

# INTRODUCTION TO FORENSIC PATHOLOGY

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## OBJECTIVES/RATIONALE

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Crime scene investigation requires knowledge in forensic pathology to solve crimes. The Student will utilize knowledge of forensics to determine sex, height and weight of an unidentified skeleton.

TEKS 121.4 1A, 1B, 1G, 1H, 1I

TAKS ELA 1, 3, 4

Mathematics 1, 2, 3, 4, 6, 7, 8, 9, 10

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## KEY POINTS

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- I. Forensic medicine is a science dealing with the relation and application of medical facts to legal problems.
  - A. Deaths that require medicolegal investigation are:
    1. Violent deaths (homicides, suicides, accidents)
    2. Suspicious deaths
    3. Sudden and unexpected deaths
    4. All deaths of children under 6
    5. Deaths in penal institutions or police custody
    6. Deaths without a physician in attendance
    7. Public health hazards
  - B. Basic questions a forensic pathologist asks:
    1. Who? Identification of the body
    2. When? Time of death
    3. Where? Scene of injury/death
    4. What? Cause of death
    5. Which? Injuries are significant
    6. Why? And How injuries/death were produced
  - C. Positive identification
    1. Visual recognition/photographs
    2. Fingerprints
    3. Dental records
    4. Skeletal remains
    5. Clothing and personal effects
    6. DNA and lab results
    7. Verbal and Visual description
- II. Factors in the estimation of time of death
  - A. Short postmortem interval (hours to days)
    1. rigor mortis- stiffening of body. The body usually remains stiff from 2-12 hours after death. After 24 hours it disappears.
    2. food in the stomach-digestive process
  - B. Intermediate postmortem (days to weeks)

1. decomposition of the body
2. entomology-study of insects
- C. Extended postmortem interval ( months to years)
  1. Mummification
  2. Skeletonization
- III. Crime scene investigation and autopsy findings
  - A. Collect and preserve any evidence
  - B. Determine cause of death—the original underlying disease or injury that initiates a chain of events, no matter how brief or prolonged, that leads to death.
  - C. Determine manner of death—how the cause of death came about; determined by history and circumstances
  - D. Document everything
- IV. Common causes of death
  - A. Natural death
    1. Cardiovascular—atherosclerosis and hypertension
    2. Central Nervous System-cerebrovascular disease, seizure disorders, meningitis
    3. Chronic alcoholism
    4. Pulmonary—COPD, asthma, pneumonia, thromboemboli
    5. Tumors and malignancies
    6. Diabetes
    7. GI perforations with hemorrhage or peritonitis
  - B. Non-natural death
    1. Blunt force injuries
      - a. Contusions
      - b. Lacerations
      - c. Fractures
      - d. Abrasions
    2. Sharp force injuries
      - a. Stab wound –deeper than long on skin
      - b. Incised wound-longer on skin than deep
      - c. Chop wound-combined sharp and blunt
    3. Firearms cases
    4. Thermal injuries
    5. Electrocution
    6. Asphyxiation
    7. Poisoning
  - C. Difficulties in determining death
    1. Patient is unable to give a history
    2. No physiological activity
    3. Laboratory tests may be unreliable post-mortem

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## ACTIVITIES

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- I. Complete Forensic Case Study.

**Teacher Note**

Divide the class into lab groups.

Using several disarticulated skeletons the students will determine sex, height, age range and shoe size of their skeleton.

Provide handouts of skeletal model and skull model and the case study.

Each group will need metric measuring tapes and protractors and record their results in lab notebook or paper.

Students can also compare their measurements to their skeleton to determine sex. Human skeletons exhibit sexual dimorphism. Measurements that can be used:

Length of thigh

Length of arm (wrist to elbow)

Arm span (finger tip to finger tip)

Width of back (shoulder to shoulder)

Index finger length

Ankle to hip

Total height

Length of foot

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**MATERIALS NEEDED**

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Forensic case study

Disarticulate skeletons

Metric measuring tapes

Protractors

Anatomical picture of human skeleton and skull model

Good web site for forensic activities:

[http://www.courttv.com/forensics\\_curriculum](http://www.courttv.com/forensics_curriculum)

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**ASSESSMENT**

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Successful completion of Case Study.

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**ACCOMMODATIONS**

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For reinforcement, the student will report on the differences between natural and non-natural deaths.

