

## OrthoInfo Basics

# About Your Knee

**Your knee is the largest joint in your body and one of the most complex. It is also vital to movement.**

Because you use it so much, it is vulnerable to injury. Because it is made up of so many parts, many different things can go wrong.

Knee pain or injury is one of the most common reasons people see their doctors. Most knee problems can be prevented or treated with simple measures, such as exercise or training programs. Other problems require surgery to correct.

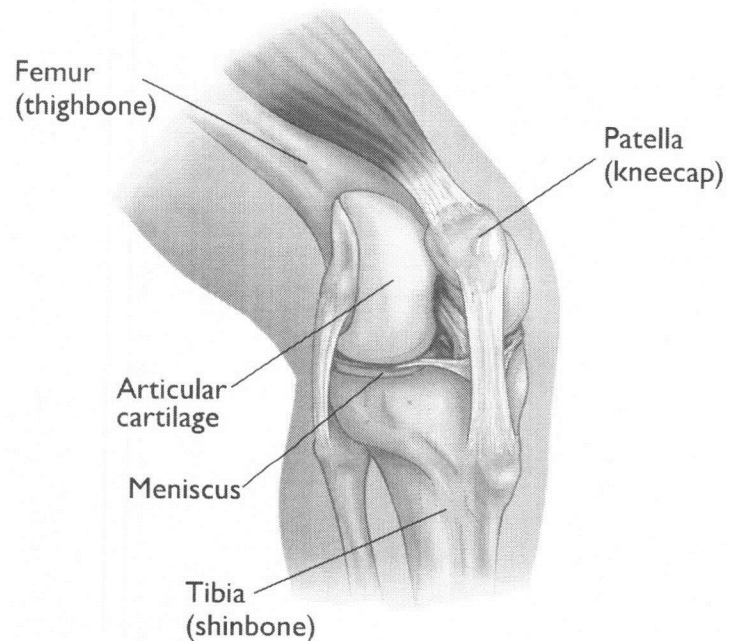
### What are the parts of the knee?

Your knee is made up of four main things: bones, cartilage, ligaments, and tendons.

**Bones.** Three bones meet to form your knee joint: your thighbone (femur), shinbone (tibia), and kneecap (patella). Your patella sits in front of the joint and provides some protection.

**Articular cartilage.** The ends of your thighbone and shinbone are covered with *articular cartilage*. This slippery substance helps your knee bones glide smoothly across each other as you bend or straighten your leg.

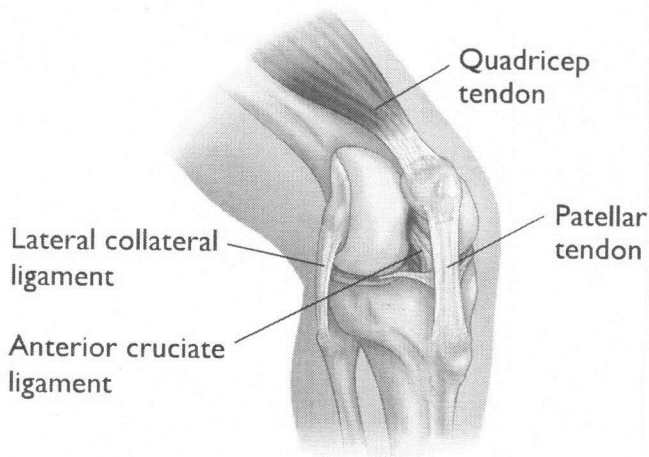
**Meniscus.** Two wedge-shaped pieces of *meniscal cartilage* act as “shock absorbers” between your thighbone and shinbone. Different from articular cartilage, the meniscus is tough and rubbery to help cushion and stabilize the joint. When people talk about torn cartilage in the knee, they are usually referring to torn meniscus.



### What are ligaments and tendons?

Ligaments and tendons connect your thighbone to the bones in your lower leg.

**Ligaments.** Bones are connected to other bones by ligaments. The four ligaments in your knee act like strong ropes to hold the bones together and keep your knee stable.



**Collateral ligaments.** These are found on the sides of your knee. The medial collateral ligament is on the inside and the lateral collateral ligament on the outside. They control the sideways motion of your knee and brace it against unusual movement.

**Cruciate ligaments.** These are found inside your knee joint. They cross each other to form an "X" with the anterior cruciate ligament in front and the posterior cruciate ligament in back. The cruciate ligaments control the back and forth motion of your knee.

