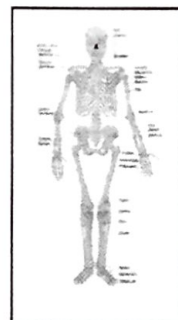


DIRECTIONS:

- Go to the class website <http://msrobbinspnhs.weebly.com/forensic-science-notes.html> or <http://mrsgonsalves.weebly.com/forensics.html>
- Scroll down to the Anthropology section and download the notes **Bonebasicweb.ppt**
- Click through the notes as a **Slide Show** so the links will all work

Video 1: What role do anthropologists play in solving crimes?

1. What does a physical anthropologist investigate?
2. What four things do we want to know about a skeleton?
3. What bones are most useful for developing a profile of a person?



Forensic Anthropology

What bones can provide clues for each of the following items?

Sex: _____

Age & Stature: _____

Race: _____

What other information can we learn from bones?

Video 3 Reading the Remains

1. What information do they provide for law enforcement agencies?
2. How many skeletons do they have in their collection?
3. What do they learn about the skeleton from each tool?

CT scan: _____

X-ray: _____

Mass Spectrometer: _____

Scanning electrons microscope: _____

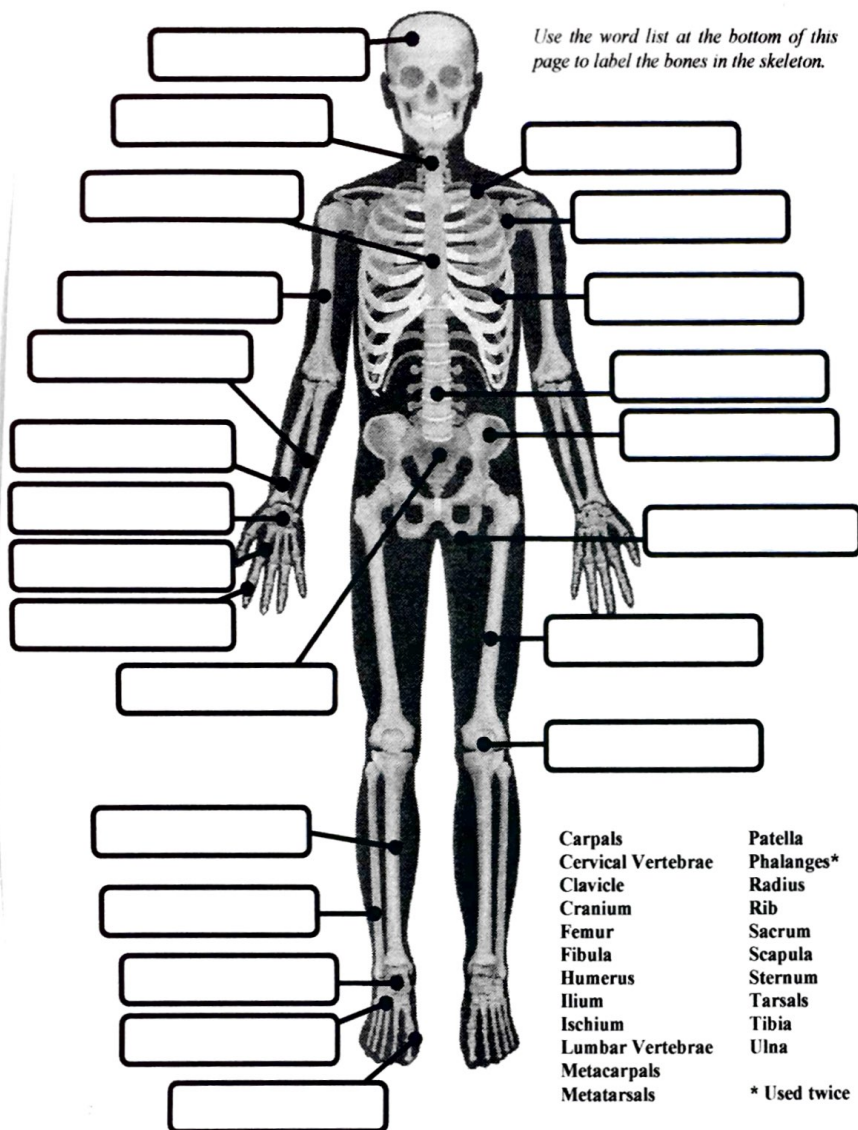
DNA Analysis: _____

NAME _____ DATE _____ PERIOD ____ ANTHROPOLOGY

Directions: (1) Identify all the bones in the skeleton, 1 term will be used twice.
 (2) Quick Quiz – Give the common name for each bone.

