**Lab: Analysis of Skeletal Remains**

*You will be given the opportunity to identify skeletal remains on the basis of :*

*Gender – using the pelvis and skull*

*Race – using the maxilla and other characteristics of the skull*

*Age – based on general characteristics*

*Height – calculated based on the length of individual bones*

**Part I: Gender**

For each pelvis that you observe, circle the appropriate answer in the chart below in order to determine gender:

*(refer to figures below as needed for characteristics)*

|  |  |  |  |
| --- | --- | --- | --- |
| **Characteristic** | **Pelvis A** | **Pelvis B** | **Pelvis C** |
| **Subpubic Angle** *(figure 2-1)* | <90or >90 | <90or >90 | <90or >90 |
| **Pubis body width** *(figure 2-10)* | 25-30mm / ~40mm | 25-30mm / ~40mm | 25-30mm / ~40mm |
| **Sacrum Tilt** | Forward / Backward | Forward / Backward | Forward / Backward |
| **Pelvic outlet** | Small / Large | Small / Large | Small / Large |
| **Ilia** | Close / Spread | Close / Spread | Close / Spread |
| **Gender Determination** | **Male / Female** | **Male / Female** | **Male / Female** |

**Figure 1 – Pelvis Characteristics for Males and Females: Figure 2: Pelvic measurements**



For each skull that you observe, circle the appropriate answer in the chart below in order to determine gender:

|  |  |  |  |
| --- | --- | --- | --- |
| **Characteristic** | **Skull A** | **Skull B** | **Skull C** |
| **Chin** | Rounded / Square | Rounded / Square | Rounded / Square |
| **Mastoid Process** *(behind ear)* | Small / Large | Small / Large | Small / Large |
| **Occipital Protuberance** *(back of skull)* | Small / Large | Small / Large | Small / Large |
| **General Anatomy**  | Graceful / Robust | Graceful / Robust | Graceful / Robust |
| **Forehead** | Vertical / Receding | Vertical / Receding | Vertical / Receding |
| **Brow Ridges** *(location of eyebrows)* | Slight / Prominent | Slight / Prominent | Slight / Prominent |
| **Muscle Lines** | Slight / Prominent | Slight / Prominent | Slight / Prominent |
| **Orbital Margins***(edge of eye sockets)* | Sharp / Rounded | Sharp / Rounded | Sharp / Rounded |
| **Angle of Ramus** *(back corner of the jaw)* | 90 / Obtuse | 90 / Obtuse | 90 / Obtuse |
| **Gender Determination** | Female / Male | Female / Male | Female / Male |

**Part II: Race**

For each skull that you observe, circle the appropriate answer in the chart below in order to determine race:

(use the figures below as necessary to determine appropriate characteristics/measurements)

|  |  |  |  |
| --- | --- | --- | --- |
| **Characteristic** | **Skull A** | **Skull B** | **Skull C** |
| **Palate Arch Shape** | Parabola / Rounded / Hyperbolic | Parabola / Rounded / Hyperbolic | Parabola / Rounded / Hyperbolic |
| **Incisor shape** | Spatulate / Shovel | Spatulate / Shovel | Spatulate / Shovel |
| **Nasal width** |  |  |  |
| **Nasal height** |  |  |  |
| **NASAL INDEX** | <0.48 / 0.48-0.53 / >0.53 | <0.48 / 0.48-0.53 / >0.53 | <0.48 / 0.48-0.53 / >0.53 |
| **Nasal spine** | Prominent / Moderate / Small | Prominent / Moderate / Small | Prominent / Moderate / Small |
| **Nasal silling/guttering** | Sharp ridge (silling) / Rounded ridge/ No ridge (guttering) | Sharp ridge (silling) / Rounded ridge/ No ridge (guttering) | Sharp ridge (silling) / Rounded ridge/ No ridge (guttering) |
| **Prognathism** | Straight / Variable / Prognathic | Straight / Variable / Prognathic | Straight / Variable / Prognathic |
| **Shape of Orbital openings** | Rounded squares / Rounded circular / Rectangular squared | Rounded squares / Rounded circular / Rectangular squared | Rounded squares / Rounded circular / Rectangular squared |
| **Race Determination** | Caucasian / Asian / African | Caucasian / Asian / African | Caucasian / Asian / African |

