Chapters 7 and 8: The Axial and Appendicular Skeletal Systems
Read pages 194 to 255

Chapter 7: AXIAL SKELETON OBJECTIVES
NAME _______________________________________

A. Types of bones, surface markings, and divisions of the skeletal system.
   1. Classify the four principle types of bones on the basis of shape and location.
   2. Describe the various markings on the surface of bones.

B. Skull.
   3. Identify the bones of the skull and the major markings associated with each.
   4. Identify the principle sutures, fontanelts, paranasal sinuses, and for a mina of the skull.

C. Hyoid bone and vertebral column.
   5. Identify the bone of the vertebral column an their principle markings.
   6. Contrast herinated (slipped) disc, and abnormal curves as disorders associated with the skeletal system.

D. Thorax.
   7. Identify the bones of the thorax and their principle markings.

Chapter 8: APPENDICULAR SKELETON OBJECTIVES

E. Pectoral (shoulder) girdle
   1. Identify the bones of the pectoral girdle and their major markings.

F. Upper extremities
   2. Identify the upper extremity, its component bones, and their markings.

G. Pelvic (hip) girdle
   3. Identify the components of the pelvic girdle and their principle markings.
   4. Compare the principle structural differences between female and male skeletons, especially those that pertain to the pelvis.

H. Lower extremities
   5. Identify the lower extremity, its component bones, and their markings.

I. Clinical Applications

A. Types of bones, surface markings, divisions of the skeletal system (pages 195 – 198)
A1. What are the two skeletal divisions? In general, what bones are included in each?

A2. Complete the table about four major and two minor types of bones.

<table>
<thead>
<tr>
<th>Type of Bone</th>
<th>Structural Features</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. Long</td>
<td>Slightly curved to absorb stress better</td>
<td></td>
</tr>
<tr>
<td>b.</td>
<td></td>
<td>Wrist, and ankle bones.</td>
</tr>
<tr>
<td>c.</td>
<td>Composed of two thin plates of bone like a “jelly sandwich”</td>
<td></td>
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<tr>
<td>d. Irregular</td>
<td></td>
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<tr>
<td>e. Sutural (Wormian)</td>
<td></td>
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</tr>
<tr>
<td>f. Sesamoid</td>
<td>Small bones suspended in tendons</td>
<td>(give two)</td>
</tr>
</tbody>
</table>

A3. In general, what are surface markings on bones? Give 3 functions. (see pages 197 – 198, Table 7.2)
A4. Contrast the bone markings in each of the following pairs (see Table 7.2, page 198).

a. Tubercle/ tuberosity

b. Crest/ line

c. Fossa/ foramen

d. Condyle/ epicondyle

B. Skull “Brain bucket” (pages 198 – 212)

B1. Color the skull bones on Figure 7-1. Be sure to color the corresponding color ovals for each bone listed on the figure.

- Ethmoid bone
- Frontal bone
- Lacrimal bone
- Mandible bone
- Maxilla bone
- Nasal bone
- Occipital bone
- Parietal bone
- Sphenoid bone
- Temporal bone
- Zygomatic bone
- Mastoid process (a region of the temporal bone)

Figure 7-1: Skull bone. (a) Skull viewed from right(lateral) side.

B2. Answer these questions on the cranium.

a. What is the primary function of the cranium? ________________________________

b. Which bones make up the cranium (rather than the face)? Write the number (1 or 2) on Figure 7-1.

1 = cranial bone  2 = facial bone
B3. Label the **bones and foramen** on the **frontal view** of the skull below. Some are done for you!

B4. Check your understanding of locations and functions of skull bones by writing the name of each skull bone next to its description.

