Inclinometers and goniometers are devices used to measure range-of-motion. Range-of-motion can be measured from the neutral position to give a reading of flexion, extension, abduction, adduction, pronation, supination, dorsiflexion, plantarflexion, etc., or it can measure the entire range to yield a total range-of-motion of the joint.

The inclinometer is simple to use: place it near the joint to be measured; turn the dial until the scale reads zero; take the joint through its range; read the range-of-motion (in degrees) directly from the dial.

**Inclinometers and Goniometers**

### Neck
- **Flexion & Extension**
  - Put head in neutral position
  - Place goniometer on top of head, set zero
  - Flex or extend neck
  - Read result
  - Note: Be careful of the goniometer slipping on hair

### Lateral Movement
- **Flexion & Extension**
  - Put head in neutral position
  - Place goniometer on top of head, set zero
  - Flex or extend neck
  - Read result
  - Note: Be careful of the goniometer slipping on hair

### Rotation
- **Flexion & Extension**
  - Lay subject supine, with head in neutral position
  - Place goniometer on forehead, set zero
  - Rotate neck
  - Read result
  - Note: Ensure both shoulders are in contact with the bed

### Hip
- **Flexion & Extension**
  - Stand subject upright, preferably supported
  - Place goniometer on thigh, set zero
  - Flex or extend hip
  - Read result
  - Note: A different result will be obtained with the knee in flexion due to pelvic tilt and lumbar flexion

- **Abduction & Adduction**
  - Stand subject upright, feet apart (or lay them on their side)
  - Place goniometer on thigh, set zero
  - Abduct or adduct hip with the body stabilized
  - Read result

- **Rotation**
  - With the goniometer on its side, set true zero
  - Lay subject supine with knee in full extension. Neutral position is found by drawing a line from between the big and second toes to the center of the heel. Using the goniometer rotate hip until zero
  - Place goniometer on side of foot, set zero
  - Internally or externally rotate hip
  - Read result
  - Note: There is no rotation of the fully extended knee unless severe joint laxity is present

### Elbow
- **Flexion & Extension**
  - Put elbow and shoulder at neutral position at zero degrees of extension
  - Place goniometer on forearm, set zero
  - Flex elbow
  - Read result
  - Note: Stabilize shoulder and upper arm to prevent error

### Knee
- **Flexion & Extension**
  - Lay subject prone, knee over edge of the bed
  - Place goniometer on shin, set zero
  - Read result

- **Rotation**
  - Lay subject on side, knee at 90° flexion, rotationally neutral
  - Place goniometer on side of foot, set zero
  - Internally or externally rotate knee
  - Read result
  - Note: It is very difficult to determine neutral position, so more useful to quote total range of motion

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The inclinometer is simple to use: place it near the joint to be measured; turn the dial until the scale reads zero; take the joint through its range; read the range-of-motion (in degrees) directly from the dial.

**Inclinometers and Goniometers**

### Neck
- **Flexion & Extension**
  - Put head in neutral position
  - Place goniometer on top of head, set zero
  - Flex or extend neck
  - Read result
  - Note: Be careful of the goniometer slipping on hair

### Lateral Movement
- **Flexion & Extension**
  - Put head in neutral position
  - Place goniometer on top of head, set zero
  - Flex or extend neck
  - Read result
  - Note: Be careful of the goniometer slipping on hair

### Rotation
- **Flexion & Extension**
  - Lay subject supine, with head in neutral position
  - Place goniometer on forehead, set zero
  - Rotate neck
  - Read result
  - Note: Ensure both shoulders are in contact with the bed

### Hip
- **Flexion & Extension**
  - Stand subject upright, preferably supported
  - Place goniometer on thigh, set zero
  - Flex or extend hip
  - Read result
  - Note: A different result will be obtained with the knee in flexion due to pelvic tilt and lumbar flexion

- **Abduction & Adduction**
  - Stand subject upright, feet apart (or lay them on their side)
  - Place goniometer on thigh, set zero
  - Abduct or adduct hip with the body stabilized
  - Read result

- **Rotation**
  - With the goniometer on its side, set true zero
  - Lay subject supine with knee in full extension. Neutral position is found by drawing a line from between the big and second toes to the center of the heel. Using the goniometer rotate hip until zero
  - Place goniometer on side of foot, set zero
  - Internally or externally rotate hip
  - Read result
  - Note: There is no rotation of the fully extended knee unless severe joint laxity is present

