

SNS COLLEGE OF PHYSIOTHERAPY

COIMBATORE-35

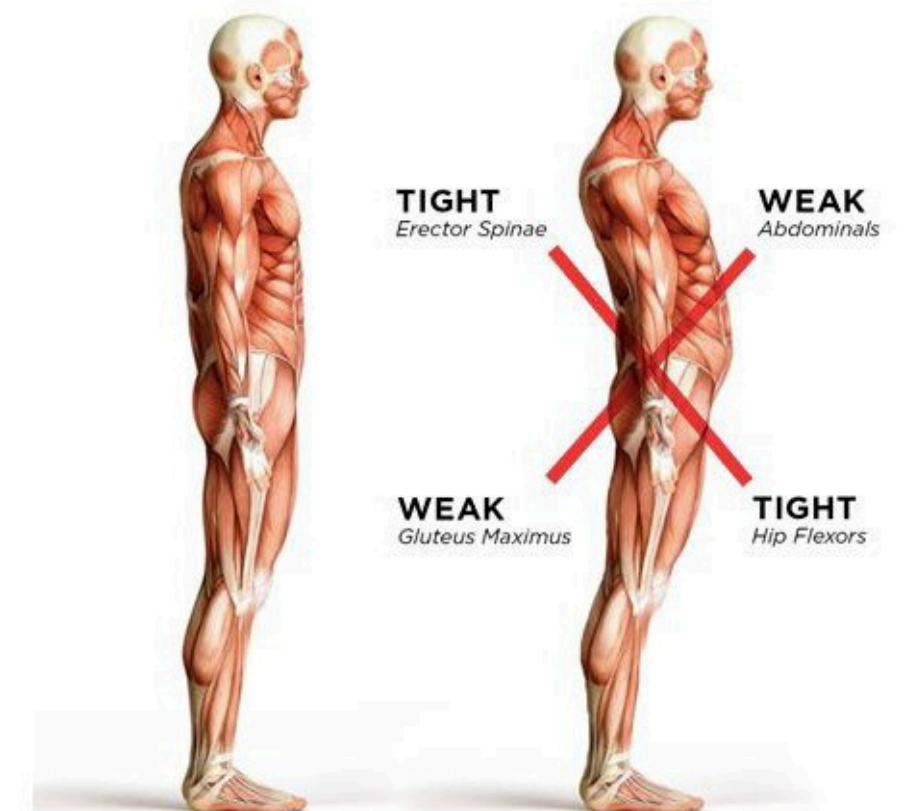
COURSE NAME:BIOMECHANICS

2nd year

TOPIC : POSTURE

Empathize

- Understand patient difficulties in standing or maintaining posture
- Identify areas of pain: lumbar spine, neck, knees, feet
- Explore daily activities causing strain (prolonged standing, carrying loads)
- Ask about habits: sedentary lifestyle, ergonomics, footwear
- Understand patient goals: pain relief, improved posture, functional mobility