<table>
<thead>
<tr>
<th>Vomer</th>
<th>Mandible</th>
<th>Lacrimal</th>
<th>Temporal</th>
<th>Nasal</th>
<th>Zygomatic</th>
<th>Palatine</th>
<th>Sphenoid</th>
<th>Frontal</th>
<th>Ethmoid</th>
<th>Occipital</th>
</tr>
</thead>
<tbody>
<tr>
<td>_____________1. This bone forms the lower jaw, including the chin. Evolved from <em>gill arches</em> in fish.</td>
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<td>_____________2. These are the cheek bones; they also form lateral walls of the orbit of the eye.</td>
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<td>_____________3. Tears pass through tiny foramina in these bones; they are the smallest bones in the face.</td>
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<td>_____________4. The bridge of the nose is formed by these bones.</td>
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<td>_____________5. Organs of hearing (internal part of ears) are located in and protected by these bones.</td>
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<td>_____________6. This bone sits directly over the spinal column; it contains the hole through which the spinal cord connect to the brains.</td>
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<td>_____________7. The name means “wall.” The bones form most of the roof and the side walls of the skull.</td>
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<tr>
<td>_____________8. These bones form most of the roof of the mouth (hard palate) and contain the sockets into which upper teeth are set. Evolved from <em>gill arches</em> in fish.</td>
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<td>_____________9. L-shaped bone form the posterior parts of the hard palate and nose.</td>
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<td>_____________10. Commonly called the forehead, it provides protection for the anterior portion of the brain.</td>
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<td>_____________11. A fragile bone, it forms much of the roof and internal structure of the nose. Sense of smell.</td>
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<tr>
<td>_____________12. It serves as a “keystone,” since it binds together many of the other bones of the skull. It is shaped like a bat, with the wings forming part of the sides of the skull and legs at the back of the nose.</td>
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<td>_____________13. This bone forms the inferior part of the septum dividing the nose into two nostrils.</td>
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</tbody>
</table>
B5. Define *suture*:
Label the 4 major sutures on the skull diagrams in B1 and B3.
List the four major sutures and give the articulating bones. One is done for you.
**Example:** 1) coronal suture - between the 2 parietals and the frontal bone.

B6. A *clinical challenge*: TMJ syndrome refers to disorders involving the only movable joint in the skull, the joint between the ________________ bone and the ________________ bone. List three signs or symptoms of this problem. (See page 208)

C. Hyoid bone and Vertebral Column (pages 212 – 222)
C1. Identify the location of the hyoid bone on yourself. Place your hand on your throat and swallow. Feel your larynx move upward? The hyoid sits (superior? inferior?) to the larynx (voice box) at the level of the mandible.

C2. In what way is the *hyoid bone* unique among all the bones of the body?

C3. The five regions of the vertebral column are grouped (A-E) in Figure 7-2 (next page). Color vertebrae in each region and be sure to select the same color for the corresponding color code oval. Now right on lines next to A-E the number of vertebrae in each region. One is done for you. Also, LABEL the first two cervical vertebrae by name!
Figure 7-2: Right lateral view of the vertebral column.

C4. Name the structure (part) that provides flexibility to the vertebral column: ________________
C5. On Figure 7-3, color the parts of the vertebrae and corresponding color code ovals. As you do this, notice differences in size and shape among the three types of vertebrae.

![Spinal cord](image)

**Figure 7-3**: Typical vertebrae. (a) thoracic vertebra, superior view. (b) thoracic vertebra, right lateral view. (c) Cervical vertebra, superior view. (d) Lumbar vertebra, superior view.

C6. Identify distinctive features of vertebrae in each region.

<table>
<thead>
<tr>
<th>C. Cervical</th>
<th>S. Sacral</th>
</tr>
</thead>
<tbody>
<tr>
<td>L. Lumbar</td>
<td>T. Thoracic</td>
</tr>
</tbody>
</table>

_____a. Small body, foramina for vertebral blood vessels in transverse process
_____b. Only vertebrae that articulate with ribs
_____c. Massive body; has blunt spinous process (squared-off looking)
_____d. Articulate with the two hipbones
_____e. Atlas and axis are vertebrae in this region
C7. Complete this exercise about slipped discs. (See Figure 7.24 on page 225)

a. The normal *intervertebral disc* consists of two parts: an outer ring of *(hyaline? elastic? fibro-?)* cartilage called ________________ and a soft, elastic, inner portion called the ________________.

b. Ligaments normally keep discs in alignment with the vertebral bodies. **What may happen** if these ligaments weaken?

c. **Why** might pain result from a slipped disc?

d. In what part of the vertebral column are slipped discs most common? What **symptoms** may result from a slipped disc in this region?

C8. Match types of abnormal curvatures of the vertebral column with description and diagrams below. (See Figure 7.25. page 226).

<table>
<thead>
<tr>
<th>K. Kyphosis</th>
<th>L. Lordosis</th>
<th>S. Scoliosis</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. Exaggerated lumbar curvature; “swayback”</td>
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<td></td>
</tr>
<tr>
<td>b. Exaggerated thoracic curvature; “hunchback”</td>
<td></td>
<td></td>
</tr>
<tr>
<td>c. S- or C- shaped lateral bending</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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Figure 7-4
D. Thorax “Ribs” (pages 222 – 224)

D1. Name the structures that compose the thoracic cage. (Why is it called a “cage”, a thoracic cage?)

