Bellwork:

- Identify/name the bones 1, 2, and 3.

Objectives:

I will:

- Finish the “Anthropological Crime Scene” Lab and Questions
- Explain how age can be determined by examining a skeleton.
What did they do with the remains they received?

SKELETONS AS FORENSIC EVIDENCE
AFTER REMAINS ARE RECOVERED

- Coffin or remains transported to morgue or other facility
- Careful opening – protect evidence for court
Anthropological Examination

- Excavated remains cleaned in forensic lab
- Arranged in correct anatomical order
BIOLOGICAL PROFILES:

- Depending upon bones present, forensic anthropologist may be able to determine
  - Sex
  - Race
  - Age
  - Stature
AGE: IMMATURE VS MATURE SKELETON

- Before puberty biological identification of remains can be difficult
  - Bones are mostly cartilage
  - Growth plates not fused
  - Sexual differences not as pronounced
  - Best determinant – skull with dentition
AGE DETERMINATION -

- Video: https://www.youtube.com/watch?v=NgbrqzgyWRo
- Write down ways to tell the age. (6:26)
WHAT CAN BE LEARNED FROM THE SKULL?

- In infants, we can determine the age, in weeks, fairly accurately by examining the development of the skull:
  
1. difference in size,
2. how the fontanels (the soft spots that ultimately become the sutures, or fixed joints between the bones in the skull) change over time, gradually becoming smaller.
Take the following two images, and try to figure out the approximate age of the second image (on the right), after examining the first image (above).
Examine the image below to see how the fontanels, grow and fuse with the other bones to form the sutures.

Although these sutures are as unique as fingerprints, as they cannot be seen antemortem (not without surgery, or a violent accident), they are not useful in terms of identification.
SUTURES

- Sutures are the junctions between adjacent bones in the skull.
- The sutures are useful in terms of determining the approximate age of a skull.
- As we grow older, the sutures ultimately completely fill in.
  - The less filled in, the younger the person.

We also often tend to lose teeth as we age, and if we really do a bad job flossing, we lose BONE as well, as in the geriatric (elderly) skull pictured:
In cases where cultures have bound the skull, the sutures have had to move as the bones take on the new shape forced by the binding of the skull. Note the change in the coronal suture in the skull pictured:
Sutures and Age

Coronal Suture closed about age 50

Sagittal Suture closed by ~ 32

Lambdoidal suture close between 21-30 yrs old
Newborn Skull
Newborn Skull
Age?

- 15 to 16 months. It is not currently possible to reliably determine sex or major racial group with child remains.
1-year-old Human Child Skull

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DETERMINING AGE

- Age can also be determined, in some cases, by the degree to which the bones show arthritis.
- Arthritis can be broken down to the prefix arthr- = joint, and -itis = inflammation.
- Arthritis is therefore the swelling of the joints.
- One of the effects of arthritis is to change the shape of the bones at the point where the joints are swollen, as you can see in the pictures.

Arthritic on the Left, and Normal on the Right
AGE

Arthritic on the Top, and Normal on the Bottom
AGE

- Another aspect of aging involves the fusion of certain bones with one another, often as a result of osteoarthritis, in which the cartilage in the joints ossifies (turns to bone).

- As there is cartilage between bones (Cartilage that connects bone to bone are called ligaments; cartilage connecting muscle to bone are called tendons.), this process, in essence, creates a larger bone made of the fusion between two bones.

**Top:** a vertebra fused with the sacrum  
**Bottom:** the manubrium (top of the sternum) fused with the clavicle (shown cut here)
Age

- **X-rays can be used to show comparative age**, simply by looking at the end of the long bones, in an area called the *epiphysis* (**/ɛ-pi-fə-səs/**).

- In a child, the area of growth is made of cartilage, and is called the *epiphyseal plate*.

- In the x-ray, it appears as a clear space running approximately parallel to the end of the bone:
Age

- In an adult hand (i.e., by the early to mid twenties), however, the growth plate has completely ossified (turned to bone). At that point, the bones stop growing.

- On the x-ray, these epiphyseal lines will appear as white lines in the same location as the plates were in the child's x-ray:
Which hand is older?
CLOSING QUESTION

- What are 3 differences between an immature and mature skeletons?