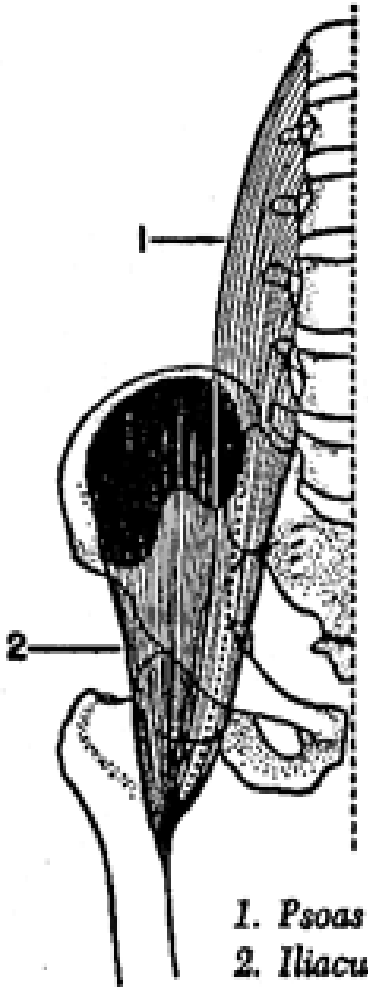
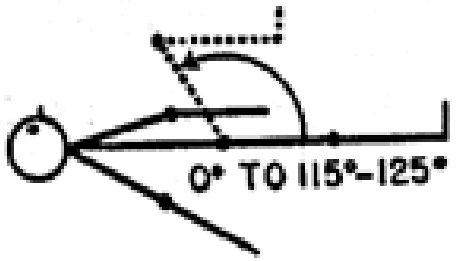
HIP FLEXION

Hip flexion



1. Psoas major
2. Iliacus

Range of Motion:



Fixation:

1. Contraction of anterior abdominal muscles to fix lumbar spine and pelvis
2. Weight of trunk

- Muscles Tested:
- **a. Psoas Major Muscle:**
- (1) Origin
- - Ventral surfaces of transverse processes of all lumbar vertebrae.
- - Sides of bodies and corresponding intervertebral discs of the last thoracic and all lumbar vertebrae and membranous arches which extend over the sides of the bodies of the lumbar vertebrae.
- (2) Insertion:
- Lesser trochanter of femur
- (3) Nerve Supply:
- L1, L2, L3, L4 Lumbar Plexus
- (4) Action:
- Flexion of the hip joint

- **b. Iliacus Muscle**
- (1) Origin
- - Superior 2/3 of iliac fossa.
- - Internal lip of iliac crest.
- - Iliolumbar and ventral sacroiliac ligaments.
- (2) Insertion: Lateral side of tendon of Psoas major, and just distal to the lesser trochanter.
- (3) Nerve Supply: L2, L3, L4 Femoral Nerve
- (4) Action: Flexion of the hip joint.

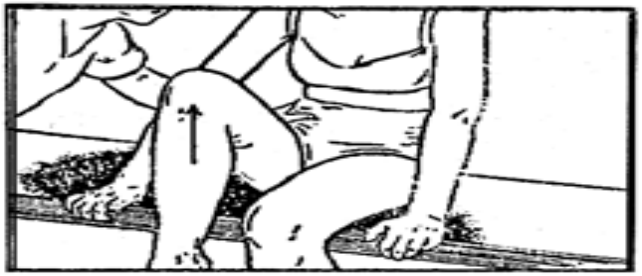
- **Accessory Muscles:**
- - Rectus femoris
- - Sartorius
- - Tensor fasciae 1atae
- - Pectineus

- Range of Motion:
- The hip flexion with the knee flexed will permit a range of motion of approximately 115° to 125°. The range of motion of the hip flexion can be limited by:
- - The contact of the thigh on the abdomen when the movement is performed with the knee in flexion.
- - The tension in the hamstring muscles when the movement is performed with the knee in extension.