**Tendons.** Muscles are connected to bones by tendons. The quadriceps tendon connects the muscles in the front of your thigh to your kneecap. Stretching from your kneecap to your shinbone is the patellar tendon.

### What are the symptoms of a knee problem?

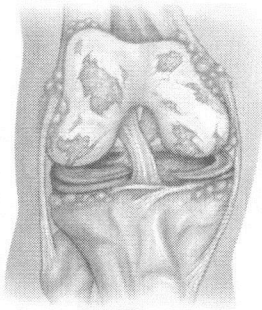
Pain and swelling are the most common signs of a knee injury. Your knee may catch or lock up.

Many ligament injuries also cause instability – the feeling that your knee is giving way.



### What are some common knee problems?

The knee is made up of many important structures, any of which can be injured. Some of the more common knee problems are described below.

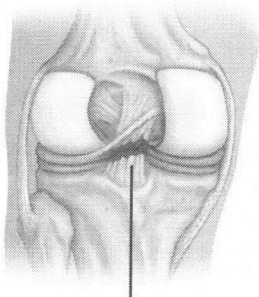
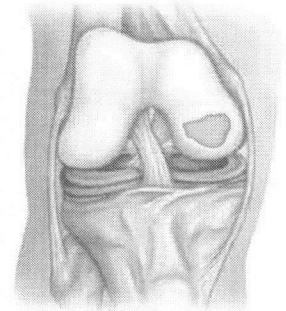


#### Articular Cartilage-Osteoarthritis

Aging or injury can cause a gradual wearing away of the articular cartilage lining our joints. This is called osteoarthritis and most often causes pain and stiffness in the knee.

#### Articular Cartilage-Chondral Defect

The joint surface can sometimes be damaged in a single, or focal, location. The rest of the joint may still be healthy.



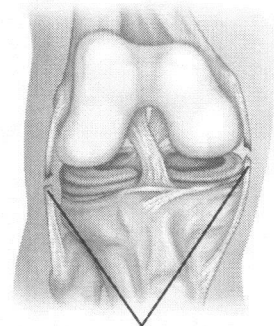
Ligament tear

#### Posterior Cruciate Ligament (PCL)

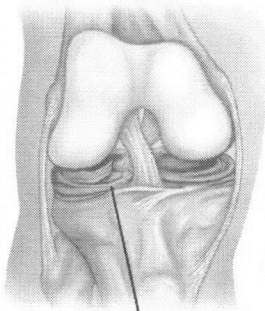
The PCL is often injured with a blow to the front of the knee while the knee is bent. This often occurs in sports and motor vehicle crashes. (Tear shown from back view of knee)

#### Collateral Ligaments

Medial collateral ligament tears often occur as a result of a direct blow or twisting injury. Lateral collateral ligament tears occur less frequently than other knee injuries. They are typically caused by a blow to the inside of the knee.



Ligament tears



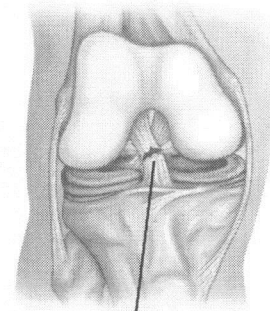
Meniscus tear

#### Menisci

Meniscal tears can occur when twisting, cutting, pivoting or squatting. They may also occur as a result of arthritis or aging.

#### Anterior Cruciate Ligament (ACL)

A quick cutting maneuver or landing from a jump incorrectly can tear your ACL. A sudden “pop” is sometimes heard at the time of injury.



Torn ligament

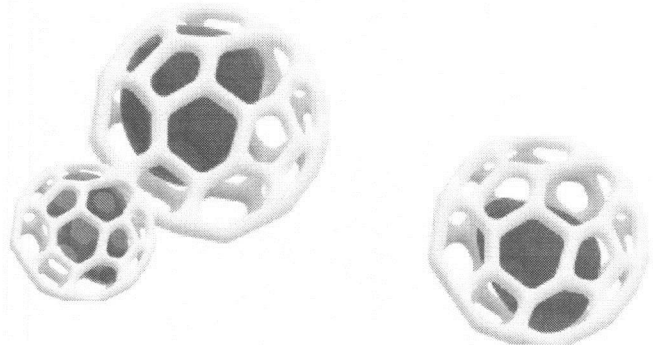
### For more information

---

For more information about your knee and common knee problems, visit *OrthoInfo* at [www.orthoinfo.org](http://www.orthoinfo.org).