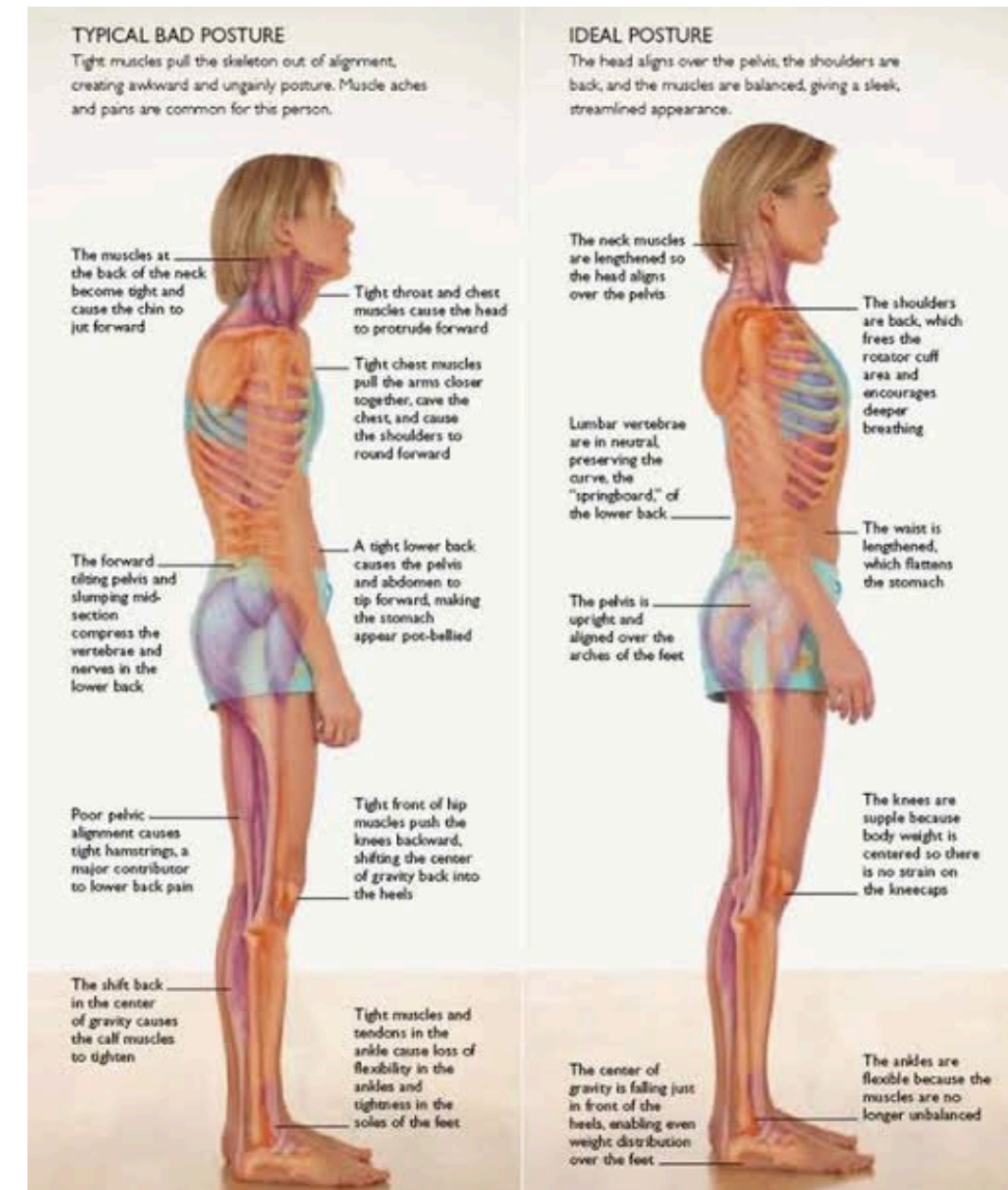


Ideate

- **Strengthen key postural muscles:**
- **Spinal extensors, abdominal muscles, gluteus medius, calf muscles**
- **Stretch tight structures affecting gravitational moments**
- **Introduce stability exercises for core and lower limb**
- **Improve ligament support by enhancing joint stability**
- **Recommend ergonomic modifications and balance training**

