Articulations and Body Movements

Fibrous, Cartilaginous, and Synovial Joints

1. Use key responses to identify the joint types described below.

Key: a. cartilaginous  b. fibrous  c. synovial

1. Typically allows a slight degree of movement
   A: cartilaginous

2. Includes joints between the vertebral bodies and the pubic symphysis
   A: cartilaginous

3. Essentially immovable joints
   B: fibrous

4. Sutures are the most remembered examples
   B: fibrous

5. Characterized by cartilage connecting the bony portions
   A: cartilaginous

6. All characterized by a fibrous articular capsule lined with a synovial membrane surrounding a joint cavity
   C: synovial

7. All are freely movable or diarthrotic
   C: synovial

8. Bone regions are united by fibrous connective tissue
   B: fibrous

9. Include the hip, knee, and elbow joints
   C: synovial

2. Describe the structure and function of the following structures or tissues in relation to a synovial joint and label the structures indicated by leader lines in the diagram.

   - **Ligament**: Dense fibrous connective tissue; attaches bones
     - Together; reinforces joints

   - **Tendon**: Dense fibrous connective tissue; reinforces the joint capsule as it spans a joint

   - **Articular Cartilage**: Hyaline cartilage; reduces friction where bones articulate

   - **Synovial Membrane**: Loose connective tissue; produces synovial fluid which decreases friction within the joint capsule

   - **Bursa**: Fluid-filled synovial sac which cushions the tendon where it crosses the bone

   ![Diagram of synovial joint with labeled structures]
3. Match the joint subcategories in column B with their descriptions in column A, and place an asterisk (*) beside all choices that are examples of synovial joints.

<table>
<thead>
<tr>
<th>Column A</th>
<th>Column B</th>
</tr>
</thead>
<tbody>
<tr>
<td>g: suture</td>
<td>1. joint between skull bones</td>
</tr>
<tr>
<td>e: pivot*</td>
<td>2. joint between the axis and atlas</td>
</tr>
<tr>
<td>a: ball and socket*</td>
<td>3. hip joint</td>
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<tr>
<td>c: gliding*</td>
<td>4. intervertebral joints (between articular processes)</td>
</tr>
<tr>
<td>b: condyloid*</td>
<td>5. joint between forearm bones and wrist</td>
</tr>
<tr>
<td>d: hinge*</td>
<td>6. elbow</td>
</tr>
<tr>
<td>d: hinge*</td>
<td>7. interphalangeal joints</td>
</tr>
<tr>
<td>c: gliding*</td>
<td>8. intercarpal joints</td>
</tr>
<tr>
<td>d: hinge*</td>
<td>9. joint between tarsus and tibia/fibula</td>
</tr>
<tr>
<td>b: condyloid*</td>
<td>10. joint between skull and vertebral column</td>
</tr>
<tr>
<td>d: hinge*</td>
<td>11. joint between jaw and skull</td>
</tr>
<tr>
<td>b: condyloid*</td>
<td>12. joints between proximal phalanges and metacarpal bones</td>
</tr>
<tr>
<td>i: synchondrosis</td>
<td>13. epiphyseal plate of a child’s long bone</td>
</tr>
<tr>
<td>a: ball and socket*</td>
<td>14. a multiaxial joint</td>
</tr>
<tr>
<td>b: condyloid*</td>
<td>15. biaxial joints</td>
</tr>
<tr>
<td>d: hinge*</td>
<td>16. uniaxial joints</td>
</tr>
<tr>
<td>d: hinge*</td>
<td></td>
</tr>
<tr>
<td>b: condyloid*</td>
<td></td>
</tr>
<tr>
<td>f: saddle*</td>
<td></td>
</tr>
<tr>
<td>e: pivot*</td>
<td></td>
</tr>
</tbody>
</table>

4. When considering movement,

What do all uniaxial joints have in common? *They allow movement in only one plane.*

What do all biaxial joints have in common? *They allow movement in two planes.*

What do all multiaxial joints have in common? *They allow all angular movement and rotation.*

5. What characteristics do all joints have in common? *All consist of bony regions separated by fibrous or cartilaginous connective tissue.*

**Selected Synovial Joints**

6. Which joint, the hip or the knee, is more stable? *Hip*

Name two important factors that contribute to the stability of the hip joint.

*Deep socket for femur* and *strongly reinforced articular capsule*
Name two important factors that contribute to the stability of the knee.

*The menisci* and *intracapsular cruciate ligaments*

7. The diagram shows a frontal section of the hip joint. Identify its major structural elements by using the key letters.

![Diagram of hip joint]

Key:

a. acetabular labrum  
b. articular capsule  
c. articular cartilage  
d. coxal bone  
e. head of femur  
f. ligamentum teres  
g. synovial cavity

8. Describe how the structure of the temporomandibular joint (TMJ) allows us to chew hard candy and hazel nuts.

*The superior compartment of the synovial cavity causes the mandible to glide forward, distributing forces to the stronger articular tubercle (to prevent breakage of the mandibular fossa).*

**Movements Allowed by Synovial Joints**

9. Label the *origin* and *insertion* points on the diagram below and complete the following statement:

During muscle contraction, the *insertion* moves toward the *origin*.

![Diagram of arm with muscle contraction]

10. Complete the statements below the stick diagrams by inserting the missing words in the answer blanks.

   1. *pronation*  
   2. *rotation*  
   3. *circumduction*  
   4. *flexion*  
   5. *flexion*  
   6. *abduction*  
   7. *adduction*  
   8. *hyperextension*  
   9. *dorsiflexion*  
   10. *extension*  
   11. *inversion*  

*(continues on next page)*
11. What structural joint changes are common to the elderly? Degenerative changes (adhesions and bone spurs) begin to “sprout up” in diarthrotic joints; intervertebral discs begin to degenerate. These changes lead to increased joint stiffness and pain.

12. Define:

*Sprain*  Ligaments reinforcing a joint are damaged by excessive stretching, or torn away from the bony attachment.

*Dislocation*  Bones are forced out of their normal positions in a joint cavity.