

# Understanding Basic Rehabilitation Techniques



## Assessing Muscle Length Practical Workbook

Publication Date: 1st September 2023

This workbook is the result of a collaborative effort by the following Physiopedia Team Members:

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## Observational and Reflective Checklist <sup>1</sup>

Observation		Yes / No	Comments
<b>Introduction and Preparation for the Skill</b>	Was the treatment area properly prepared for the patient ? e.g. pillows, safe environment etc.		
	Did the therapist introduce themselves?		
	Was the patient comfortable		
	Was the patient adequately exposed or draped?		
	Was an explanation for the procedure given?		
	Was the explanation clear and succinct?		
	Was consent obtained?		
<b>Performing the Skill</b>	Was the Plinth set at the right height?		
	Was the therapist's posture compromised?		
	Did the therapist identify the joint and other relevant bony landmarks?		
	Was the Measurement Tool aligned correctly? e.g. goniometer, tape measure		
	Was the measurement reading accurate?		
	Did the therapist compare both sides of the body?		
<b>Safe and Effective Performance of Technique</b>	Was the procedure carried out with due care and attention?		
<b>How would you rate the proficiency in the overall performance of the skill?</b>	Excellent		
	Very Good		
	Good		
	Satisfactory		
	Borderline		
	Fail		

## Muscle Length Test for Hip Flexors

### Thomas Test (Iliacus, Psoas Major, Tensor Fascia Latae, Sartorius, Rectus Femoris)



Figure.1 Start Position Thomas Test



Figure.2 End Position Thomas Test

Measurement Information	
<b>Start Position</b>	Patient standing at the end of the plinth with their gluteal folds touching the edge of the plinth.
<b>Goniometer Placement</b>	<b>Fulcrum / Axis:</b> Greater Trochanter of Femur <b>Stationary Arm:</b> Parallel to Lateral Midline of Pelvis <b>Moving Arm:</b> Parallel to Longitudinal Axis of Femur directed towards the Lateral Epicondyle <sup>2</sup>
<b>Stabilisation</b>	Posterosuperior stabilisation to Anterior Superior Iliac Spine to minimise anterior pelvic tilt where hip flexors may appear to have appropriate length, giving a false negative.
<b>Test Motion</b>	Therapist places one hand behind the patient's knee and another behind their back before helping them to lay back on the table with their knee flexed.
<b>End Position</b>	Patient should keep non-test leg flexed to 90 degrees, and slowly lower leg to be tested as far as possible.
<b>Measurement</b>	This test has multiple outcomes depending on the end position. Goniometer can be used to measure hip and / or knee range of motion to give you an objective measure. <ol style="list-style-type: none"> <li><b>Posterior thigh does not touch table and knee flexes &gt;80°</b> - Indicates tightness in iliopsoas, pectineus, adductor longus, brevis and magnus.</li> <li><b>Posterior thigh does not touch table and knee extends</b> - Indicates tightness in psoas major, iliacus, rectus femoris, tensor fasciae latae, sartorius, pectineus, and adductor longus, brevis, magnus.</li> <li><b>Posterior thigh touches table and knee extends</b> - Indicates tightness in rectus femoris, tensor fasciae latae, and sartorius.</li> <li><b>Thigh abducts as hip extends</b> - Indicates tightness in tensor fasciae latae (TFL) / Iliotibial band (ITB).</li> <li><b>Any combination of three of the following movements; Abduction, flexion, external rotation of hip and flexion of knee</b> - Indicate tightness in sartorius. <sup>2</sup></li> </ol>
<b>End Feel</b>	Firm End Feel due to muscle tension or muscle shortening <ul style="list-style-type: none"> <li>Knee Flexed at end Hip Extension - Tension due to Rectus Femoris</li> <li>Knee Extended at end Hip Extension - Tension due to Anterior Joint Capsule, Iliopsoas, Iliofemoral and Ischiofemoral Ligament</li> <li>Tension due to shortening of sartorius, pectinievus, adductors (longus,magnus,brevis) or TFL/ITB</li> </ul>