### Elbow
- **Flexion & Extension**
  - Put elbow and shoulder at neutral position at zero degrees of extension
  - Place goniometer on forearm, set zero
  - Flex elbow
  - Read result
  - Note: Stabilize shoulder and upper arm to prevent error

### Knee
- **Flexion & Extension**
  - Lay subject prone, knee over edge of the bed
  - Place goniometer on shin, set zero
  - Read result

- **Rotation**
  - Lay subject on side, knee at 90° flexion, rotationally neutral
  - Place goniometer on side of foot, set zero
  - Internally or externally rotate knee
  - Read result
  - Note: It is very difficult to determine neutral position, so more useful to quote total range of motion
**SHOULDER**

- **FLEXION & EXTENSION**
  - Place goniometer on upper arm, set zero
  - Flex or extend shoulder
  - Read result
  
  **Note:** Do not allow the subject to twist

- **ABDUCTION & ADDUCTION**
  - Put shoulder into neutral position
  - Place goniometer on upper arm, set zero
  - Abduct or adduct shoulder
  - Read result
  
  **Note:** Do not allow the subject’s body to twist

- **ROTATION OF FLEXED SHOULDER**
  - Put shoulder at 90° flexion, elbow at 90° flexion, forearm and upper arm horizontal
  - Place goniometer on forearm, set zero
  - Internally or externally rotate shoulder
  - Read result from inner or outer dial
  
  **Note:** Keep subject’s arm horizontal

- **ROTATION OF ABDUCTED SHOULDER**
  - Put shoulder at 90° abduction, elbow at 90° flexion, forearm and upper arm horizontal
  - Place goniometer on forearm, set zero
  - Internally or externally rotate shoulder
  - Read result from inner or outer dial
  
  **Note:** Keep the subject’s arm horizontal

**SPINE**

- **FLEXION & EXTENSION**
  - Stand subject upright
  - Place goniometer on region of spine to be tested, set zero
  - Flex or extend the spine
  - Read result
  
  **Note:** If the subject is clothed, the goniometer may slip during flexion

- **PLOTTING CURVATURE**
  - With the goniometer on it s side, set true zero
  - Stand subject upright
  - Place the goniometer at different levels of the spine
  - Read result at each level and plot
  
  **Note:** Kyphotic and Lordotic curvatures are shown as positive or negative values

- **LATERAL MOVEMENT**
  - Stand subject upright
  - Place the goniometer at different levels of the spine
  - Read result
  
  **Note:** The higher the goniometer is placed the greater will be the measured compound angle

**ANKLE**

- **DORSIFLEXION & PLANTARFLEXION**
  - Lay subject supine, with foot over edge of bed
  - Place goniometer on the sole of foot, set zero
  - Plantarflex or dorsiflex the ankle
  - Read result
  
  **Note:** More accurate readings can be obtained when the subject wears flat shoes to reduce the curvature of the foot

**WRIST**

- **FLEXION & EXTENSION**
  - Put hand and forearm prone on table
  - Place goniometer behind MCP joints on back of hand, set zero
  - Move hand over edge of table, flex or extend wrist
  - Read result from inner or outer dial
  
  **Note:** Ensure forearm and elbow are always in contact with the table

- **ABDUCTION & ADDUCTION**
  - Place side of hand, forearm and elbow on table
  - Place goniometer on side of hand, set zero
  - Move hand over edge of table, abduct or adduct wrist
  - Read result
  
  **Note:** Ensure back of the hand is always in vertical plane. To eliminate abduction/adduction of MCP joints put fingers in full flexion

**MCP JOINT**

- **FLEXION & EXTENSION**
  - Put hand prone on table, finger over the edge
  - Place goniometer on finger, set zero
  - Flex or extend MCP
  - Read result
  
  **Note:** Maintain full extension of the PIP joint. For small fingers a wooden splint may be taped to the finger

- **ABDUCTION & ADDUCTION**
  - Put side of hand, forearm and elbow on table
  - Place goniometer on finger, set zero
  - Abduct or adduct MCP
  - Read result
  
  **Note:** Ensure the little finger, wrist and elbow are always in contact with the table