*OrthoInfo* is the patient education website of the American Academy of Orthopaedic Surgeons (AAOS), and is a trusted source of information about musculoskeletal conditions. Our articles are developed by orthopaedic surgeons, and provide detailed information about a wide range of injuries and diseases, as well as treatment options and prevention topics.

AAOS does not endorse any treatments, procedures, products, or physicians referenced in this handout. This information is provided as an educational service and is not intended to serve as medical advice. Anyone seeking specific orthopaedic advice or assistance should consult his or her orthopaedic surgeon.



Weiss Orthopedics  
150 N. Robertson Blvd. Suite 360  
Beverly Hills, Ca 90211  
(310) 652-1800  
[www.weissorthopedics.com](http://www.weissorthopedics.com)



## **Knee Conditioning Program**

### ***Purpose of Program***

---

After an injury or surgery, an exercise conditioning program will help you return to daily activities and enjoy a more active, healthy lifestyle. Following a well-structured conditioning program will also help you return to sports and other recreational activities.

This is a general conditioning program that provides a wide range of exercises. To ensure that the program is safe and effective for you, it should be performed under your doctor's supervision. Talk to your doctor or physical therapist about which exercises will best help you meet your rehabilitation goals.

**Strength:** Strengthening the muscles that support your knee will reduce stress on your knee joint. Strong muscles help your knee joint absorb shock.

**Flexibility:** Stretching the muscles that you strengthen is important for restoring range of motion and preventing injury. Gently stretching after strengthening exercises can help reduce muscle soreness and keep your muscles long and flexible.

**Target Muscles:** The muscle groups targeted in this conditioning program include:

- Quadriceps (front of the thigh)
- Hamstrings (back of the thigh)
- Abductors (outer thigh)
- Adductors (inner thigh)
- Gluteus medius and gluteus maximus (buttocks)

**Length of program:** This knee conditioning program should be continued for 4 to 6 weeks, unless otherwise specified by your doctor or physical therapist. After your recovery, these exercises can be continued as a maintenance program for lifelong protection and health of your knees. Performing the exercises two to three days a week will maintain strength and range of motion in your knees.

### ***Getting Started***

---

**Warmup:** Before doing the following exercises, warm up with 5 to 10 minutes of low impact activity, like walking or riding a stationary bicycle.

**Stretch:** After the warm-up, do the stretching exercises shown on Page 1 before moving on to the strengthening exercises. When you have completed the strengthening exercises, repeat the stretching exercises to end the program.

**Do not ignore pain:** You should not feel pain during an exercise. Talk to your doctor or physical therapist if you have any pain while exercising.

**Ask questions:** If you are not sure how to do an exercise, or how often to do it, contact your doctor or physical therapist.



## Knee Conditioning Program

Introduction 1

### STRETCHING EXERCISES

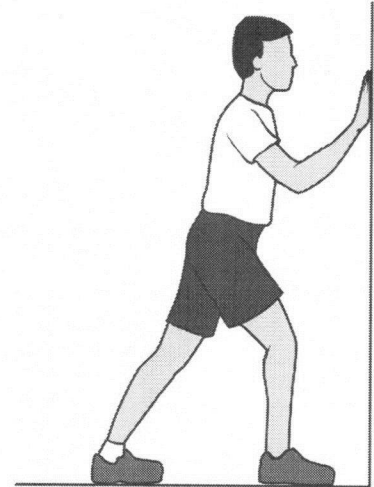
#### 1. Heel Cord Stretch

<b>Repetitions</b>	<b>Main muscles worked:</b> Gastrocnemius-soleus complex You should feel this stretch in your calf and into your heel
2 sets of 4	
<b>Days per week</b>	<b>Equipment needed:</b> None
6 to 7	

##### Step-by-step directions

- Stand facing a wall with your unaffected leg forward with a slight bend at the knee. Your affected leg is straight and behind you, with the heel flat and the toes pointed in slightly.
- Keep both heels flat on the floor and press your hips forward toward the wall.
- Hold this stretch for 30 seconds and then relax for 30 seconds. Repeat.