Practice Results			
	Measurement 1:	Measurement 2:	Measurement 3:
Right			
Left			

## Muscle Length Test for Hip Flexor Ely Test (Rectus Femoris)

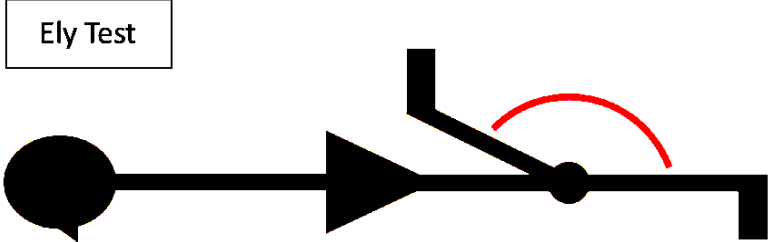


Figure.1 Start Position Ely Test



Figure.2 End Position Ely Test

### Measurement Information

<b>Start Position</b>	The patient is positioned in supine with the hip in neutral and the knee in extension
<b>Goniometer Placement</b>	<b>Fulcrum / Axis:</b> Over Lateral Epicondyle of Femur <b>Stationary Arm:</b> Parallel to Longitudinal Axis Femur directed towards the Greater Trochanter <b>Moving Arm:</b> Parallel to Longitudinal Axis of Fibula directed towards the Lateral Malleolus <sup>2</sup>
<b>Stabilisation</b>	Stabilise the hip and pelvis to maintain the hip in neutral and minimise hip flexion
<b>Test Motion</b>	Place one hand under the anterior ankle and flex the knee by lifting the leg off the plinth
<b>Compensatory Movement</b>	Anterior pelvic tilt and flexion of the hip to place the rectus femoris on slack
<b>End Position</b>	Knee is flexed bringing the heel towards the buttock until resistance is felt from tension in the anterior thigh at the point where further knee flexion causes the hip to flex.
<b>Measurement</b>	<p>A goniometer is used to measure and record available knee flexion.</p> <ul style="list-style-type: none"> <li>• If the knee can be flexed to at least 90° with hip in neutral then length of rectus femoris is normal.</li> <li>• Positive test can indicate tightness in rectus femoris, or can also indicate femoral nerve irritation due to lumbo-sacral or hip lesion.</li> </ul> <div style="text-align: center;">  <p>Ely Test <span style="float: right;">3</span></p> </div>
<b>End Feel</b>	<ul style="list-style-type: none"> <li>• Firm End Feel due to tension in rectus femoris</li> </ul>

### Practice Results

	Measurement 1:	Measurement 2:	Measurement 3:
Right			
Left			

## Muscle Length Test for Hamstrings

### 90/90 Test / Popliteal Angle (Semitendinosus, Semimembranosus, Biceps Femoris)

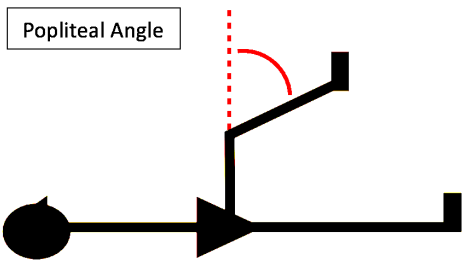


Figure.1 Start Position 90/90 Test



Figure.2 End Position 90/90 Test

#### Measurement Information

<b>Start Position</b>	Patient is supine with hip and knee both in 90° flexion and contralateral limb lying passively on the plinth
<b>Goniometer Placement</b>	<b>Fulcrum / Axis:</b> Lateral Aspect of Knee Joint <b>Stationary Arm:</b> Aligned with Femur towards Greater Trochanter <b>Moving Arm:</b> Aligned with Fibula directed towards the Lateral Malleolus <sup>2</sup>
<b>Stabilisation</b>	Stabilise the femur to minimise hip rotation, adduction, and abduction. It can be difficult to stabilise both pelvis and knee when performing the 90/90 test. However, the therapist must ensure that excessive anterior or posterior pelvic tilt is minimised through a precise start position, adequate stabilisation, and observation of pelvic motion while maintaining hip in 90° flexion.
<b>Test Motion</b>	Place one hand behind the achilles and slowly extend the knee as far as possible while maintaining hip in 90° flexion.
<b>End Position</b>	Maintain hip in 90° flexion while knee is extended to the limit of motion so that the biceps femoris, semitendinosus, and semimembranosus are put on full stretch. Ankle should be relaxed in plantarflexion throughout the test.
<b>End Feel</b>	Firm end feel due to tension in biceps femoris, semitendinosus, and semimembranosus
<b>Measurement</b>	<p>A goniometer is used to measure and record available knee extension to give us the popliteal angle. The measurement should be taken between the shank and vertical, such that if the leg extends so the knee is straight in full extension the angle is 0°.</p> <p>Alternative measurement is to use a measuring tape to measure the distance from the heel to the bed.</p> <div style="text-align: right;">  <p>Popliteal Angle <span style="float: right;">3</span></p> </div>