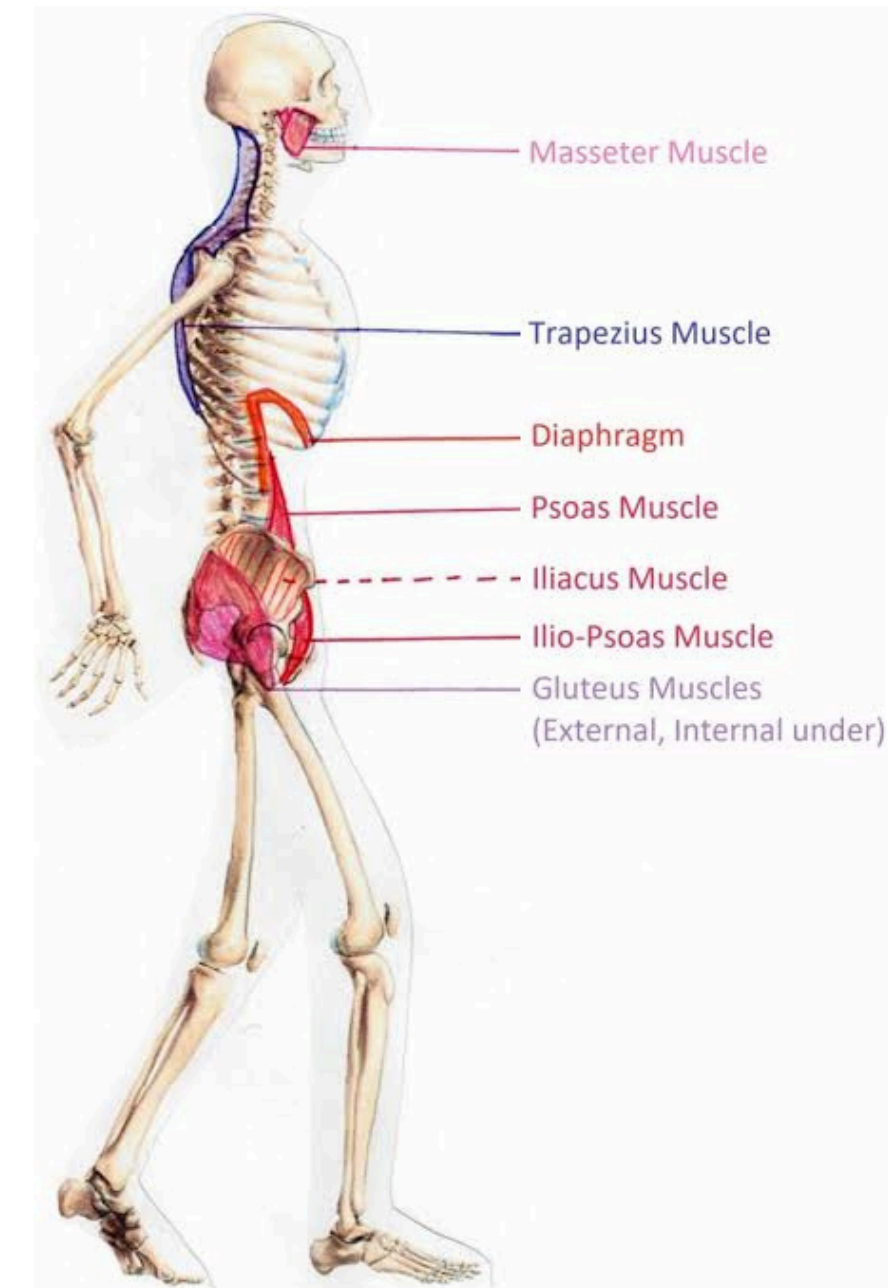
Define & Explain

- Muscles maintain posture by producing counteracting forces against gravity
- Ligaments support joints and prevent excessive movement
- Key concept: Gravitational Moments
- Gravity creates a moment arm at each joint
- Muscles/ligaments counterbalance to maintain upright alignment
- Example:
- Gravity causes forward head moment → neck extensors counteract
- Gravity causes trunk flexion → spinal extensors counteract



Muscles Maintaining Erect Posture

- **Neck:** cervical extensors prevent forward head fall
- **Trunk:** erector spinae prevent trunk flexion; abdominals provide stabilization
- **Hip:** gluteus medius prevents pelvic drop; iliopsoas stabilizes hip
- **Knee:** quadriceps prevent buckling; hamstrings stabilize knee
- **Ankle:** soleus & gastrocnemius prevent forward sway



