The Skeleton: The Types of Joints and movement

www.ocep.co.uk/wp-content/uploads/2013/06/Joints-Movement-Powerpoint.ppt
Let's put the bones into the four categories

<table>
<thead>
<tr>
<th>Long Bones</th>
<th>Short Bones</th>
<th>Flat Bones</th>
<th>Irregular Bones</th>
</tr>
</thead>
<tbody>
<tr>
<td>Femur</td>
<td>Tarsals</td>
<td>Patella</td>
<td>Atlas</td>
</tr>
<tr>
<td>Humerus</td>
<td>Carpals</td>
<td>Cranium</td>
<td>Axis</td>
</tr>
<tr>
<td>Tibia</td>
<td></td>
<td>Pelvis (Llium)</td>
<td>Cervical</td>
</tr>
<tr>
<td>Radius</td>
<td></td>
<td>Scapula</td>
<td>Thoracic</td>
</tr>
<tr>
<td>Ulna</td>
<td></td>
<td>Sternum</td>
<td>Lumbar</td>
</tr>
<tr>
<td>Fibula</td>
<td></td>
<td>Ribs</td>
<td>Sacrum</td>
</tr>
<tr>
<td>Phalanges</td>
<td></td>
<td></td>
<td>Coccyx</td>
</tr>
<tr>
<td>Meta Tarsals</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Meta Carpals</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Clavicle</td>
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</tbody>
</table>
Aims of the Lesson

• Within this lesson you will develop your knowledge and understanding of:
  – The three classifications of joints
  – The six types of synovial joints
  – The types of body movements
Types of Joints

• Immovable or fixed joints (Fibrous)
  • These joints are held together by tough tissue which develops during childhood.
  • Examples include: the Cranium, pelvis and vertebrae

• Slightly moveable joints (Cartilaginous)
  • Here, movement is needed but only to a certain point e.g the vertebral column
  • Individual vertebrae are separated by cartilage

• Freely moveable joints (Synovial)
  • These joints are also called synovial and allow movement to take place.
  • There are 6 types of freely moveable or synovial joints
Types of Synovial Joints

- Freely Moveable (Synovial) joints can be divided into six groups depending upon the way they move.

Key:
- Ball and Socket Joint
- Hinge Joint
- Pivot Joint
- Gliding Joint
- Saddle Joint
- Condyloid Joint
Of all the joints in the body, the BALL AND SOCKET JOINT allows the greatest range of movement.

In this type of joint, one end of the bone is shaped like a ball, and it fits into a hollow socket at the end of another joint.

Held together by ligaments and tendons.

Two main Ball and Socket Joints: Shoulder and hip joints.
Hinge Joints

- **HINGE JOINTS** allow extensive flexion and extension (Bending and straightening) with only a small amount of rotation.
- The joint is made by the joining of two bone ends which have smooth surfaces. They are shaped to move against each other with minimum friction.
- Strong ligaments stop the bones from sliding off from one side to the other.

Examples of Hinge Joints: Elbow and Knee Joints
Pivot Joint

- PIVOT JOINTS allow only rotation.
- The joint works by the end of one bone having a “peg” which fits into a “ring” formed by the other bone.
- There is a pivot joint at the top of the spinal column, between the axis and atlas bones of the neck. This allows us to turn, raise and lower our heads – this is crucial in controlling balance and maintaining awareness.
Gliding Joints

- GLIDING JOINTS allow flexion and extension through a slight gliding motion between the ends of small bones such as hands and feet.
- These small bones can move over one another to increase the flexibility of the hands and feet.
- Strong ligaments link them together and stop them moving too far.
Saddle Joints

- SADDLE JOINTS occur where concave and convex surfaces meet.
- The saddle joints allow the movement of the joint forward and backwards, and right to left.
- Examples of saddle joints include the fingers and thumbs.
Condyloid Joints

• Within the CONDYLOID JOINT the full convex shape of one bone end, fits into the full concave shape of an adjoining bone.

• This allows for movement in all directions, however full rotations.

• The main example of the Condyloid joint is the wrist.
Why are they called Synovial Joints?

They all have some thing called **Synovial Fluid** in them.

- This lubricates the joint, like oil in a working engine. It enables all parts of the joint to move against each other smoothly.

- This is inside the **synovial (joint) capsule** which holds the fluid in place.

- The **synovial membrane** lies inside the capsule where the fluid is produced.
Connective Tissues

• There are three types of connective tissues used within the joints.
  • Cartilage
    – Cartilage forms a cushion between bones in order to stop them rubbing
  • Ligaments
    – Ligaments are like very strong string that holds bones together
  • Tendons
    – Tendons attach muscles to bones (or to other muscles)
## What’s the difference?

<table>
<thead>
<tr>
<th>Cartilage</th>
<th>Tendons</th>
<th>Ligaments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tough</td>
<td>Attaches bone to muscle</td>
<td>Attaches bone to bone</td>
</tr>
<tr>
<td>Flexible</td>
<td>Sturdy</td>
<td>Elastic</td>
</tr>
<tr>
<td>At end of bone</td>
<td>Non elastic</td>
<td>Stabilise</td>
</tr>
<tr>
<td>Cushions</td>
<td>Size changes depending on muscle</td>
<td>Made of many fibres</td>
</tr>
<tr>
<td>Anchor</td>
<td>Strong</td>
<td></td>
</tr>
</tbody>
</table>
Types of Joint Movement

• There are six different kinds of movement the joints can allow

• These are:
  – Extension
  – Flexion
  – Abduction
  – Adduction
  – Circumduction
  – Rotation
**Extension:** straightening or extending a limb. (Opening a Joint)

**Flexion:** Bending or flexing a limb. (Closing a joint)

**Abduction:** Moving a limb away from the centre line of the body.
**Rotation**: This is a turning or rotational movement of a limb or body part.

**Circumduction**: The ability of a limb to be moved in circles.

**Adduction**: Moving a limb towards the centre line of the body.
Plantarflexion (or plantar flexion) is the movement which increases the approximate 90 degree angle between the front part of the foot and the shin, as when pressing down on a car pedal.

Dorsiflexion is the movement which decreases the angle between the dorsum (superior surface) of the foot and the leg, so that the toes are brought closer to the shin. The movement moving in opposite directions is called plantarflexion. Put more simply: it applies to the upward movement of the foot at the ankle joint.
**Pronation** – A rotation of the forearm that moves the palm from an anterior-facing position to a posterior-facing position, or palm facing down. This is not medial rotation as this must be performed when the arm is half flexed.

**Supination** – The opposite of pronation, the rotation of the forearm so that the palm faces anteriorly, or palm facing up. The hand is **supine** (facing anteriorly) in the anatomical position.
Hyperextension - Movement at a joint to a position beyond the joint's normal maximum extension
The knee (HINGE JOINT) is used when flexing (bending) and extending (straightening) the leg to kick a football.