I. GROSS ANATOMY OF BONE

A. Bone shapes (Fig. 6.2, p. 174 [180]) Using a box of disarticulated bones, be able to classify any bone as one of the following:


B. Gross anatomy of a long bone (Fig. 6.8) Observe the following on a labeled beef bone and on a longitudinally sectioned human femur. Be able to recognize the difference between an epiphyseal plate and an epiphyseal line; the difference is clinically of great importance.

1. Epiphysis
2. Diaphysis
3. Periosteum
4. Articular cartilage
5. Compact bone
6. Spongy (cancellous) bone
7. Red bone marrow
8. Medullary (marrow) cavity
9. Yellow bone marrow
10. Epiphyseal plate
11. Epiphyseal line

C. Nutrient foramina of bones (Fig. 7.6 p. 207 [210]) Blood vessels and nerves enter the bones through these small openings (singular is foramen). Use real human bones, including the skull, to find examples of them. Notice the supraorbital, infraorbital, and mental foramina of the skull. Can you find nutrient foramina on a human femur?
II. HISTOLOGY OF BONE

A. Cancellous (spongy) bone (Fig. 6.4)

1. Cancellous bone is essential to the weight-bearing function of bone, and the trabeculae grow in such a way as to support the weight of the body.

2. Compare the bodies of the vertebral bones of several different real vertebral columns. Some have obvious osteoporosis; some do not. The light weight and large spaces between the trabeculae of the spongy bone of the bodies of the vertebrae are indicative of osteoporosis.

B. Microscopic view of compact bone (Fig. 6.6) Use the text illustration only.

1. Osteon
2. Central canal
3. Concentric lamellae
4. Lacunae (in life these contain ________________________)
5. Canaliculi

III. STRUCTURAL AND FUNCTIONAL CLASSIFICATION OF JOINTS

A. Structural classification (Text pp. 249-251 [253-255] Give examples of each.

1. Fibrous joint (Joints bound by connective tissue)
   
   Example: ______________________________

   Example: ______________________________

2. Cartilaginous joint (Joints connected by cartilage) Use the skeleton for examples.

   Example: ______________________________

   Example: ______________________________

   Example: ______________________________
3. **Synovial joint** (Complex joints designed for free movement) Use the text illustration for the structures listed below (Fig. 8.7, p. 253 [257])

   Example: ___________________________

   Example: ___________________________

   **Joint cavity** (contains synovial fluid)

   **Articular cartilage**

   **Tendon**

   **Tendon sheath**

   **Synovial membrane**

   **Bursa** (the "pocket" or recessed area of the joint cavity)

   **Fibrous capsule**

   **Periosteum**

B. **Functional classification** of synovial joints (Fig. 8.8, 8.10, 8.12, pp. 257-259 [253-254]) Use the skeletons to give an example of each.

1. **Hinge**

   Example: ___________________________

2. **Ball-and-socket**

   Example: ___________________________

3. **Plane (gliding)**

   Example: ___________________________

C. The knee joint (Fig. 8.31b,d): Learn the following on a knee model. (Please do not attempt to flex the knee models, which are not nearly as sturdy as the real item!)

   **Femur**

   **Anterior cruciate ligament**

   **Tibia**

   **Posterior cruciate ligament**

   **Fibula**

   **Lateral collateral ligament**

   **Patella**

   **Medial collateral ligament**

   **Quadriceps**

   **Lateral meniscus**

   **femoris tendon**

   **Medial meniscus**

   **Patellar ligament**
D. A comparison of the male and female pelvises

1. Review of all coxal structures (Fig. 7.32, pp. 241-244). Use articulated and disarticulated coxal bones.

<table>
<thead>
<tr>
<th>Female</th>
<th>Male</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ilium</td>
<td>Pelvic inlet</td>
</tr>
<tr>
<td>Ischium</td>
<td>Iliac crest</td>
</tr>
<tr>
<td>Pubis</td>
<td>Ischial tuberosity</td>
</tr>
<tr>
<td>Symphysis pubis</td>
<td>Ischial spine</td>
</tr>
<tr>
<td>Acetabulum</td>
<td>Sacroiliac joint</td>
</tr>
<tr>
<td>Anterior superior iliac spine</td>
<td>Obturator foramen</td>
</tr>
<tr>
<td>Anterior inferior iliac spine</td>
<td>Subpubic angle</td>
</tr>
</tbody>
</table>

2. Features of the female pelvis compared to the male (Fig. 7.32, p.244; Table 7.11. Use the articulated female pelvises and compare to the articulated male pelvises. Determine the sex of each of the real and artificial skeletons in the lab.

<table>
<thead>
<tr>
<th>Female</th>
<th>Male</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oval shaped pelvic inlet</td>
<td>Heart shaped pelvic inlet</td>
</tr>
<tr>
<td>Wider, shorter ilium</td>
<td>Steeper, longer ilium</td>
</tr>
<tr>
<td>Subpubic angle &gt; 90°</td>
<td>Subpubic angle less than 90°</td>
</tr>
<tr>
<td>Ischial spines farther apart</td>
<td>Ischial spines closer together</td>
</tr>
<tr>
<td>Wider sacrum</td>
<td>Not as wide</td>
</tr>
<tr>
<td>Lighter in weight*</td>
<td>Heavier in weight*</td>
</tr>
</tbody>
</table>

*The lighter weight of the female pelvis is not obvious with the artificial bones, which are made of a heavy plastic.
Optional notes on the joints

1. The most common type of arthritis, *osteoarthritis*, results from wear and tear on the **articular cartilages** of joints such as the knees, hips, and others that bear weight.

2. *Rheumatoid arthritis* begins with damage to the **synovial membrane**, which is caused by “auto-antibodies” that attack the synovial membranes. The inflammation that results causes swelling and ultimately deformation of the affected joints.

3. A blow to the lateral side of the knee, as in a football tackle, can tear the **medial collateral ligament** and **medial meniscus**. A twisting injury to the knee, as when the feet are planted but the body is jolted around, can tear the **anterior cruciate ligament**. The **quadriceps femoris tendon** can also be torn. Ask your athletic friends who have had knee surgery what ligaments had to be repaired.

4. An X-ray can reveal whether a child is done growing in height. If an **epiphyseal plate** is seen at a joint, is the period of growth over?

5. A “Dexa Scan” is a standard x-ray procedure in which the bodies of the lumbar vertebrae and the **neck** of the left femur are visualized by a double beam of x-radiation and their density analyzed. This is used to identify **osteoporosis**.

6. A pulled muscle usually produces a sharp, knifelike pain where the origin of the muscle or its tendon is stretched or torn. Bursitis (inflammation of a **bursa**) usually produces a dull, aching pain.