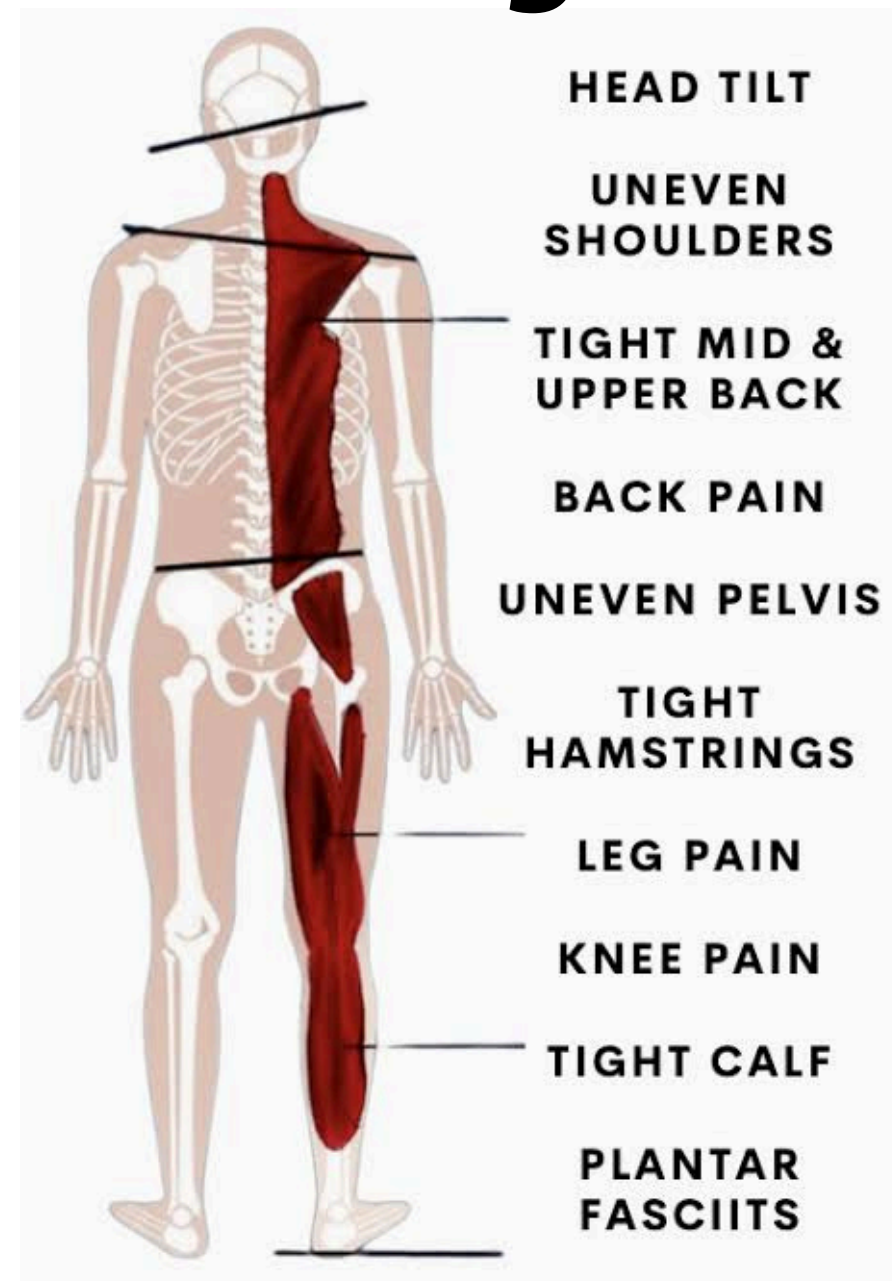
Ligaments Maintaining Erect Posture



- **Spinal ligaments**
- **Anterior & posterior longitudinal ligaments stabilize vertebrae**
- **Ligamentum flavum maintains upright spine tension**
- **Hip ligaments: iliofemoral ligament prevents posterior leaning**
- **Knee ligaments: ACL/PCL prevent anterior–posterior tibial shift**
- **Ankle ligaments: maintain stability during sway**
- **Ligaments act as passive restraints, reducing energy need for posture**