**Tip** Do not arch your back.



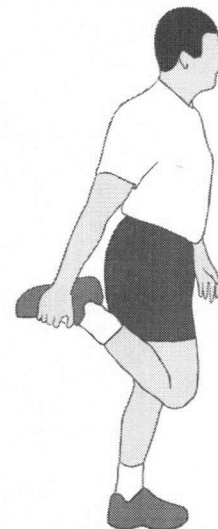
#### 2. Standing Quadriceps Stretch

<b>Repetitions</b>	<b>Main muscles worked:</b> Quadriceps You should feel this stretch in the front of your thigh
2 to 3	
<b>Days per week</b>	<b>Equipment needed:</b> None
4 to 5	

##### Step-by-step directions

- Hold on to the back of a chair or a wall for balance.
- Bend your knee and bring your heel up toward your buttock.
- Grasp your ankle with your hand and gently pull your heel closer to your body.
- Hold this position for 30 to 60 seconds.
- Repeat with the opposite leg.

**Tip** Do not arch or twist your back.





## Knee Conditioning Program

### STRETCHING EXERCISES

#### 3. *Supine Hamstring Stretch*

---

<b>Repetitions</b>
--------------------

2 to 3
--------

**Main muscles worked:** Hamstrings

You should feel this stretch at the back of your thigh and behind your knee

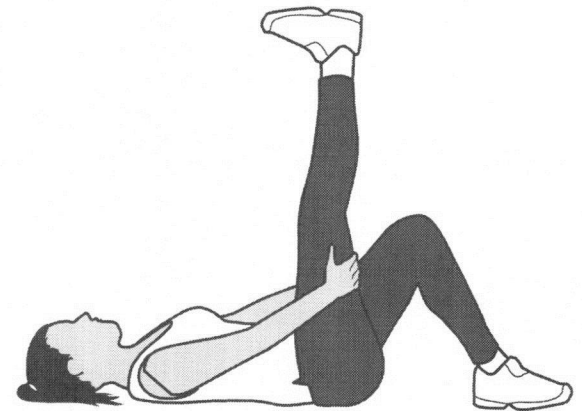
**Equipment needed:** None

<b>Days per week</b>
----------------------

4 to 5
--------

#### Step-by-step directions

- Lie on the floor with both legs bent.
- Lift one leg off of the floor and bring the knee toward your chest. Clasp your hands behind your thigh below your knee.
- Straighten your leg and then pull it gently toward your head, until you feel a stretch. (If you have difficulty clasping your hands behind your leg, loop a towel around your thigh. Grasp the ends of the towel and pull your leg toward you.)
- Hold this position for 30 to 60 seconds.
- Repeat with the opposite leg.



<b>Tip</b>	Do not put your hands at your knee joint and pull.
------------	--



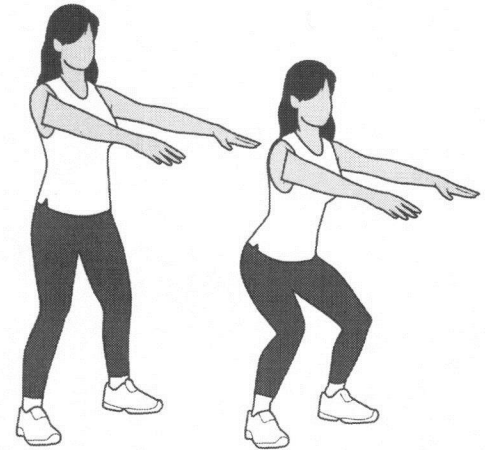
## Knee Conditioning Program STRENGTHENING EXERCISES

### 4. Half Squats

<b>Repetitions</b>	<b>Main muscles worked:</b> Quadriceps, gluteus, hamstrings You should feel this exercise at the front and back of your thighs, and your buttocks
3 sets of 10	
<b>Days per week</b>	<b>Equipment needed:</b> As the exercise becomes easier to perform, gradually increase the resistance by holding hand weights. Begin with 5 lb. weights and gradually progress to a greater level of resistance, up to 10 lb. weights.
4 to 5	

#### Step-by-step directions

- Stand with your feet shoulder distance apart. Your hands can rest on the front of your thighs or reach in front of you. If needed, hold on to the back of a chair or wall for balance.
- Keep your chest lifted and slowly lower your hips about 10 inches, as if you are sitting down into a chair.
- Plant your weight in your heels and hold the squat for 5 seconds.
- Push through your heels and bring your body back up to standing.



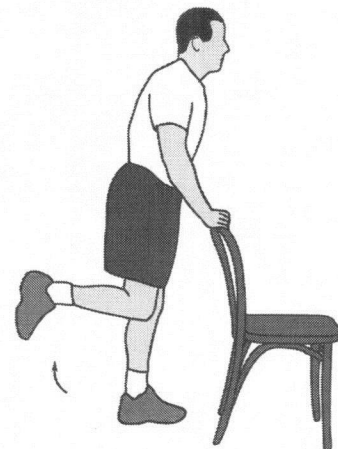
**Tip** Do not bend forward at your waist.