Figure 3: Adult Teeth Figure 4: Palate and Incisor shapes of different races

Spatulate shaped: Caucasian

Spatulate shaped: African

Shovel shaped: Asian

Parabolic Palate: Caucasian

Hyperbolic Palate: African

Rounded Palate: Asian

**Part III: Long Bones**

For each long bone (femur or humerus) that you observe, circle the appropriate answer in the chart below in order to determine gender or age: *(use the figures below as necessary to determine appropriate characteristics/measurements)*

**Femur**

|  |  |  |  |
| --- | --- | --- | --- |
| **Characteristic** | **Femur A** | **Femur B** | **Femur C** |
| **Vertical diameter of femoral head in mm** *(figure 5-35)* | N/A | <43.5 / 43.5-44.5 / 44.5 | <43.5 / 43.5-44.5 / 44.5 |
| **Bicondylar width in mm** *(figure 6, distance from 34-33)* | N/A | <74 / 74-76 / >76 | <74 / 74-76 / >76 |
| **Maximum length of the femur in mm***(figure 6, distance from 28-34)* | N/A | <405 / 405-430 / >430 | <405 / 405-430 / >430 |
| **Gender Determination** | N/A | Female / Indeterminate / Male | Female / Indeterminate / Male |



Figure 5: Femoral Head Diameter Figure 6: Femur Measurements



**Humerus**

|  |  |  |  |
| --- | --- | --- | --- |
| **Characteristic** | **Humerus A** | **Humerus B** | **Humerus C** |
| **Transverse diameter of humeral head in mm (figure 7a)** | 37.0-39.0 / 42.7 – 44.7 | 37.0-39.0 / 42.7 – 44.7 | 37.0-39.0 / 42.7 – 44.7 |
| **Vertical diameter of humeral head in mm (figure 7b)** | 42.7 / 48.8 | 42.7 / 48.8 | 42.7 / 48.8 |
| **Maximum length of humerus in mm (figure 8, distance from 36-40)** | 305.9 / 339.0 | 305.9 / 339.0 | 305.9 / 339.0 |
| **Epicondylar width (figure 8, distance from 39-42)** | 56.8 / 63.9 | 56.8 / 63.9 | 56.8 / 63.9 |
| **Gender Determination**  | Female / Male | Female / Male | Female / Male |

Figure 7: Humeral Head Measurements

*7a: Transverse diameter 7b: Vertical diameter*





 Figure 8: Humerus

**Part IV: Age Determination**

One way of determining age is by looking at the development of the cranial sutures. For each skull that you have access to, examine the sutures and fill out the chart below (use the included figures as needed)

|  |  |  |  |
| --- | --- | --- | --- |
| **Characteristic** | **Skull A** | **Skull B** | **Skull C** |
| **Frontal Suture** | Present / Absent | Present /Absent | Present / Absent |
| **Other Sutures** | Open / Closed | Open / Closed | Open / Closed |
| **Age Determination** | Adolescent / Adult | Adolescent / Adult | Adolescent / Adult |

Figure 9: Skeletal Suture Development



**Pelvic Age Determination:**

Circle the age of each pelvis according to the developmental occurrence characteristics observed on each pelvis. Use the pelvic figures referenced as needed.

|  |  |  |  |
| --- | --- | --- | --- |
| **Developmental Occurrence** | **Pelvis A (approx. age)** | **Pelvis B (approx. age)** | **Pelvis C (approx. age)** |
| **The pubis bone and ischium are almost completely united by bone (figure 2-10, 3)** | 7-8 | 7-8 | 7-8 |
| **The ilium, ischium, and pubis bones are joined together (figure 2-5, 3, 10)** | 13-14 | 13-14 | 13-14 |
| **The two lowest segments of the sacral vertebrae become joined together** **(figure 10-8)** | 18 | 18 | 18 |
| **The ilium, ischium, and pubis bones become fully ossified with no evidence of epiphyseal unions (indicated by cartilaginous lines) (figure 2-5, 3, 10)** | 20-25 | 20-25 | 20-25 |
| **All segments of the sacrum are united with no evidence of epiphyseal unions (figure 10-8, 9)** | 25-30 | 25-30 | 25-30 |