For enrichment, the student will interview a medical examiner and the TV program CSI to real practice.

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**REFLECTIONS**

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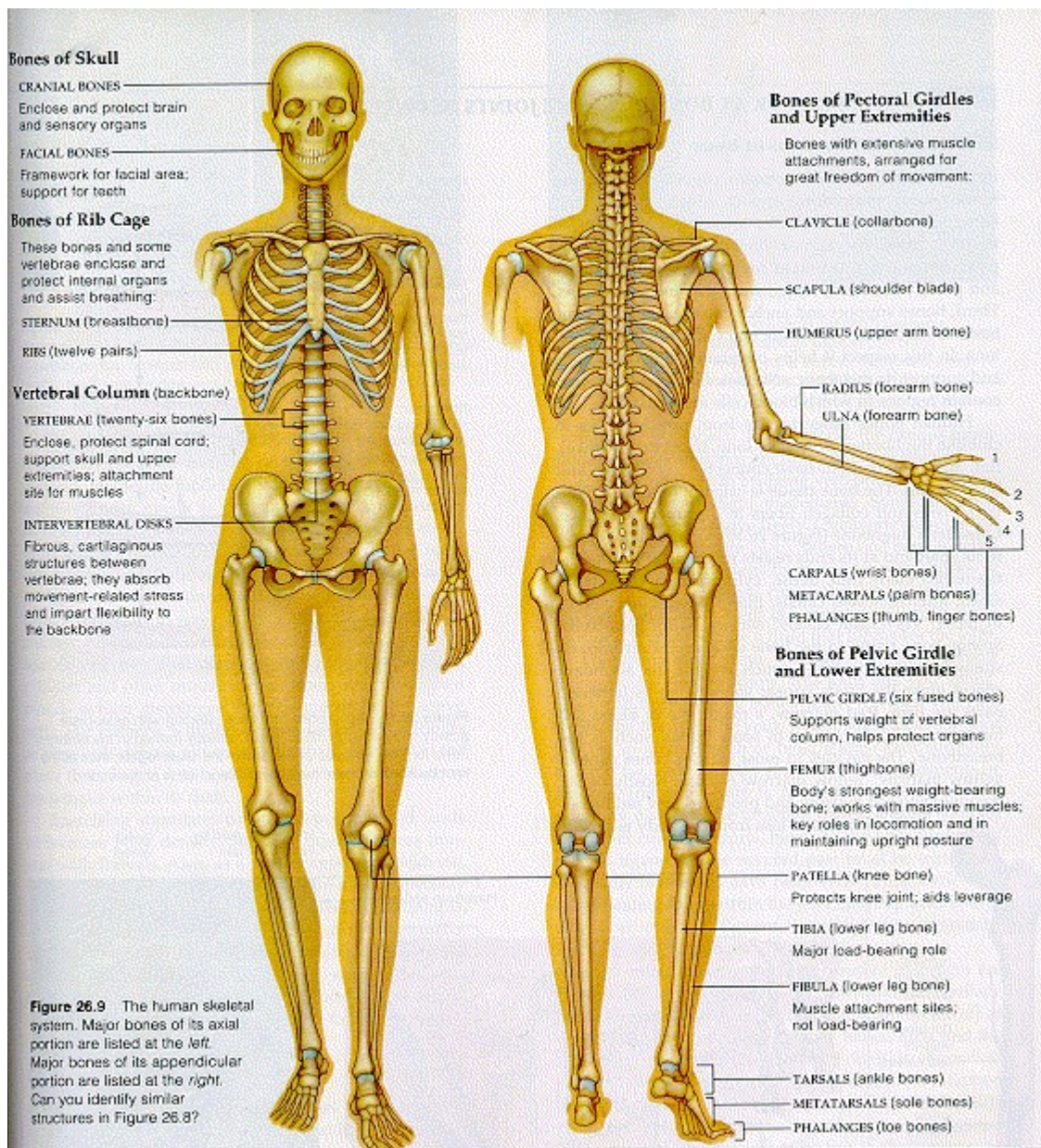
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## FORENSIC CASE STUDY