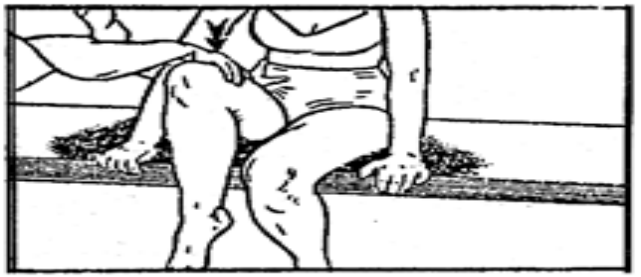
- ***Effects of weakness of the hip flexor muscles***
- Weakness in the hip flexor muscles decreases the ability to flex the hip joint and results in marked disability in:
- a. Stair climbing.
- b. Walking up or down the incline.
- c. Getting up from a reclined position.
- d. Bringing the trunk forward in the sitting position preliminary to rising from a chair.
-
- In marked weakness, walking is difficult because the leg must be brought forward by pelvic motion (produced by anterior or lateral abdominal muscle action) rather than by hip flexion.

- ***Main types of contracture of hip flexor muscles, and their effect on posture:***
- a. Bilateral hip flexion deformity will be combined with increased lumbar lordosis.
- b. Unilateral hip flexion contracture will be often combined with hip abduction and external rotation.

