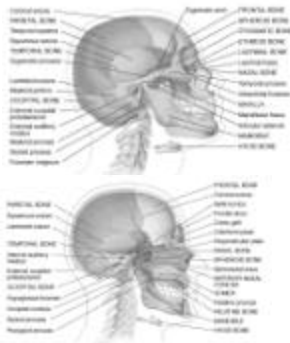


- Forehead, roof of orbits, & anterior cranial floor
- Frontal suture gone by age 6 (metopic suture)
- Supraorbital margin and frontal sinus

7-7

Parietal & Temporal Bones

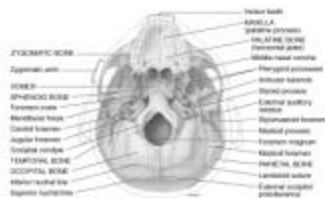
- Parietal
 - sides & roof of cranial cavity
- Temporal
 - temporal squama
 - zygomatic process forms part of arch
 - external auditory meatus
 - mastoid process
 - styloid process
 - stylomastoid foramen(VII)
 - mandibular fossa (TMJ)
 - petrous portion (VIII)



7-8

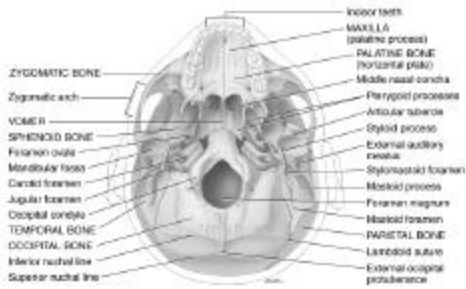
Temporal and Occipital bones

- Temporal
 - carotid foramen (carotid artery)
 - jugular foramen (jugular vein)
- Occipital
 - foramen magnum
 - occipital condyles
 - external occipital protuberance attachment for ligamentum nuchae
 - superior & inferior nuchal lines



7-9

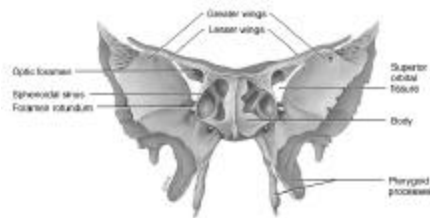
Sphenoid bone



- Base of skull
- Pterygoid processes are attachment sites for jaw muscles

7-10

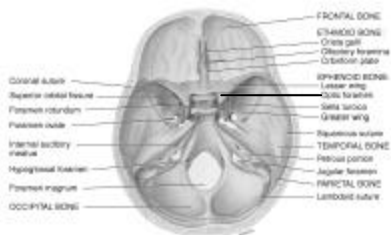
Sphenoid in Anterior View



- Body is a cubelike portion holding sphenoid sinuses
- Greater and lesser wings
- Pterygoid processes

7-11

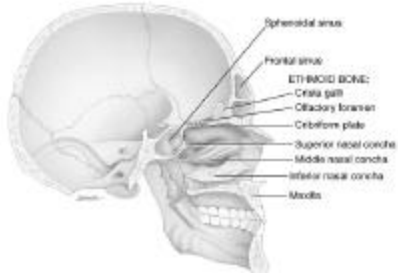
Sphenoid from Superior View



- Lesser wing & greater wing
- Sella turcica holds pituitary gland
- Optic foramen

7-12

Ethmoid Bone

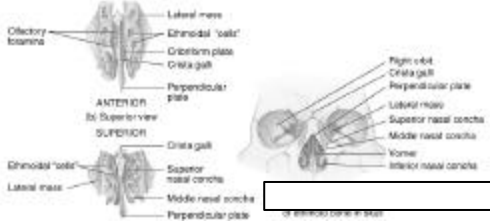


- Cranial floor, lateral nasal walls & nasal septum
- Cribriform plate & olfactory foramina
- Crista galli for attachment of membranes cover the brain

7-13

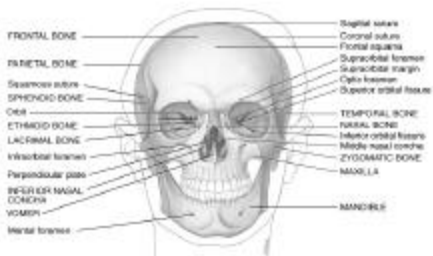
Ethmoid bone

- Lateral masses contain ethmoid sinuses
- Perpendicular plate is upper part of nasal septum
- Superior & middle nasal concha or turbinates
 - filters & warms air