Human Skeleton

Use the word list at the bottom of this page to label the bones in the skeleton.



T. Trimpe 2010 <http://sciencespot.net>

Quick Quiz:

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____
8. _____
9. _____
10. _____
11. _____
12. _____

Bone Challenge

What was your time?

What is Forensic Anthropology ?

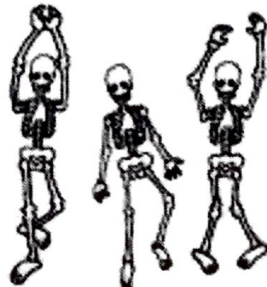
The field of anthropology involves the study of the biological and cultural aspects of humankind in any place at any time. Two sub-fields of anthropology are:

- Cultural anthropology, which is the observation of norms, customs, political, economic and religious systems in a culture over time.
- Physical anthropology, which is the identification and interpretation of the human evolution and variation of humans.

Forensic anthropology is a specialized applied sub discipline of physical anthropology in which the goal is to analyze and interpret human remains in unexplained deaths. Forensic anthropologists conduct their work by analyzing human skeletons or decomposing remains to extract as much information about the person and the circumstances surrounding his or her death. Forensic anthropologists provide this valuable information to medical examiners, pathologists and law enforcement. A forensic anthropologist will analyze potential remains according to the following list of questions:

1. Are the remains skeletal?
2. Are the skeletal remains human or animal?
3. Are the skeletal remains modern or historical?
4. How many individuals were found?
5. Is there evidence of time since death?
6. What is the age, sex, stature, and ancestry of the individual?
7. What are their individualizing features?
8. Are there any other factors that can aid in establishing the cause and manner of death?

The forensic anthropologist creates an osteobiography (bone story) about the deceased remains they examine. This includes a discussion of age, sex, stature, ancestry, and individualizing features (e.g. previous illnesses, genetic abnormalities, trauma). Determining the age, sex, stature and ancestry help to determine if the individual has been listed as a missing person, while the identification of individualizing features may help to positively identify a person. Forensic anthropologists will also look for signs of recent trauma that may have been the cause of death.



Fill-in-the-blank Notes:

What is Forensic Anthropology?

NAME: _____ DATE: _____

Carefully read the related reading and then fill in the blanks below.

The field of _____ is the study of the _____ and _____ aspects of humankind in any place at any time. Two sub-fields of anthropology are:

- _____ **Anthropology:** the observation of norms, customs, political, economic and religious systems in a culture over time.
- _____ **Anthropology:** the identification and interpretation of the human evolution and variation of humans.

_____ is a specialized applied sub discipline of physical anthropology in which the goal is to analyze and interpret _____ in unexplained _____. Forensic anthropologists conduct their work by analyzing _____ or _____ remains to extract as much information about the person and the circumstances surrounding his/her _____. Forensic anthropologists provide this valuable information to _____, pathologists and _____. A forensic anthropologist will analyze potential remains according to the following list of questions:

- [illegible]

The forensic anthropologist creates a(n) _____
(_____) about the deceased remains they examine. This
_____ includes a discussion of age, _____,
stature, _____, and individualizing features (e.g. previous illnesses,
_____, trauma). Determining the age, sex, stature and ancestry help to
determine if the individual is a _____ person, while the identification of
_____ features may help to positively identify a person. Forensic
anthropologists will also look for signs of _____ which may have been the
cause of death.

~~~~~  
**“Crime is terribly revealing. Try and vary your methods as your will, your tastes,  
your habits, your attitude of mind, and your soul is revealed by your actions.”**

- Agatha Christie (English Detective, Novelist and Playwright, 1890-1976)  
~~~~~


Reading: FORCE and Types of BONE FRACTURES

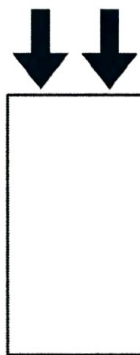
Introduction

In forensic science there are five main causes of death: accident, homicide, natural, suicide, and unknown. Bones usually exhibit clues concerning violent deaths such as homicide, suicide or accident, and these manners of death will most likely exhibit some degree of skeletal trauma that can be interpreted by a forensic anthropologist.

Directions of Force

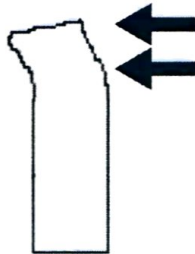
The type of break in the bone depends on the direction from which the force was applied. There are five directions of force that cause bone fractures: compression, shearing, bending, torsion, and tension.