D2. On Figure 7-5, color and label the three parts of the sternum.

![Figure 7-5 Anterior view of the thorax.](image)

D3. Complete this exercise about ribs.

a. There are a total of ________ ribs (______ pairs) in the human skeleton.

b. Ribs slant in such a way that the anterior portion of the ribs is (superior? inferior?) to the posterior end of the rib.

c. Posterior, all ribs articulate with the (bodies? spinous process?) of thoracic vertebrae. Ribs 1 to 10 also pass anterior to and articulate with (transverse processes? spinous process?) of thoracic vertebrae.  (continued on next page →)
d. Anteriorly, ribs numbered ______ to ______ attach to the sternum directly by means of strips of hyaline cartilage, called ____________________ cartilage. These ribs are called (true? false?) ribs. *Color those ribs on Figure 7-5, leaving the costal cartilages white.

e. Ribs 8 to 10 are called ________________. Select a different color and color them again leaving costal cartilages white. Do these ribs attach to the sternum? (Yes? No?)

** If so, in what manner?

f. Ribs #_______ and ______ are called “floating ribs.” Now color them in a different color.

** Why are these ribs so named “floating ribs”?

g. What function is served by the costal groove?

h. What occupies intercostal spaces?

D4. At what point(where) are the ribs most commonly fractured? Which pair(s)?

E. Pectoral “shoulder” girdles (Chapter 8; pages 232 – 234)
E1. Do this exercise about the pectoral girdle.
   a. Which bones form the pectoral girdle?

b. Do these bones articulate (form a joint) with the vertebrate or ribs? (Yes? or No?) _______________

c. The pectoral girdle is part of the (axial? appendicular?) skeleton. Identify the point (marked by *) on the Figure 8-3 at which the shoulder girdle articulates with the axial skeleton. Name the two bones forming that joint. Palpate (press and feel) the bones at this joint on yourself.

______________________________ and ________________________________.
E2. **Figure 8-1** is a posterior view of the scapula. Identify this bone (right or left) by inserting its name on the line beside the figure. Select different colors for the structures listed below and use them to color the coding circles and the corresponding structures. Then, label the borders and angles indicated by leader lines.

- Spine
- Glenoid cavity
- Acromion
- Coracoid process

![Figure 8-1](image)

**Figure 8-1**

**F. Upper extremities (page 235 – 240)**

**F1.** List the bone (or groups of bones) in the upper extremity from proximal to distal. Indicate how many of each bone there are. Two are done for you. Refer to **Figure 8-3** to check your answers.

- a. ___HUMERUS_______(1)  
- b. ________________________( )  
- c. ________________________( )  
- d. ________________________( )  
- e. ___METACARPALS_______(5)  
- f. ________________________( )
F2. **Figure 8-2** is an anterior view of the three bones (A, B, C) of the left arm and forearm in the anatomical position. Identify each bone (A, B, and C) by writing its name at the leader line. Then, label all the bone markings listed below by inserting leader lines and the names of the bone markings on the figure. Finally, color the coding circles and the bone markings.

- Trochlear notch
- Trochlea
- Radial tuberosity
- Capitulum
- Deltoid tuberosity
- Head (three)
- Styloid process
- Coronoid process
- Olecranon process
- Greater tubercle
- Lesser tubercle

![Figure 8-2](image)

**Figure 8-2**
F3. For extra review: See Figure 8-3. Color the axial and appendicular divisions of the skeleton.

Figure 8-3
F4. **Label** the numbered parts of **Figure 8-4**. **Right hand** (dorsal surface). **Color** the 5 **metacarpals** one color, the **proximal phalanges** one color, the **middle phalanges** one color, and the **distal phalanges** another color.

![Figure 8-4](image)

**G. Pelvic (hip) girdle (pages 240 – 245)**

**G1.** Describe the pelvic bones in this exercise.

a. Name the bones that form the pelvic girdle: ____________________________________________

b. Which two symmetrical bones form the pelvis? __________________________________________

c. Locate the point (**) on **Figure 8-3** at which the pelvic girdle portion of the appendicular skeleton articulates with the axial skeleton. **Name the bones involved** in that joint: ______________________________________ and ________________________.