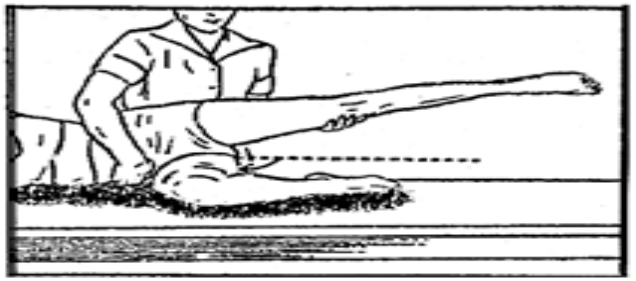
Grade " 3 "
Fair Strength →



Grade " 4 , 5 "
Good and Normal Strength →

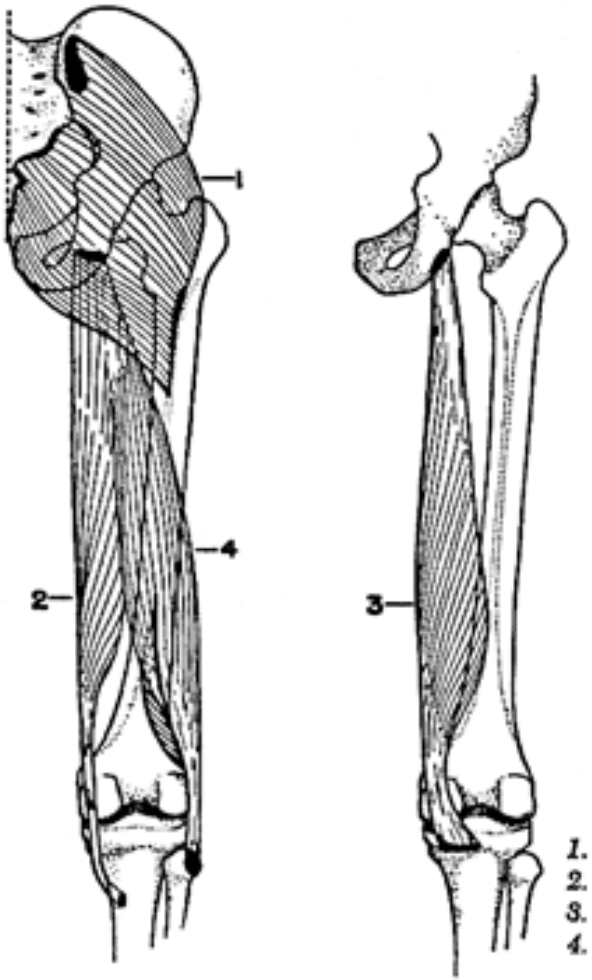


Grade " 2 "
Poor Strength →

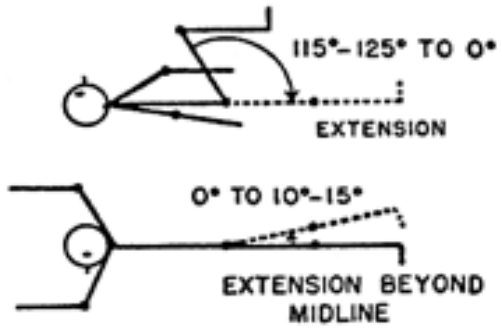


Grade " 1 , 0 "
Trace and Zero Strength →

HIP EXTENSION



Range of Motion:



Fixation:

1. Contraction of iliocostalis lumborum and quadratus lumborum muscles
2. Weight of trunk

1. *Gluteus maximus*
2. *Semitendinosus*
3. *Semimembranosus*
4. *Biceps femoris (long head)*

- Muscles Tested:
- **a. Gluteus Maximus**
- (1) Origin:
- - Posterior gluteal line of illium and portion of bone superior and posterior to it.
- - Posterior surface of lower part of sacrum.
- - Side of coccyx.
- - Aponeurosis of erector spinae.
- - Sacrotuberous ligament and gluteal aponeurosis
- (2) Insertion:
- - Larger proximal portion and superficial fibers of distal portion of muscle into tract of fasciae latae muscle.
- - Deeper fibers of distal portion into gluteal tuberosity of femur.
- (3) Nerve Supply:
- Inferior gluteal nerve: L5, S1, S2.
- (4) Action:
- - Extends and laterally rotates the hip joint.
- - Assists in adduction of the hip joint with the lower fibers.
- - Through its insertion into the iliotibial tract, helps to stabilize the knee in extension.

b. Semitendinosus

(1) Origin:

Tuberosity of ischium by tendon common with long head of Biceps femoris.

(2) Insertion:

- Proximal part of medial surface of body of tibia
- Deep fascia of the leg.

Semimembranosus

(1) Origin:

Tuberosity of ischium proximal and lateral to Biceps femoris and Semitendinosus.

(2) Insertion:

Posteromedial aspect of medial condyle of tibia

(3) Action:

- Extend the hip joint and assist in the hip medial rotation
- Flex and medially rotate the knee joint

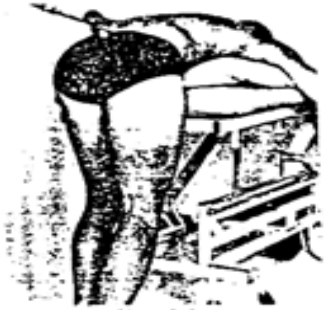
(4) Nerve Supply:

Sciatic Nerve: L4, L5, SI, S2.

- **c. Biceps Femoris:**
- (1) Origin of Long Head:
- - Distal part of sacrotuberous ligament.
- - Posterior part of tuberosity of ischium.
- (2) Insertion:
- - Lateral side of head of fibula
- - Lateral condyle of tibia
- - Deep fascia on lateral side of leg
- (3) Nerve Supply:
- - Long Head: Tibial branch of sciatic nerve: L5,Sl,S2,S3
- - Short Head: Peroneal branch of sciatic nerve: L5, SI, S2
- (4) Action:
- - The long head extends the hip joint and assist in the hip lateral rotation.
- - The long and short heads of Biceps femoris flex and laterally rotate the knee joint.