1. **COMPRESSION** = A force that pushes down on bone. Fracture lines will often be numerous, wide-reaching and tend to radiate from the point of impact. This type of force most often occurs upon the skull and the shape of the displaced bone will likely match the instrument used to create the wound.

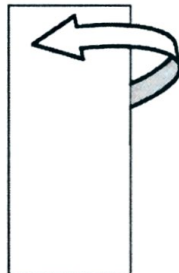


2. **SHEARING** = Force similar to bending when the immobilization of one bone segment occurs. When force is applied, a linear shearing type of fracture in the bone occurs, usually caused when a person attempts to stop himself from falling. This usually occurs in accidents rather than homicides or suicides. However, there is one type of forensic case where shearing forces can occur - when a victim is dismembered using a sharp instrument (i.e. handsaw).

3. **BENDING** = a force that impacts the bone at a right angle causing a triangular break usually through its cross section; causes fracture lines at the point of impact or on the side opposite from the break. This usually causes complete breaks or fractures in adults, and 'green-stick' fractures in children. The most common fracture caused by a bending force is called a parry fracture of the ulnar bone in the arm and is caused when a person holds up their arms in self defense, resulting in the inward displacement of the bone. Parry fractures are **often seen in deaths involving a violent struggle.**



4. **TORSION** = twisting forces that occur most often in accidents. One end of the bone is held stationary while the other end of the bone is twisted in some way. The fracture spirals down the long axis of the bone. This occurs most often occur in accidents (skiing, biking) and in forensic cases of child abuse.



5. **TENSION** = a force that pulls on the long axis of the bone causing it to break. Tension forces most often cause dislocations of bone, but if the force is strong enough a portion of bone can break away. This type of bone injury displays few fracture lines and occur **most often occur in accidents rather than violent deaths.**



Worksheet: FORCE & Types of BONE FRACTURES

Name: _____ Date: _____

Complete the following TRUE-FALSE questions after reading 'FORCE and Types of BONE FRACTURES'. If the statement is FALSE, place the correct statement in the line below.

1. In Forensic Science there are four main causes of death: accident, homicide, natural, suicide. **TRUE FALSE**
-

2. Bones usually exhibit clues concerning violent deaths such as homicide, suicide or accident. **TRUE FALSE**
-

3. When a compression force is applied to bone the fracture lines will often be numerous, wide-reaching and radiate from the point of impact. **TRUE FALSE**
-

4. In a compression fracture, the shape of the displaced bone will not match the instrument used to create the wound. **TRUE FALSE**
-

5. Compression fractures are usually found upon the bones in the rib cage. **TRUE FALSE**
-

6. A 'bending' bone fracture is usually caused by a person attempting to stop himself from falling. **TRUE FALSE**
-

7. Shearing bone fractures will likely be evident if a victim is dismembered by a saw. **TRUE FALSE**

8. A bending fracture is caused by a force that impacts the bone at a right angle, causing a triangular break usually, through its cross section. **TRUE FALSE**

9. A parry fracture is caused when a person kicks her legs in self defense. **TRUE FALSE**

10. Parry fractures are often seen in deaths where there was a violent struggle. **TRUE FALSE**

11. A torsion fracture is caused by a spiral down the long axis of the bone; most often occur in accidents and in cases of child abuse. **TRUE FALSE**

12. A tension fracture is caused by a force that pushes on the long axis of the bone, causing it to break. **TRUE FALSE**

READING: DETERMINING TYPES OF TRAUMA FROM SKELETAL REMAINS

When skeletal remains are found, forensic anthropologists can only infer the actual cause of death after the examination of the bones because there are so many unknowns about this type of trauma. Forensic anthropologists will often state that the trauma is "*consistent*" with a certain cause of death once the examination is complete. For example, if a stab wound to the torso was thought to be the cause of death, existence of this type of wound does not *prove* that it was the cause. Therefore, a forensic anthropologist will list the cause of death as "*consistent with death by stabbing*". This is because the person could possibly have died from other causes before he or she was stabbed.

In forensic science there are five main causes of death: accident, homicide, natural, suicide and unknown. Bones usually exhibit clues concerning violent deaths such as homicide, suicide or accident as these manners of death most likely will result in skeletal trauma and can be interpreted by a forensic anthropologist.