7-14

14 Facial Bones



- | | | |
|----------------------------|---------------------------|----------------|
| Nasal (2) | Maxillae (2) | Zygo matic (2) |
| Mandible (1) | Lacrimal (2) | Palatine (2) |
| Inferior nasal conchae (2) | Vomer (1), _{1,5} | |

Maxillary bones



- Floor of orbit, floor of nasal cavity or hard palate
- Maxillary sinus
- Alveolar processes hold upper teeth
- Cleft palate is lack of union of maxillary bones

7-16

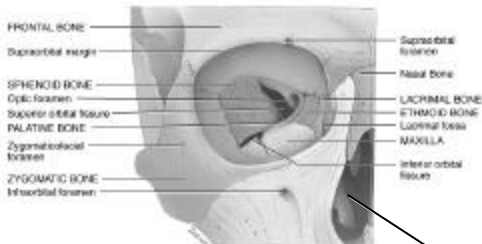
Zygomatic Bones



- Cheekbones
- Lateral wall of orbit along with sphenoid
- Part of zygomatic arch along with part of temporal

7-17

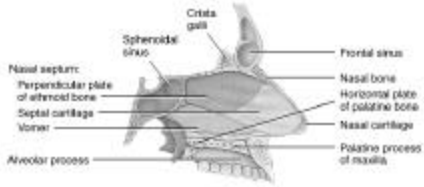
Lacrimal and Inferior Nasal Conchae



- Lacrimal bones
 - part of medial wall of orbit
 - lacrimal fossa houses lacrimal sac
- Inferior nasal concha or turbinate (not part of ethmoid)

7-18

Palatine & Vomer



- Palatine
 - L-shaped : one end is back part of hard palate, other end is part of orbit (see previous picture)
- Vomer
 - posterior part of nasal septum

7-19

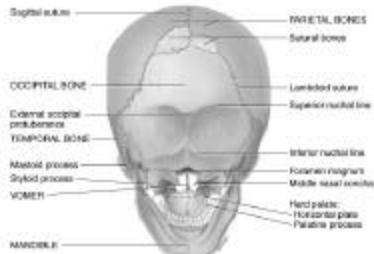
Mandible



- Body, angle & rami
- Condylar & coronoid processes
- Alveolar processes for lower teeth
- Mandibular & mental foramen

7-20

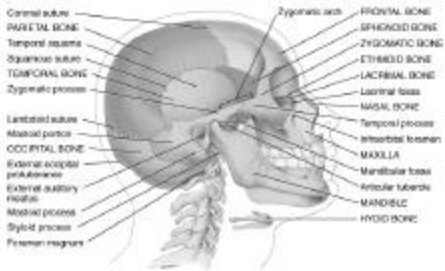
Sutures



- Lambdoid suture unites parietal and occipital
- Sagittal suture unites 2 parietal bones

7-21

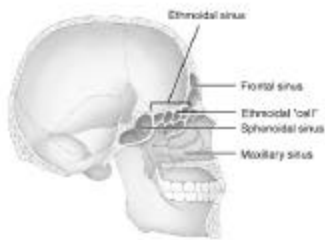
Sutures



- Coronal suture unites frontal and both parietal bones
- Squamous suture unites parietal and temporal bones

7-22

Paranasal Sinuses

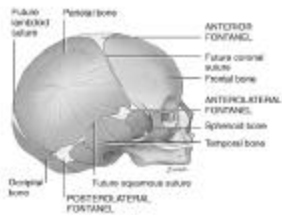


- Paired cavities in ethmoid, sphenoid, frontal and maxillary
- Lined with mucous membranes and open into nasal cavity
- Resonating chambers for voice, lighten the skull
- Sinusitis is inflammation of the membrane (allergy)

7-23

Fontanelles of the Skull at Birth.