- Range of Motion:
- Beyond the mid line the normal extension of the hip is of 10° to 15°. The range of motion of the hip extension can be limited by:
- a. Tension in the iliofemoral ligament
- b. Tension in the hip flexor muscles
-

- ***Effects of weakness of the hip extensor muscles:***
- * Bilateral marked weakness of the Gluteus maximus muscle makes walking extremely difficult, and necessitates the aid of crutches.
- * The individual bears weight on the extremity in a position of postero-lateral displacement of the trunk over the femur (hyperextension of the hip joint).
- * Raising the trunk from a forward-bent position requires the action of the Gluteus Maximus, and in cases of weakness, patients must push themselves to an upright position by using their arms.



Starting Position

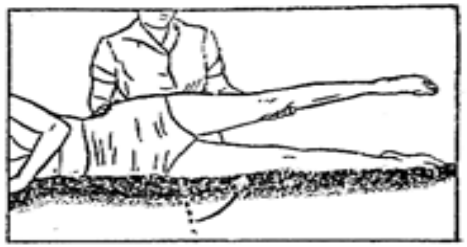
Grade " 3" : Screen Position

Grade " 4 and 5 " : Resistance

Alternate test: Starting Position

Grade " 3" Alternate screen position

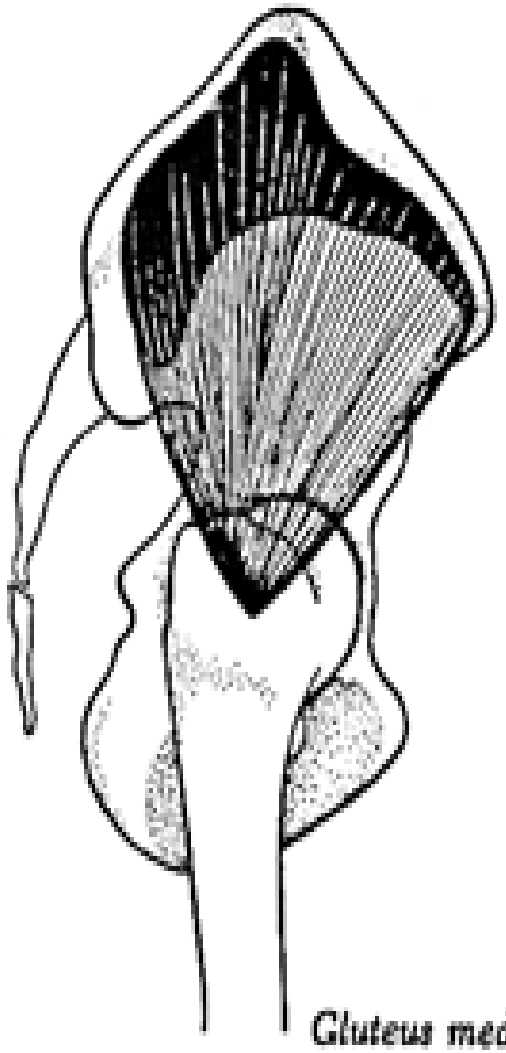
Grade " 4 & 5 " Resistance in alternate start position



Grade " 2 " (Poor)

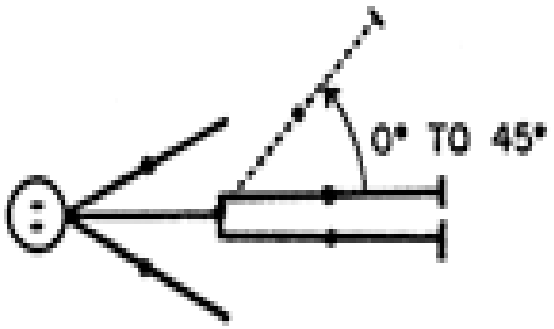
Grade " 1 , 0 " (Trace, Zero)

HIP ABDUCTION



Gluteus medius

Range of Motion:



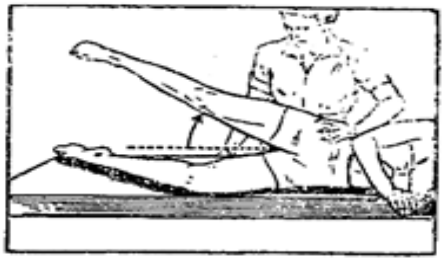
Fixation:

1. Contraction of lateral abdominal muscles and latissimus dorsi
2. Weight of trunk

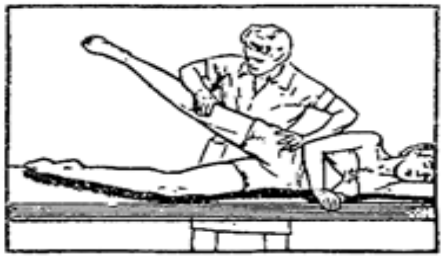
- Muscles Tested:
- **a. Gluteus Minimus**
- (1) Origin:
- - External surface of illium between anterior and inferior gluteal lines.
- - Margin of greater sciatic notch.
- (2) Insertion:
- - Anterior border of greater trochanter of femur.
- - Hip joint capsule.
- (3) Nerve Supply:
- Superior gluteal nerve: L4, L5, S1,
- (4) Action:
- - Abducts and medially rotates the hip joint.
- - May assist in the flexion of the hip joint.

- **b. Gluteus Medius:**
- (1) Origin:
- - External surface of illium between iliac crest and posterior gluteal line dorsally.
- - Anterior gluteal line ventrally.
- - Gluteal aponeurosis.
- (2) Insertion: Oblique ridge on lateral surface of greater trochanter of femur.
- (3) Nerve Supply: Superior gluteal nerve: L4, L5, SI.
- (4) Action
- - Abducts the hip joint.
- - The anterior fibers medially rotate and may assist in the flexion of the hip joint.
- - The posterior fibers laterally rotate and may assist in the extension of the hip joint.

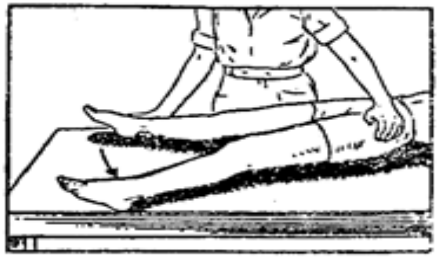
- **Accessory Muscles:**
- - Tensor Fasciae Latae
- - Gluteus Maximus (upper fibers)
-
- Range of Motion:
- From the mid line to full range of motion, the hip joint can abduct for 45°. This range of motion may be limited by:
- a. Tension of the distal band of iliofemoral ligament and of the pubocapsular ligament.
- b. Tension of the hip adductor muscles.
-



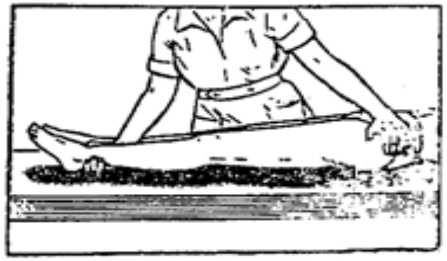
Grade " 3 " Fair Strength



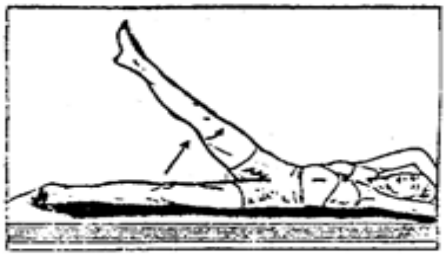
Grade " 4 , 5 "
Good and Normal Strength