Blunt Force Trauma

An injury caused by a blow from a wide instrument with a flat or round surface, injuring a wide surface area of the bone. The injury usually involves bone compression, bending, or shearing forces over a wide area. The fracture wounds tend to be fairly simple unless excessive force is applied, in which case comminuted fractures (which contains many bone fragments) can occur. Weapons used, such as clubs, can cause blunt force trauma, however falling or being pushed onto on a hard surface can also result in such injuries. This type of trauma can occur during collisions or airplane crashes.

Projectile Trauma

An injury caused by projectile trauma will often have distinctive characteristics. These types of wounds exhibit complete displacement of bone with radiating fracture lines from the point of impact. The type of force caused by this trauma usually involves compression, but some weapons can apply a bending force. The focus of the force and the resulting bone injury caused by projectile trauma will start out small, but usually becomes wider and more significant as the projectile passes through bone. Bullets, arrows, or spears can cause projectile trauma.

Sharp Force Trauma

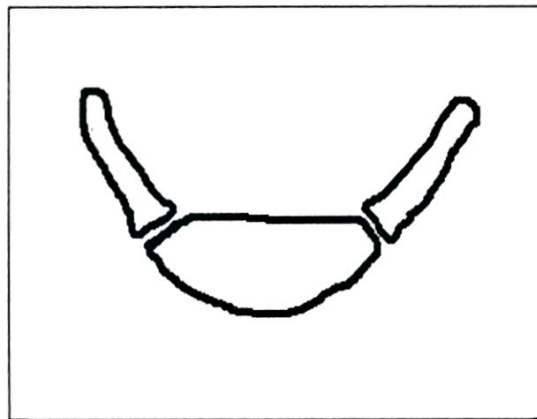
This refers to an injury caused by either compression or a shearing force applied towards a narrow focus. When the force is perpendicular, puncture wounds will appear in the bone. If force is applied at an angle, grazing cut marks are typically evident. Complete fractures of bone can occur when the weapon used is a 'chopping' type of instrument (i.e. axe). Incomplete bone fractures will occur when the weapon used is a 'cutting' type of instrument (i.e. knife).

Death by Strangulation

The hyoid bone is a free-floating c-shaped structure made up of three bones that covers the voice box (larynx) in the neck. The adult hyoid bone will appear fractured in eight per cent of the deaths caused by suicidal hangings, while fractured hyoids are observed in 34% of strangulation deaths. Thus, if a forensic anthropologist observes a fractured hyoid bone, there is a "strong indication" that strangulation occurred.

Unfortunately, it is difficult for forensic anthropologists to conclude that strangulation has occurred in a young child because the three bones of the hyoid have fused together in only 7.1% of humans under the age of 20. Fusion of the hyoid bones in humans is usually not complete until adulthood.

Drawing of an adult human hyoid bone.



This set of bones found in the human neck will often fracture if someone has been strangled to death.

WORKSHEET: DETERMINING TYPES OF TRAUMA FROM SKELETAL REMAINS

NAME: _____ DATE: _____

Complete the reading '**Determining TYPES of TRAUMA from SKELETAL REMAINS**' to answer the following questions.

1. Why can the cause of death only be "inferred" by forensic anthropologists rather than *confirmed* after they have studied skeletal remains ?
2. List the 5 main causes of death in Forensic Science and circle the types of death that will likely cause skeletal trauma.
3. *Fill in this chart by stating the type of weapon used to cause this trauma, the type(s) of force applied by this type of trauma and type(s) of bone injuries caused by this type of trauma.*

Type of Trauma:	Type of Weapon(s):	Type of Force(s):	Type(s) of Bone Injury present:
-----------------	--------------------	-------------------	---------------------------------

Blunt Force:

Projectile:

Sharp Force:

Strangulation:

4. Beside each of the following injuries - state the **type of trauma** that likely caused it:

a) A fractured hyoid bone is found in the skeleton of adult male:

b) Linear grazing marks are found Upon the ribs of unknown skeleton:

c) A small round hole with radiating fractures is found in the breast bone of a skeleton:

d) A fractured hyoid is found in the skeleton of a young child:

e) Simple fracture wounds and bone fragments over a large surface area of a skull are observed:

f) Small puncture wounds appear on the pelvic girdle of a cadaver:

~~~~~  
*Murder is unique in that it abolishes the party it injures, so that society has to take the place of the victim and on his behalf demand atonement or grant forgiveness; it is the one crime in which society has a direct interest.*

- W. H. Auden (1907 - 1973)

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**Now → Go to the class website + submit
your answers on the Google Form**