- Dense connective tissue membrane-filled spaces (soft spots)
- Unossified at birth but close early in a child's life.
- Fetal skull passes through the birth canal.
- Rapid growth of the brain during infancy



7-24

Foramina of the Skull

- Table 7.3 describes major openings of skull
- In which bone would you find the following and what is their function?
 - foramen magnum
 - optic foramen
 - mandibular foramen
 - carotid canal
 - stylomastoid foramen

7-25

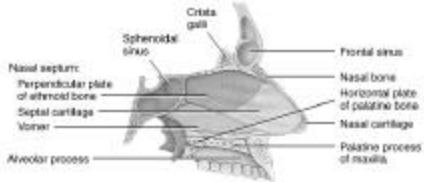
Bones of the Orbit



- Roof is frontal and sphenoid
- Lateral wall is zygomatic and sphenoid
- Floor is maxilla, zygomatic and sphenoid
- Medial wall is maxilla, lacrimal, ethmoid and sphenoid
- Orbital fissures and optic foramen

7-26

Nasal Septum

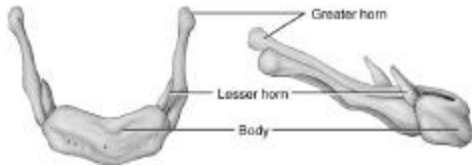


- Divides nasal cavity into left and right sides
- Formed by vomer, perpendicular plate of ethmoid and septal cartilage
- Deviated septum does not line in the midline
 - developmental abnormality or trauma

7-27

Hyoid Bone

- U-shaped single bone
- Articulates with no other bone of the body
- Suspended by ligament and muscle from skull
- Supports the tongue & provides attachment for tongue, neck and pharyngeal muscles

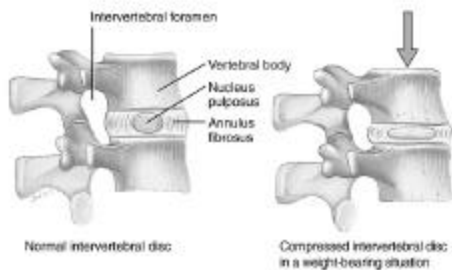


Vertebral Column

- Backbone or spine built of 26 vertebrae
- Five vertebral regions
 - cervical vertebrae (7) in the neck
 - thoracic vertebrae (12) in the thorax
 - lumbar vertebrae (5) in the low back region
 - sacrum (5, fused)
 - coccyx (4, fused)

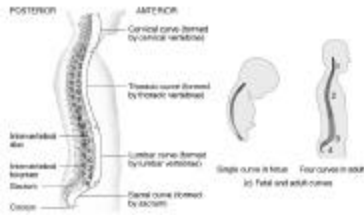


Intervertebral Discs



- Between adjacent vertebrae absorbs vertical shock
- Permit various movements of the vertebral column
- Fibrocartilagenous ring with a pulpy center

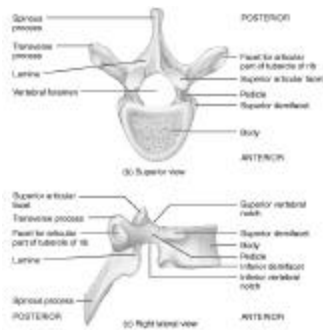
Normal Curves of the Vertebral Column



- Primary curves
 - thoracic and sacral are formed during fetal development
- Secondary curves
 - cervical if formed when infant raises head at 4 months
 - lumbar forms when infant sits up & begins to walk at 1 year

7-31

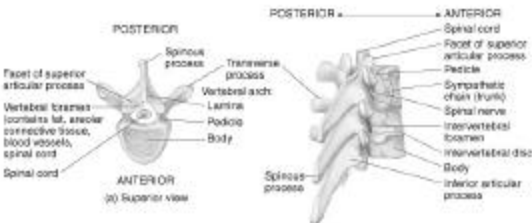
Typical Vertebrae



- Body
 - weight bearing
- Vertebral arch
 - pedicles
 - laminae
- Vertebral foramen
- Seven processes
 - 2 transverse
 - 1 spinous
 - 4 articular
- Vertebral notches

7-32

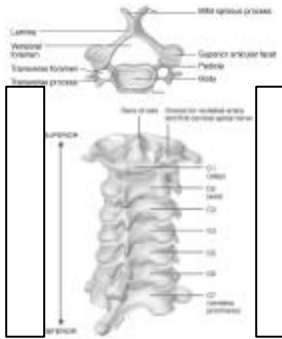
Intervertebral Foramen & Spinal Canal



- Spinal canal is all vertebral foramen together
- Intervertebral foramen are 2 vertebral notches together

