Intro to Kinesiology
Application Questions

- Identify the 3 main positions of the left hip.
  - FL, ER, and ADD
- What is the position of the left knee?
  - EXT
- What is the position of the right forearm?
  - Supination
- Identify the 2 main positions of the neck.
  - EXT, L Rot

Cardinal Plane: where all 3 planes meet, dividing body into equal parts
Center of Gravity (COG): point where the 3 cardinal planes intersect

Axis: point that run through the center of the joint around which a part rotates

Questions

1. Flexion occurs in the Sagittal plane around a Frontal axis.
2. Abduction/Adduction always occurs in the Frontal plane around a Sagittal axis.
3. Radial/Ulnar deviation occurs in the Frontal plane around a Sagittal axis.
4. When the anterior forearm moves toward the anterior surface of the humerus, What joint motion is involved?- Elbow Flexion. In what plane is the motion occurring?- Sagittal. Around what axis?- Coronal (Frontal).
5. When returning the fingers to anatomical position from the fully spread position, what joint motion is involved?- Finger Adduction. In what plane is the motion occurring?- Coronal (Frontal). Around what axis?- Sagittal.

Normal End Feel:
- Bony
- Soft Tissue Stretch
- Soft Tissue Approximation

Abnormal End Feel:
- Abnormal Bony
- Boggy
- Muscle Spasm
- Empty
- Springy

Close-packed: Maximum congruency, tight
  - i.e. Knee extension

Open-packed: Minimal congruency, loose

Closed-chain: Reversal of muscle action where the origin is pulled toward the insertion [O -> I]

Open-chain: Movement where the insertion is moving toward the origin [I -> O]
Muscles are attached to bones, cross at least one joint, when muscle contracts, one end of jt moves toward the other.

**Insertion:** more movable bone; moves toward the origin

**Origin:** more stable bone; typically closer to the trunk

**Tone:** slight tension that is present in a muscle at all times, even when muscle is resting. State of readiness allows the muscle to act more easily and quickly when needed

**Isometric Contraction:** joint angle does not change, muscle length does not change

**Concentric Contraction:** joint angle changes, muscle length **shortens**

**Eccentric Contraction:** joint angle changes, muscle length **lengthens**

**Agonist:** “prime mover”; a muscle or muscle groups that cause the motion

**Assisting mover:** assist in providing the desired motion

**Antagonist:** muscle that performs the **OPPOSITE** motion of the agonist; roles change depending upon the particular joint action

**Cocontraction:** when agonist and antagonist contract at the same time

**Stabilizer:** muscle or muscle group that supports, or makes firm, a part and allows the agonist to work more efficiently i.e. abdominals during push ups

**Neutralizer:** contracts to prevent the unwanted motion

**Synergist:** muscles that works with one or more other muscles to enhance a particular motion

**Force Couple:** occurs when 2+ forces act in different directions, resulting in a turning effect
Thenar: thumb side
  • Opponens Pollicis
  • ABDuctor Pollicis Brevis
  • Flexor Pollicis Brevis

Hypothenar: pinky side
  • Opponens Digitii Minimi
  • ABDuctor Digitii Minimi
  • Flexor Digitii Minimi

Hand: Muscles (Extrinsic)

Flexor Digitorum Superficialis:
  • Action: FLEX MCP and PIP fingers
  • Insertion: Middle phalanx

Flexor Digitorum Profundus:
  • Action: FLEX MCP, PIP, DIP fingers
  • Insertion: Distal phalanx

Flexor Pollicis Longus:
  • Action: FLEX CMC, MCP, IP of thumb
  • Insertion: Distal phalanx of thumb

ABDuctor Pollicis Longus:
  • Action: ABDuct thumb (CMC)
  • Insertion: Base of 1st MCP

Extensor Pollicis Brevis:
  • Action: EXTEND CMC and MCP of thumb
  • Insertion: Proximal phalanx of thumb