**G2.** Answer the following questions about **coxal bones**. Refer to **Figure 8-5** for help.

a. Each coxal (hip) bone originates as three bones that fuse early in life. These bones are the ______________________________________, _______________________________________ and _______________________________________. At **what location** do these 3 bones fuse during adolescence? ______________________________________.
G3. Refer to Figure 8-5 for the following:

a. Identify the bones and bone markings indicated by the solid lines.

b. Label the dashed lines showing the dimensions of the true pelvis and the diameter of the false pelvis.

c. Select different colors for the structures listed in the color ovals.

d. List three ways the female pelvis differs from the male pelvis in the blanks below.
   *Feel free to add more if you wish.

1) _________________________________________________________________________________

2) _________________________________________________________________________________

3) _________________________________________________________________________________

Figure 8-5. Articulated pelvic girdle
H. Lower extremities (pages 245 – 251)

H1. Refer to Figure 8-3 and list the bones in the lower extremity from proximal to distal. Indicate how many of each bone there are. One is done for you.

a. ___FEMUR______________ (1 )

b. ______________________( )

c. ______________________( )

d. ______________________( )

e. ______________________ ( )

f. ______________________ ( )

g. ______________________ ( )

H2. Refer to Figure 8-6 of the thigh and leg for the following:

a. Identify each bone and put your answer in the blanks below.
b. Complete the illustration by inserting the following terms at the ends of the solid lines.

<table>
<thead>
<tr>
<th>Head of femur</th>
<th>Tibial crest</th>
<th>Head of fibula</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercondylar eminence</td>
<td>Lesser tronchater</td>
<td>Medial malleolus</td>
</tr>
<tr>
<td>Tibial tuberosity</td>
<td>Greater tronchater</td>
<td>Lateral malleolus</td>
</tr>
</tbody>
</table>

Figure 8-6
H3. Label the numbered parts of the left foot (superior view)

H4. Now that you have seen all of the bones of the axial and appendicular skeleton, complete this table relating to common and anatomical names of bones.

<table>
<thead>
<tr>
<th>Common Name</th>
<th>Anatomical Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. Shoulder blade</td>
<td></td>
</tr>
<tr>
<td>b. Pollex</td>
<td></td>
</tr>
<tr>
<td>c. Collar bone</td>
<td></td>
</tr>
<tr>
<td>d. Heel bone</td>
<td></td>
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<tr>
<td>e. Olecranon process</td>
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</tr>
<tr>
<td>f. Kneecap</td>
<td></td>
</tr>
<tr>
<td>g. Tibial crest</td>
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<td>h. Toes</td>
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<tr>
<td>i. Palm of hand</td>
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<td>j. Wrist bones</td>
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<tr>
<td>k. Tarsals</td>
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<tr>
<td>l. Fingers</td>
<td></td>
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<tr>
<td>m. Zygomatic process or arch</td>
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<tr>
<td>n. Breast bone</td>
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<td>o. Hallucis</td>
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</tbody>
</table>

H5. For extra review:
Label all bones marked with leader lines on Figure 8-3 without HELP!
I. Clinical applications: please respond in complete sentences and thoughts!
1. Jack, a young man, is treated at the clinic for an accident in which he hit his forehead. When he returns for a checkup, he complains that he can’t smell anything. A hurried X-ray of his head reveals a fracture. What part of which bone was fractured to cause his loss of the sense of smell?

2. Janet, a 10-year-old girl, is brought to the clinic after falling out of a tree. An X-ray shows she has small fractures of the transverse processes of T3 to T5 on the right side. Janet will be watched for what abnormal spinal curvature over the next several years?

3. A young woman is brought to the emergency room after falling on her outstretched arm. Her forearm is bruised both anteriorly and posteriorly along most of its length, but there is no fracture. The doctor explains that she dislocated the head of the radius, but it has relocated spontaneously. What persistent injury is responsible for the bruising?

4. Bart, a truck driver, tells his physician that he has a shooting pain in his right leg. What is a likely diagnosis?

5. Mr. Ogally, a heavy beer drinker with a large potbelly, complained of severe lower back pains. X-rays showed displacement of his lumbar vertebrae. What is the condition called and what probably caused it in Mr. Ogally?

6. An infant was born with feet turned medially and toes pointed inferiorly. What name is given to this condition?

7. A 75-year-old woman and her 9-year-old granddaughter were in a train crash in which both sustained trauma to the chest. X-rays showed that the grandmother had several fractured ribs but her granddaughter had none. Explain these surprisingly different findings.

8. After having a severe cold accompanied by nasal congestion, Helen complained that she had a frontal headache and the right side of her face ached. What bony structures probably became infected by the bacteria or viruses causing the cold?

9. Snakes can swallow prey with diameters larger than that of the snake’s open mouth. What design modifications of the snake’s jaw might allow this maneuver?