7-33

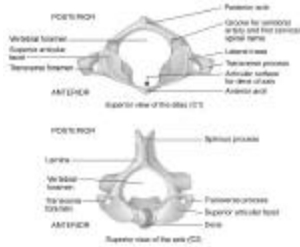
Typical Cervical Vertebrae (C3-C7)



- Smaller bodies
- Larger spinal canal
- Transverse processes
 - shorter
 - transverse foramen for vertebral artery
- Spinous processes of C2 to C6 often bifid
- 1st and 2nd cervical vertebrae are unique
 - atlas & axis

7-34

Atlas & Axis (C1-C2)

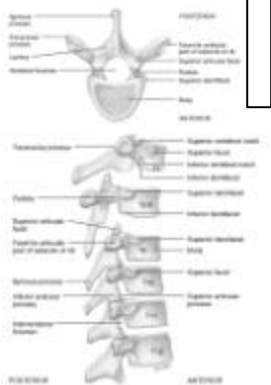


- Atlas -- ring of bone, superior facets for occipital condyles
 - nodding movement at atlanto-occipital joint signifies “yes”
- Axis -- dens or odontoid process is body of atlas
 - pivotal movement at atlanto-axial joint signifies “no”

7-35

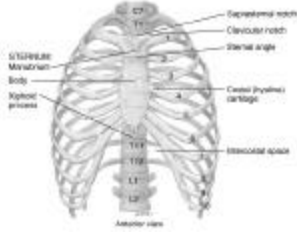
Thoracic Vertebrae (T1-T12)

- Larger and stronger bodies
- Longer transverse & spinous processes
- Facets or demifacets on body for head of rib
- Facets on transverse processes (T1-T10) for tubercle of rib



7-36

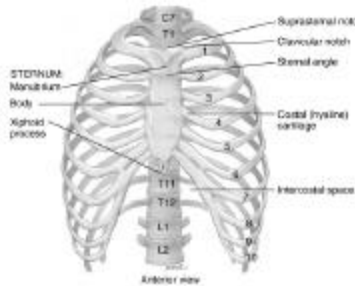
Thorax



- Bony cage flattened from front to back
- Sternum (breastbone)
- Ribs
 - 1-7 are true ribs (vertebrosternal)
 - 8-12 are false ribs (vertebrochondral)
 - 11-12 are floating
- Costal cartilages
- Bodies of the thoracic vertebrae.

7-40

Sternum

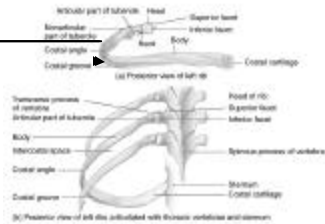


- Manubrium
 - 1st & 2nd ribs
 - clavicular notch
- Body
 - costal cartilages of 2-10 ribs
- Xiphoid
 - ossifies by 40
 - CPR position
 - abdominal mm.

7-41

Ribs

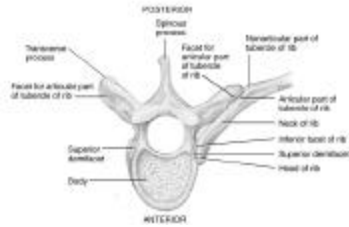
Fracture at site of greatest curvature.



- Increase in length from ribs 1-7, thereafter decreasing
- Head and tubercle articulate with facets
- Body with costal groove containing nerve & blood vessels
- Intercostal spaces contain intercostal muscles

7-42

Rib Articulation

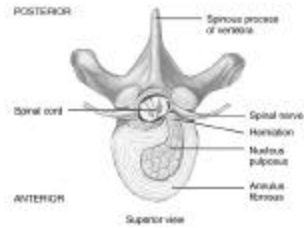


- Tubercle articulates with transverse process
- Head articulates with vertebral bodies

7-43

Herniated (Slipped) Disc

- Protrusion of the nucleus pulposus
- Most commonly in lumbar region
- Pressure on spinal nerves causes pain
- Surgical removal of disc after laminectomy



7-44

Clinical Problems

- Abnormal curves of the spine.
 - scoliosis (lateral bending of the column)
 - kyphosis (exaggerated thoracic curve)
 - lordosis (exaggerated lumbar curve)
- Spina bifida is a congenital defect
 - failure of the vertebral laminae to unite
 - nervous tissue is unprotected
 - paralysis

7-45