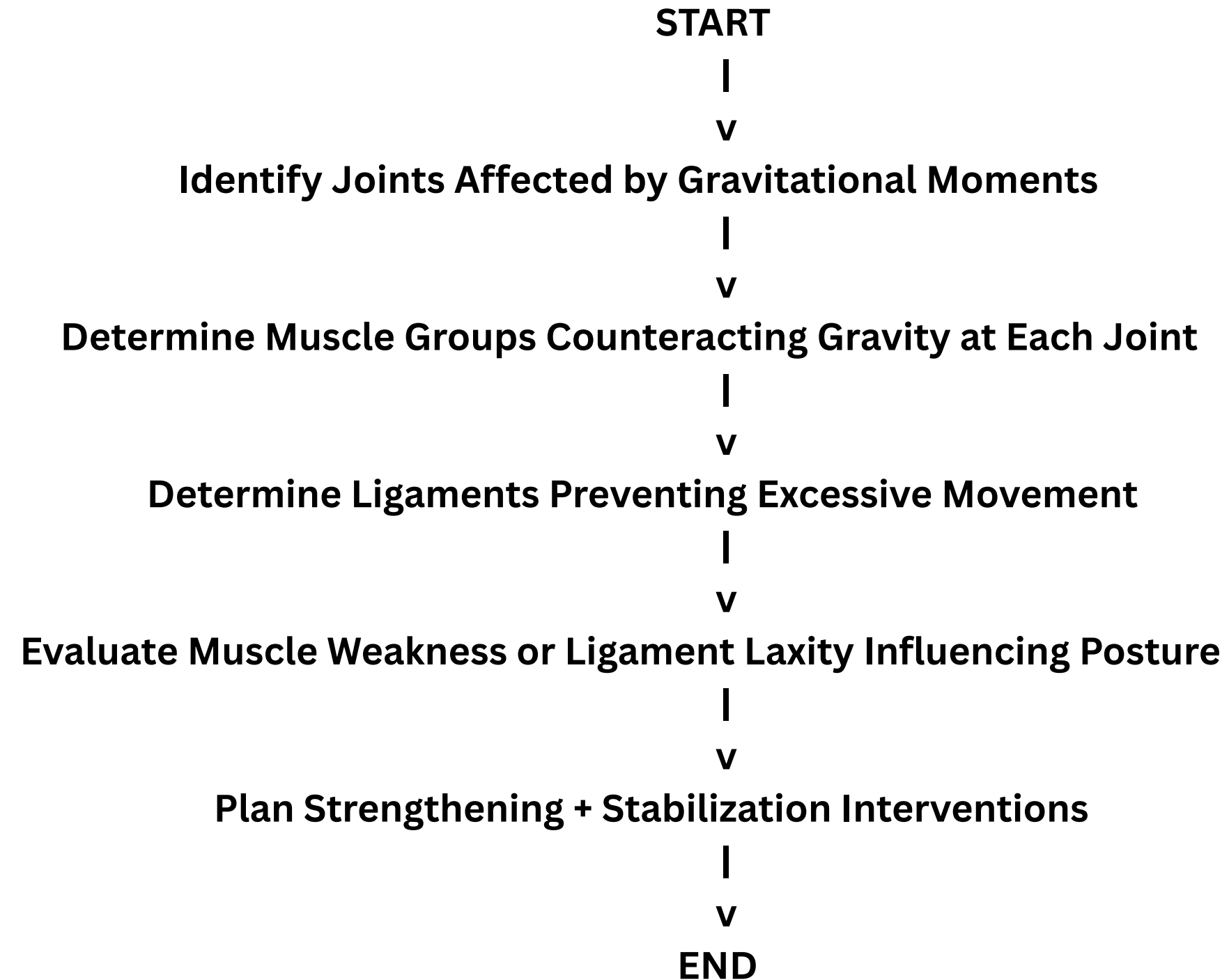
Gravitational Moments at

Major Joints



- Head: gravity pulls head forward → neck extensors resist
- Spine: gravity flexes spine → extensor muscles counteract
- Hip: gravity creates extension moment → hip flexors resist
- Knee: gravity creates hyperextension moment → posterior capsule & ligaments check
- Ankle: gravity pushes body forward → plantarflexors (soleus) resist

FLOWCHART



MCQS

1. Which muscle primarily prevents the trunk from flexing forward?

- A. Rectus abdominis
- B. Erector spinae ✓
- C. Gluteus maximus
- D. Sternocleidomastoid

2. The iliofemoral ligament mainly resists:

- A. Knee valgus
- B. Hip hyperextension ✓
- C. Ankle dorsiflexion
- D. Lumbar flexion

3. Gravitational moment at the ankle tends to cause:

- A. Backward sway
- B. Forward sway ✓
- C. Lateral sway
- D. No movement

MCQS

4. Which muscle counteracts forward head posture due to gravity?

- A. Scalenes
- B. Cervical extensors ✓
- C. Pectoralis major
- D. Biceps brachii

5. Which ligament helps maintain upright spinal alignment?

- A. Lateral collateral ligament
- B. Deltoid ligament
- C. Posterior longitudinal ligament ✓
- D. Ulnar collateral ligament

6. Gravity causes hyperextension at which joint in relaxed standing?

- A. Hip
- B. Knee ✓
- C. Shoulder
- D. Elbow