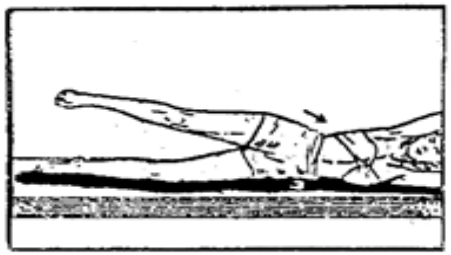
Grade " 2 " Poor Strength



Grade " 1 , 0 "
Trace and Zero Strength

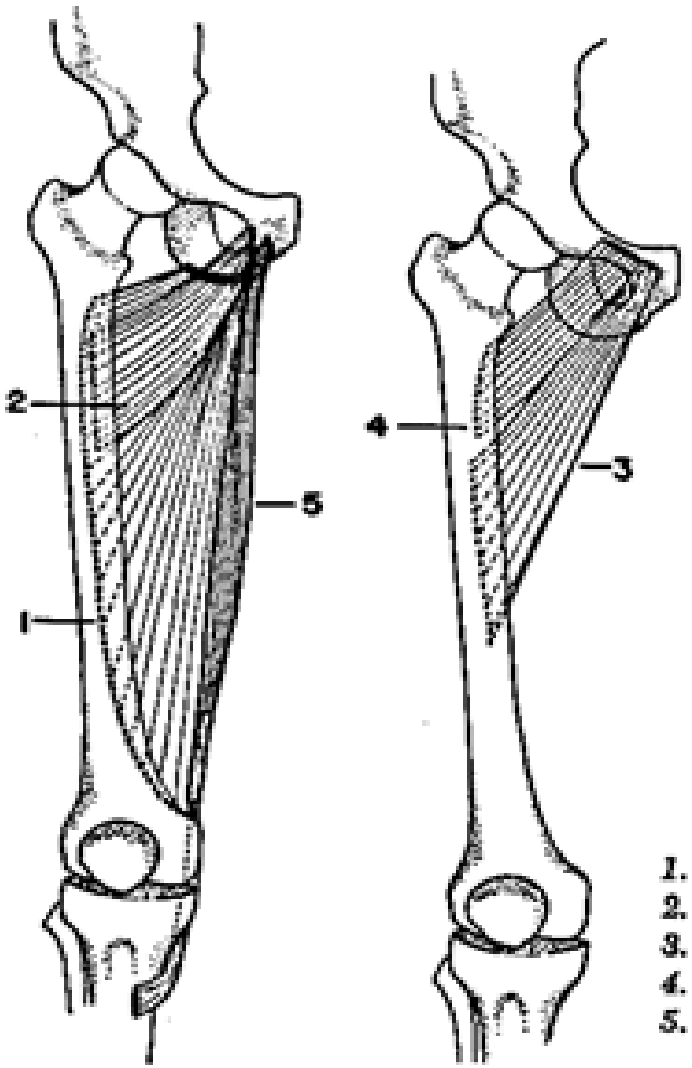


Substitution by hip lateral
rotators or flexors

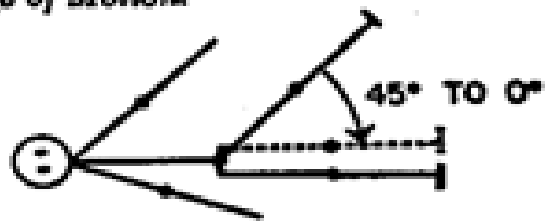


Substitution by pelvis

HIP ADDUCTION



Range of Motion:



Fixation:

1. Weight of trunk

1. *Adductor magnus*
2. *Adductor brevis*
3. *Adductor longus*
4. *Pectineus*
5. *Gracilis*

- Muscle Tested:
- **a. Pectineus**
- (1) Origin:
- Surface of superior ramus of pubis ventral to pectin between iliopectineal eminence and pubic tubercle.
- (2) Insertion:
- Pectineal line of femur
- (3) Nerve Supply: Femoral and Obturator Nerves: L2, L3, L4.

- **b. Adductor Magnus:**
- (1) Origin: Inferior pubic ramus, ramus of ischium, (anterior fibers) and ischial tuberosity (posterior fibers).
- (2) Insertion: Medial to gluteal tuberosity, middle of linea aspera, medial supracondylar line, and adductor tubercle of medial condyle, of femur.
- (3) Nerve Supply: Obturator and Sciatic Nerves: L2, L3, L4, L5, S1.