#### Practice Results

	Measurement 1:	Measurement 2:	Measurement 3:
Right			
Left			

## Muscle Length Test for Calf

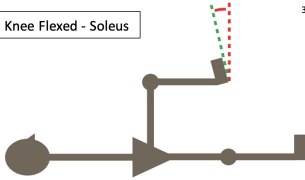
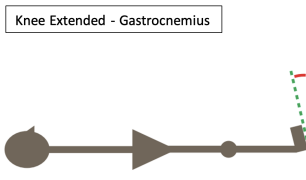
### Silfverskiold Test (Soleus and Gastrocnemius)



**Figure.1** Start Position Silfverskiold

**Figure.2** Mid Position

**Figure.2** End Position- Gastrocnemius

Measurement Information	
<b>Start Position</b>	<p><b>Soleus:</b> Patient is supine with hip and knee flexed to 90°, stabilise the subtalar joint by holding the calcaneus in neutral, supinate the forefoot to prevent movement of the intertarsal joints</p> <p><b>Gastrocnemius:</b> Patient is supine as you extend the Hip and knee to neutral while stabilising the subtalar joint by holding calcaneus in neutral, supinate the forefoot to prevent movement of the intertarsal joints</p>
<b>Goniometer Placement</b>	<p><b>Fulcrum / Axis:</b> Lateral Malleolus of Fibula</p> <p><b>Stationary Arm:</b> Parallel to Longitudinal Axis of Fibula in line with head of Fibula</p> <p><b>Moving Arm:</b> Parallel to Longitudinal Axis of 5th Metatarsal <sup>2</sup></p>
<b>Stabilisation</b>	<p><b>Soleus:</b> Stabilise tibia and fibula to minimise rotation of the hip and maintain the knee in flexion.</p> <p><b>Gastrocnemius:</b> Stabilise tibia and fibula to minimise hip rotation and maintain the knee in full extension.</p>
<b>Test Motion</b>	Initially test soleus length with the knee in flexion. Use one hand to move the foot into dorsiflexion by pushing on the bottom of the foot, avoiding pressure on the lateral border of the foot. Then extend the hip and knee and remeasure dorsiflexion with the knee fully extended to measure gastrocnemius.
<b>End Position</b>	<p><b>Soleus:</b> With knee in 90° flexion dorsiflex the ankle towards the vertical to the limit of motion.</p> <p><b>Gastrocnemius:</b> With knee in full extension, maintain ankle in dorsiflexion to the limit of motion.</p>
<b>End Feel</b>	<p><b>Soleus:</b> Firm end feel due to tension in soleus muscle.</p> <p><b>Gastrocnemius:</b> Firm end feel due to tension in gastrocnemius muscle.</p>
<b>Measurement</b>	<p>A goniometer is used to measure dorsiflexion with a flexed knee for soleus length followed by extended knee for gastrocnemius length. A 90° angle at the ankle is recorded as 0° dorsiflexion. If unable to achieve 0° record as either -5° Dorsiflexion or 5° Plantarflexion..</p> <div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;"> <p>Knee Flexed - Soleus</p>  </div> <div style="text-align: center;"> <p>Knee Extended - Gastrocnemius</p>  </div> </div>

Practice Results						
	Measurement 1:		Measurement 2:		Measurement 3:	
	Soleus	Gastroc	Soleus	Gastroc	Soleus	Gastroc
Right						
Left						

## References

1. Fox JE, Day RJ. A Physiotherapist's Guide to Clinical Measurement. Elsevier Health Sciences; 2009 Mar 27.
2. Norkin CC, White DJ. Measurement of Joint Motion: A Guide to Goniometry. FA Davis; 2016 Nov 18.
3. Scotland NHS. Cerebral Palsy Integrated Pathway Scotland (CPIPS) - Origins and Development Core Dataset Clinical Assessment. (2017).