# SKELETONS: Museum of Osteology

## Forensic Osteology: Human Skulls

*Teacher Resource*

### Grade Levels: 9th – 12th Grade

**9th-12th Grade Oklahoma Academic Standards (OAS)**

**HS-LS1-2 From Molecules to Organisms: Structure and Processes**
HS-LS1-2: Develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multi-cellular organisms.

**HS-LS1-3 From Molecules to Organisms: Structure and Processes**
HS-LS1-3: Students who demonstrate understanding can: Plan and conduct an investigation to provide evidence of the importance of maintaining homeostasis in living organisms.

**6.GM.3 Geometry & Measurement (GM)**
6.GM.3.2: Solve problems in various real-world and mathematical contexts that require the conversion of weights, capacities, geometric measurements, and time within the same measurement systems using appropriate units.

**HS-PS3-3 Energy**
HS-PS3-1 Energy: Design, build, and refine a device that works within given constraints to convert one form of energy into another form of energy.

**HS-PS3-3 Energy**
HS-PS3-1: Students who demonstrate understanding can: Create a computational model to calculate the change in the energy of one component in a system when the change in energy of the other component(s) and energy flows in and out of the system are known.

## Program Overview:

*Forensic Osteology: Human Skulls* is a crime lab based program focusing on the forensic investigation of trauma to the human skull. After a basic introduction to skull osteology and lab procedures, students will breakup into teams using a variety of tools from their forensic science kit to evaluate and document key evidence to support their results. They will then defend their findings to the class. Museum quality replicas of human skulls—from actual crime scenes—are used in this program.

## Learning Objectives:

- Participants will successfully identify various trauma signatures to the skull and associated dentition.
- Participants will successfully utilize forensic measuring instruments to perform their evaluation.
- Participants will successfully work as teams in a lab environment—documenting and communicating their findings to the class.

## Background:

In this program, forensic osteology is the process of analyzing defects to the human skull and associated dentition that are the result of trauma. Detailed cranial/dental measurements; knowledge of ballistic/blunt/sharp force wound patterns; and comprehensive documentation are essential to forensic osteology. The ultimate goal is to provide expert testimony in regards to the cause of death.

For a career in forensic osteology, an individual should have a bachelor's degree in anatomy, biology, chemistry, physiology or anthropology as well as a graduate degree in human biology or anthropology. Though a degree at the Master's level may qualify you to begin your investigative career, most forensic osteologists have a Ph.D. degree.

## Vocabulary:

- Forensic Science
- Frontal Bone
- Parietal Bone
- Occipital Bone
- Temporal Bone
- Squamous
- Nasal Bone
- Maxillary Bone
- Palatine
- Sagittal Suture
- Coronal Suture
- Squamosal Suture
- Lambdoidal Suture
- Bregma
- Lamda
- Orbit
- Occipital Condyle
- Foramen Magnum
- Zygomatic Arch
- Supra-orbital Ridge
- Mandible
- Incisor
- Canine
- Premolar
- Molar
- Mastoid Process
- Occipital Protuberance
- Sphenoid Bone
- Vomer
- Infraorbital/Supraorbital Foramen
- Mental Foramen
- Styloid Process
- Pterygoid process (medial/lateral)
- Wormian Suture
- Wormian Bone
- External Auditory Meatus
- Concha
- Enamel Hypoplasia
- Dental Caries

**Reference:** visit the SKELETONS: Museum of Osteology Education web page at: http://skeletonmuseum.com/education

## Recommended Reading:


Katzenberg, M. Anne and Grauer, Anne L.
2018 *Biological Anthropology of the Human Skeleton*. Wiley-Blackwell, Hoboken, NJ.

Larsen, Clark Spencer
1999 *Bioarchaeology: Interpreting Behavior from the Human Skeleton*. Cambridge University Press, Cambridge, United Kingdom.

Ortner, Donald J.
2003 *Identification of Pathological Conditions in Human Skeletal Remains*. Academic Press, Cambridge, MA.

White, Tim D. and Folkens, Pieter A.
2005 *The Human Bone Manual*. Academic Press, Cambridge, MA.

White, Tim D., Black, Michael T. and Folkens, Pieter A.
2011 *Human Osteology*. Elsevier Science, Amsterdam, Netherlands.

## While at SKELETONS:

- Visit the Pathology Exhibit and have students point out various types of bone injuries, diseases, and traumas.
- Discuss what types of information we can learn about an individual from their skeletal remains.
- At the Pathology Exhibit, discuss the various bone cells and the role they play in the bone remodeling process.
- Discuss sexual dimorphism in humans while visiting the Pathology Exhibit and Primate Exhibit.
- Have your students discuss the scientific approach they would use to evaluate the human skull for various types of trauma.