Figure 10: Pelvic Development

**Femur Age Determination:**

Circle the age of each pelvis according to the developmental occurrence characteristics observed on each femur. Use the femur figures from above as needed.

|  |  |  |  |
| --- | --- | --- | --- |
| **Developmental Occurrence** | **Femur A (approx. age)** | **Femur B (approx. age)** | **Femur C (approx. age)** |
| **The greater trochanter first appears (figure 6-30)** | 4 | 4 | 4 |
| **The lesser trochanter first appears (figure 6-31)** | 13-14 | 13-14 | 13-14 |
| **The head, greater trochanter, and lesser trochanter first join the shaft (figure 6-30, 31, 32)** | 18 | 18 | 18 |
| **The condyles first join the shaft (figure 6-33, 34, 32)** | 20 | 20 | 20 |

**Humerus Age Determination:**

Circle the age of each pelvis according to the developmental occurrence characteristics observed on each femur. Use the humerus figures from above as needed.

|  |  |  |  |
| --- | --- | --- | --- |
| **Developmental Occurrence** | **Humerus A** **(approx. age)** | **Humerus B** **(approx. age)** | **Humerus C** **(approx. age)** |
| **The head and tuberosities join to become a single large epiphysis (figure 8-36, 37)** | 6 | 6 | 6 |
| **The radial head, trochlea, and external condyle blend and unite with the shaft (figure 8-41, 40, 38)** | 16-17 | 16-17 | 16-17 |
| **The internal condyle unites with the shaft (figure 8-39, 38)** | 18 | 18 | 18 |
| **The upper epiphysis unites with shaft (figure 8)** | 20 | 20 | 20 |

**Part V: Height ~ using long bones**

For each skeleton plug in the maximum length of the long bone asked for in the chart. You will have to use the gender and race you have determined from your analysis thus far. Use the stature formula figure below as needed.

|  |  |
| --- | --- |
|  | **Skeleton A** |
| **Gender** | **Race** | **Humerus Length** | **Calculations****(SHOW WORK)** | **Height** **(in cm)** | **Height** **(in in)** | **Height** **(in ft + in)** |
|  |  |  |  |  |  |  |
|  | **Skeleton B** |
| **Gender** | **Race** | **Femur Length** | **Calculations** **(SHOW WORK)** | **Height** **(in cm)** | **Height** **(in in)** | **Height** **(in ft + in)** |
|  |  |  |  |  |  |  |
|  | **Skeleton C** |
| **Gender** | **Race** | **Femur Length** | **Calculations** **(SHOW WORK)** | **Height** **(in cm)** | **Height** **(in in)** | **Height** **(in ft + in)** |
|  |  |  |  |  |  |  |

Figure 11: Stature formulae

|  |  |  |
| --- | --- | --- |
| **Race/gender** | **Bone** | **Formula = Height in cm** |
| African/male | Humerus | 2.88 (max length in cm) + 75.48 |
| Caucasian/male | Humerus | 2.89 (max length in cm) + 78.10 |
| Asian/male or female | Humerus | 2.68 (max length in cm) +83.19 |
| African/female | Humerus | 3.08 (max length in cm) + 64.67 |
| Caucasian/female | Humerus | 3.36 (max length in cm) +57.97 |
| African/male | Femur | 2.10 (max length in cm) + 72.22 |
| Caucasian male | Femur | 2.32 (max length in cm) +65.53 |
| Asian male/female | Femur | 2.15 (max length in cm) +72.57 |
| African/female | Femur | 2.28 (max length in cm) + 59.76 |
| Caucasian female | Femur | 2.47 (max length in cm) + 54.10 |

Final Step!!!! Composite for Each Skeleton: fill out the chart below for each skeleton based on your observations from this lab

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Skeleton** | **Age** | **Race** | **Gender** | **Height (ft, in)** |
| **A** |  |  |  |  |
| **B** |  |  |  |  |
| **C** |  |  |  |  |