- **c. Gracilis:**
- (1) Origin:
- Inferior half of symphysis pubis and medial margin of inferior ramus of the pubic bone.
- (2) Insertion:
- Proximal part of medial surface of body of tibia distal to condyle.
- (3) Nerve Supply:
- Obturator Nerve: L2, L,3 ,L4.
-
- **d. Adductor Brevis:**
- (1) Origin:
- Outer surface of inferior ramus of pubis.
- (2) Insertion:
- Distal 2/3 of pectineal line, and proximal half of medial lip of linea aspera.
- (3) Nerve Supply:
- Obturator Nerve: L2, L3, L4.

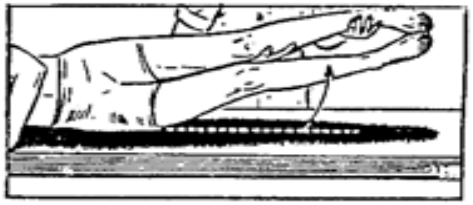
- **e. Adductor Longus:**
- (1) Origin:
- Anterior pubis at junction of crest and symphysis.
- (2) Insertion:
- Middle 1/3 of medial lip of linea asp era.
- (3) Nerve Supply:
- Obturator Nerve: L2, L3, L4.

- Range of Motion:
- From the hip abduction position to the mid line the range of motion is 45°. The range of motion of hip adduction may be limited by:
- a. Contact with the other leg
- b. When hip is flexed, tension of ischio-femoral ligament.

- ***Substitutions:***
- - Anterior tilting of the pelvis or flexion of the hip allows substitution by the hip flexors.
- - Forward rotation of the pelvis with extension of the hip shows attempt to hold with lower fibers of Gluteus maximus

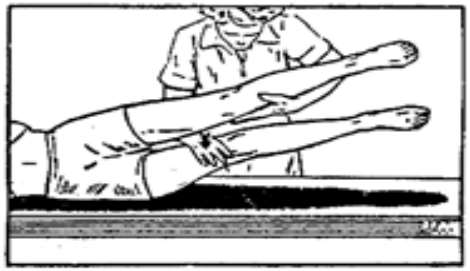
Grade " 3 "

Fair Strength ➔



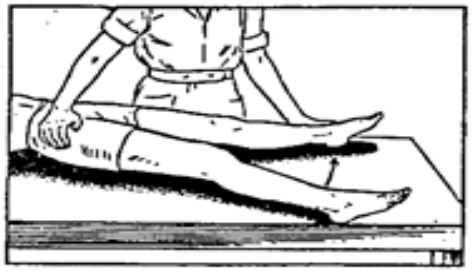
Grade " 4 , 5 "

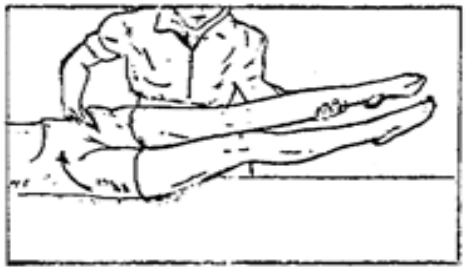
Good and Normal Strength ➔



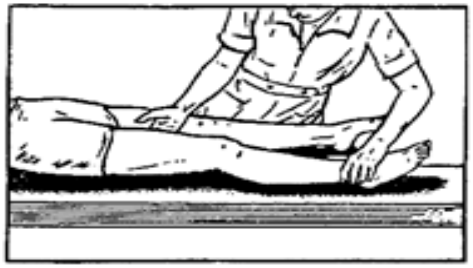
Grade " 2 "

Poor Strength ➔





Substitution by pelvis, hip flexors and leg medial rotators



Grade " 1 , 0 "

Trace and Zero Strength