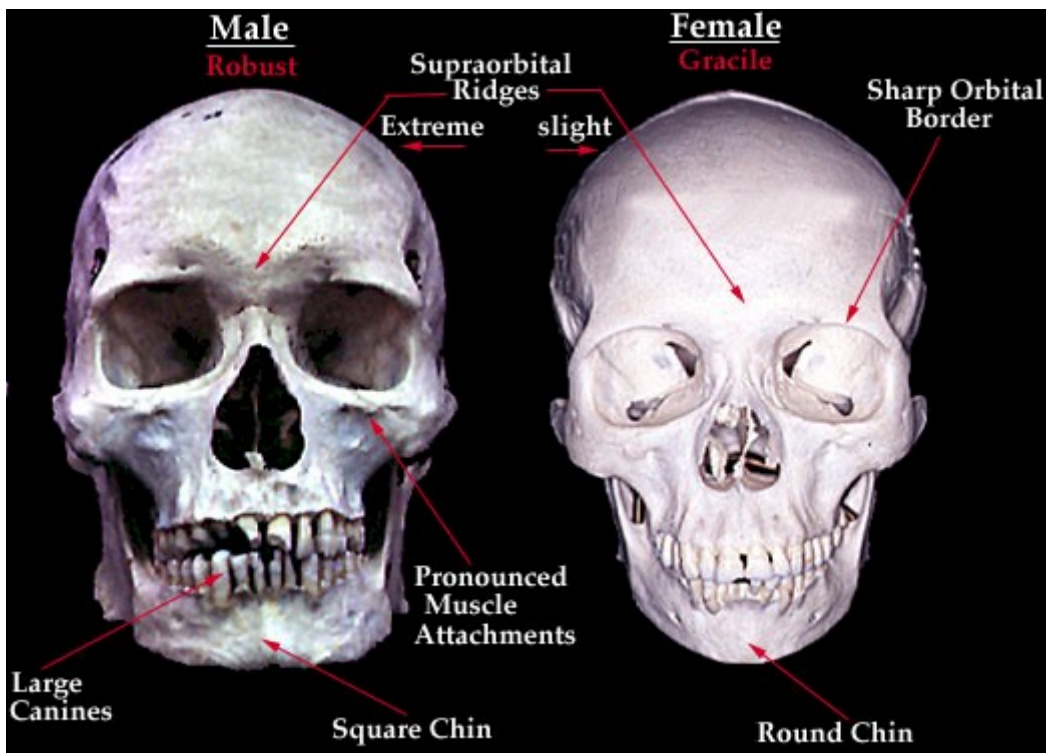
**PROBLEM:** Officer Brown was walking his beat downtown when he noticed dogs digging in a vacant lot. Recognizing that one of the animals had a bone in its mouth, he went over to observe what they had uncovered. He was surprised to see several other bones. He immediately called the dispatcher on his two-way radio, reported his findings and before much time had lapsed, the area was swarming with investigators. As it turned out, an array of bones was uncovered. No entire skeleton could be unearthed. The remains were delivered to the medical examiner who was asked to determine as much as possible about the bones, i.e. sex, height, shoe size and age range. Your job now is to separate these bones into groups of individual skeletons.

**Take the box of bones you have been given, answer the following questions, and solve the problem.**

- 1. Using your diagram of skeleton, label and identify the bones you have in your box.**
- 2. Compare the different lengths and shapes of the bones. Sort them accordingly.**
- 3. Compare the diameters using the metric measuring tape. Do you need to rearrange your groups or split the bones into more groups?**
- 4. Note the coloration. Are there major differences? This is not always reliable, but can occasionally be helpful.**
- 5. Some of the bones may belong to different aged persons. The amount of calcium may decrease with age. Thus, the density of the bones may decline. How could you compare the density of bones?**
- 6. The structure of the human pelvis and the shape of the skull are used to determine the sex. Measure the angle of the pubic arch with protractor. If the angle is less than 100 degrees it is usually male and greater it is a female. By observing the skull, a skull with a sloping forehead is usually male. Refer to your handout of a skull and determine the sex of your skeleton.**
- 7. In order to determine the height of the skeleton, you must use a math formula and the leg bones. The formula is  $1.30(\text{length of the femur plus the length of the tibia both in centimeters}) = \text{height}$ .**
- 8. Shoe size can often be predicted by measuring the distance between a person's bend of the elbow and the wrist.**



(from Biology concepts and applications , Third Edition by Cecie Starr, Wadsworth Publishing Company, 1996)



<http://renoir.vill.edu/~ysp/Teacher/Webpages/Forensics/forensic.html>  
Osteo Interactive