Extensor Pollicis Longus
  • Action: Extend CMC, MCP, IP of thumb
  • Insertion: Distal phalanx of thumb

Extensor Digitorum:
  • Insertion: Distal phalanx of 2nd-5th fingers

Extensor Indicis:
  • Insertion: Distal Phalanx of the 2nd finger

Extensor Digitii Minimi:
  • Insertion: Distal phalanx of the 5th finger
Wrist

Scaphoid, Lunate, Triquetrum, Pisiform-PROXIMAL ROW
Trapezium, Trapezoid, Capitate, Hamate-DISTAL ROW

Two Joints: Radiocarpal and Midcarpal Joint

Four Ligaments: Radial and Ulnar Collateral, Palmar and Dorsal Radiocarpal

Questions:

1. Considered a condyloid joint with distal end of radius being concave and proximal row of carpals being convex, this means the proximal row of carpals moves in a direction that is opposite to the hand.

2. A biaxial joint which allows for flexion, extension, and radial deviation and ulnar deviation; when all these motions are combined it is circumduction.

3. Name the bones of the wrist joint starting laterally on the proximal row.
   a. Scaphoid, Lunate Triquetrum, Pisiform
   b. Trapezium, Trapezoid, Capitate, Hamate

4. Which muscles attach on the medial epicondyle of the humerus? Lateral epicondyle?
   a. Wrist Flexors
   b. Wrist Extensors

5. Which muscles cross the wrist joint on the radial side? Ulnar side?
   a. Extensor Carpi Radialis Longus and Flexor Carpi Radialis
   b. Extensor Carpi Ulnaris and Flexor Carpi Ulnaris

6. Many function activities have the wrist join in a/an neutral or slightly extended position. What type of muscular contraction is required to maintain this position?
   a. Isometric

7. What wrist joint position and which muscle group is working isometrically to accomplish brushing hair on the opposite side?
   a. Neutral or slight flexion
   b. Flexors

8. Standing with your arms at your side, elbow flexed, forearm in a neutral position, hold on to a loop of elastic tubing that has the other end attached about your head to some stationary object. Bend your wrist down.
   a. What joint motion is occurring at the wrist?- Ulnar deviation
   b. What type of contraction is occurring?- Concentric
   c. What muscles are being strengthened?- Wrist ulnar deviators

9. What if the forearm was fully supinated?
   a. What joint motion is occurring at the wrist?- Extension
   b. What type of contraction is occurring?- Concentric
   c. What muscles are being strengthened?- Wrist extensors

Motions:

- Flexion (90): Flexor Carpi Ulnaris, Flexor Carpi Radialis
- Neutral
- Extension (70): Extensor Carpi Radialis Longus, Extensor Carpi Radialis Brevis, Extensor Carpi Ulnaris
- Ulnar Deviation (35): Flexor Carpi Ulnaris, Extensor Carpi Ulnaris
- Radial Deviation (25): Flexor Carpi Radialis, Extensor Carpi Radialis Longus

End Feel of wrist: Soft Tissue Stretch; EXCEPT for radial deviation
Elbow

Humerus, Ulna, Radius

Three Ligaments: Medial and Lateral Collateral, Annular

One Capsule

Uniaxial Hinge Joint

Questions:
1. Name the ligament that stabilizes the lateral side of the elbow.
   a. Lateral, or radial, collateral ligament
2. Name the ligament that stabilizes the medial side of the elbow.
   a. Medial, or ulnar, collateral ligament
3. Name the ligament that stabilizes the radius and allows it to rotate.
   a. Annular ligament
4. To which bone must a muscle attach to do forearm supination or pronation?
   a. Radius
5. Which muscles connect the scapula to the ulna?
   a. Long head of the triceps
6. A 46 year old patient is sitting in a chair that has armrest and his OTA asks him to place both hands on the armrests and perform a chair push up, lifting his buttocks off the seat.
   a. What joint motion is occurring in the right elbow?- Extension
   b. What type of contraction is occurring?- Concentric
   c. What muscles are being strengthened?- Triceps
   d. Is this an open-chain or closed-chain activity?- Closed

Application & Review Questions

What elbow and forearm joint motions are occurring from the starting position ('A') to the ending position ('B')?

