**Bone Growth and Articulation Notes**

**BONE FORMATION**

* Known as “\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_” or “Osteogenesis” (=bone creation).

Two Types of Embryonic Ossification:

1. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Ossification
2. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_Ossification

A**. Intramembranous Ossification**

LOCATION: Occurs in flat bones like ribs and the plates of the skull. (=Epiphysis Formation)

1. Begins with the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ of connective tissue “sheets” in late embryonic development.
2. These sheets are highly \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and form osteoblasts on the interior.
3. The osteoblasts turn into \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, thus forming the spongy bone.
4. The remaining CT “sheets” are layed down to form the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
5. The newer \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ accumulate on the edge of the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ bone and then create the compact bone.

**B. Endochondral Ossification**

LOCATION: Long, short & Irregular Bones (=\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_Formation)

1. Chondrocytes \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_up and begin to die.
2. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ forms along the outside of the cartilage.
3. Osteoblasts invade the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_(Primary Ossification Center) in the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_turning into osteocytes.
4. Next, \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_die in the epiphyses, osteoblasts invade the \_\_\_\_\_\_\_\_\_\_\_ (Secondary Ossification Center) turning into osteocytes.
5. The POC and SOC never merge and are left with \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ inbetween the 2 regions.
6. This remaining cartilage becomes the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ or “Growth Plate” where new cells are \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_down.

**BONE GROWTH**

Two Types of Bone Growth

1. Length-Wise (=\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Growth)
2. Diameter/Width (=\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_l Growth)

**Oppositional Growth**

1. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_in the epiphyseal plate divide (via Mitosis).
2. They are\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ by bone on the diaphysis side of the plate.
3. When growth stops, \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_in the epiphyseal plate is replaced by bone.
4. Osteocytes then lay down the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ matrix (=calcification)

**Appositional Growth**

1. Bone around \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ cavity is destroyed.
2. More \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_marrow moves into the cavity and fills the space.
3. The periosteum adds\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ bone to the outside.

**JOINT TYPES**

**4 Main Categories of Joints**

1. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ 3. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
2. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ 4. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. Immovable Joints

* \_\_\_\_\_\_\_ movement

Example: The plates of the skull that form the cranial sutures.

2. Fibrous Joints

* \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ movement in the joint.
* Dense connective tissue \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ bones together.
* Forms \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ membrane.

Examples: Ulna/Radius and Tibia/Fibula

3. Cartilaginous Joint

* Formed by \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ or Fibrocartilage.

 Examples: Intervertebral disks (Vertebra),Costal Cartilage (Ribs), Symphysis Pubis (Pubic Bone)

4. Synovial Joints

* The most “\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_” joints in the body.
* Membrane secretes \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_fluid in the joint.
* Fluid used for \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ of the joint.
* Fluid is produced by the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ sack.
* Bone ends have \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_(hyaline) cartilage.

\*\*\*Types of Synovial Joints (write chart underneath notes on ISN-43).\*\*\*

**BONE TERMINOLOGY**

1. \_\_\_\_\_\_\_\_\_\_\_\_\_\_on Bones 2. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ in Bone 3.\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_in Bones

1. **Bumps on Bones**

1. Process = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (on vertebrae, scapula).
2. Condyle = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, smooth projections (on posterior, distal femur)
3. Epicondyle = found \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ a condyle (on anterior, distal femur).
4. Spine/Crest = thorn-like, \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ projection (on tibia shaft).
5. Tubercle = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ process (on humerus).
6. Tuberosity = large, \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ tubercle (on radius shaft).
7. Trochanter = large, rough \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (found on femur).

2. **Depressions on Bones**

* \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_= flat area that articulates (on vertebrae)
* \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ = shallow indentation ( on scapula)

3. **Holes in Bones**

* Foramen = \_\_\_\_\_\_\_\_\_\_\_\_\_\_for blood vessels, nerves, and ligaments (vertebrae, coxa, cranium).
* Meatus = bony \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (opening for ear)
* Sinus Cavity = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ filled with \_\_\_\_\_\_\_\_\_\_\_\_\_(on anterior cranium).