- Elbow Flexion, Forearm Supination

Motions:
- Flexion (145): Brachialis, Biceps, Brachioradialis
- Extension (0): Triceps
- Pronation (80): Pronator Teres, Pronator Quadratus
- Supination (90): Biceps, Supinator

End Feel of Elbow Flexion: soft tissue approximation
End Feel of Elbow Extension: bony
End Feel of Forearm Supination: soft tissue stretch
End Feel of Forearm Pronation: bony
Shoulder Joint

Ball-and-socket joint, moves in all 3 planes around all 3 axes

Questions:
1. What landmarks can be used to determine if a model of an unattached bone is a left or right scapula? - Vertebral border, glenoid cavity
2. What are the SITS muscles, and why are they called “rotator cuff muscles”?  
   a. Supraspinatus, Infraspinatus, Teres Minor, Subscapularis; it holds the head of the humerus in toward the glenoid fossa as it moves within the socket
3. Which shoulder joint muscles do not attach to the scapula?  
   a. Anterior Deltoid, Pectoralis Major, Lats
4. What motions occur when placing a book on an upper shelf  
   a. Shoulder Joint motion? - Flexion  
   b. Shoulder Girdle motion? - Upward rotation and protraction
5. What motions occur when fastening your seatbelt with your left hand  
   a. Shoulder Joint motion? - ADDuction and medial rotation  
   b. Shoulder Girdle motion? - Downward rotation and protraction

Motions:
- Flexion: Anterior Deltoid, Pectoralis Major
- Extension: Posterior Deltoid, Lats, Teres Major
- Lateral Rotation: Posterior Deltoid, Infraspinatus, Teres Minor
- Medial Rotation: Anterior Deltoid, Lats, Teres Major, Subscapularis, Pectoralis Major
- Horizontal ABduction: Posterior Deltoid, Infraspinatus, Teres Minor
- Horizontal ADDuction: Anterior Deltoid, Lats, Teres Major, Pectoralis Major
- ABDuction: All Deltoids, Supraspinatus
- ADDuction: Pectoralis Major, Lats, Teres Major

Scaption: most functional activities occur in scapular plane
Rotator Cuff: Supraspinatus, Infraspinatus, Teres Minor, Subscapularis

End Feel of Shoulder: Soft tissue stretch
Shoulder Girdle

Joints: Sternoclavicular and Acromioclavicular

Questions:
1. What landmark is commonly used to determine the direction of the scapula is rotation? - Inferior angle of the scapula
2. What direction is the landmark moving if the scapula is rotating upwardly? - Laterally
3. What is the scapulohumeral rhythm? - the movement relationship between the shoulder girdle and shoulder joint. For every 2 degrees of shoulder flexion or abduction, shoulder girdle rotates upwardly 1 degree
4. Starting at the interior angle and going clockwise, name the shoulder girdle muscles that attach to the posterior surface of the right scapula.
   a. Rhomboids, Lower and Middle Traps, Levator Scapula, Upper Traps
5. Identify the shoulder girdle motions that occur with the following actions
   a. Closing a window by pulling down? - Downward rotation
   b. Opening a window by pulling up? - Upward rotation
   c. Combing your hair in the back? - Upward rotation and retraction

Motions:
- Elevation: Upper Traps, Levator Scapula, Rhomboids
- Depression: Lower Traps, Pectoralis Minor
- Upward Rotation: Upper and Lower Traps, Serratus Anterior
- Downward Rotation: Upper Traps, Levator Scapula, Rhomboids, Pectoralis Minor
- Scapular Retraction: Middle Traps, Rhomboids
- Scapular Protraction: Serratus Anterior, Pectoralis Minor

“Sway Back” “Flat Back”