### 5. Hamstring Curls

<b>Repetitions</b>	<b>Main muscles worked:</b> Hamstrings You should feel this exercise at the back of your thigh
3 sets of 10	
<b>Days per week</b>	<b>Equipment needed:</b> As the exercise becomes easier to perform, gradually increase the resistance by adding an ankle weight. Begin with a 5 lb. weight and gradually progress to a greater level of resistance, up to a 10 lb. weight. If you have access to a fitness center, this exercise can also be performed on a weight machine. A fitness assistant at your gym can instruct you on how to use the machines safely.
4 to 5	

#### Step-by-step directions

- Hold onto the back of a chair or a wall for balance.
- Bend your affected knee and raise your heel toward the ceiling as far as possible without pain.
- Hold this position for 5 seconds and then relax. Repeat.



**Tip** Flex your foot and keep your knees close together.





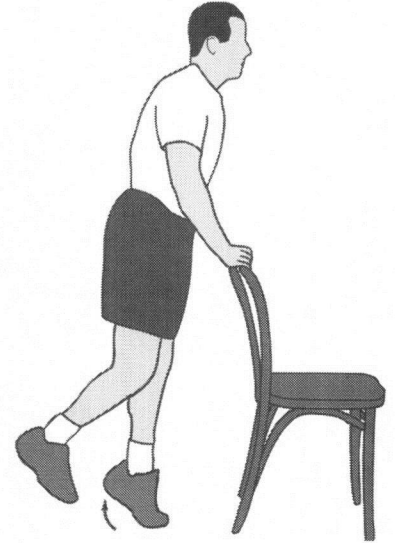
## Knee Conditioning Program STRENGTHENING EXERCISES

### 6. Calf Raises

<b>Repetitions</b>	<b>Main muscles worked:</b> Gastrocnemius-soleus complex You should feel this exercise in your calf
2 sets of 10	
<b>Days per week</b>	<b>Equipment needed:</b> Chair for support
6 to 7	

#### Step-by-step directions

- Stand with your weight evenly distributed over both feet. Hold onto the back of a chair or a wall for balance.
- Lift your unaffected foot off of the floor so that all of your weight is placed on your affected foot.
- Raise the heel of your affected foot as high as you can, then lower.
- Repeat 10 times.



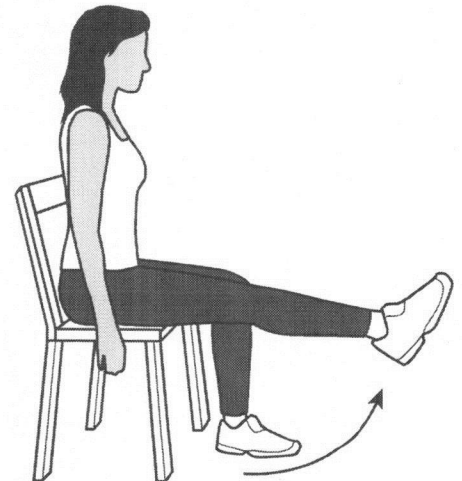
**Tip** Keep your weight centered on the ball of your working foot.

### 7. Leg Extensions

<b>Repetitions</b>	<b>Main muscles worked:</b> Quadriceps You should feel this exercise at the front of your thigh
3 sets of 10	
<b>Days per week</b>	<b>Equipment needed:</b> As the exercise becomes easier to perform, gradually increase the resistance by adding an ankle weight. Begin with a 5 lb. weight and gradually progress to a greater level of resistance, up to a 10 lb. weight. If you have access to a fitness center, this exercise can also be performed on a weight machine. A fitness assistant at your gym can instruct you on how to use the machines safely.
4 to 5	

#### Step-by-step directions

- Sit up straight on a chair or bench.
- Tighten your thigh muscles and slowly straighten and raise your affected leg as high as possible.
- Squeeze your thigh muscles and hold this position for 5 seconds. Relax and bring your foot to the floor. Repeat.



**Tip** Do not swing your leg or use forceful momentum to lift it higher.

**8. Straight-**

### Leg Raises

<b>Repetitions</b>
--------------------

*AAOS does not endorse any treatments, procedures, products, or physicians referenced herein. This information is provided as an educational service and is not intended to serve as medical advice. Anyone seeking specific orthopaedic advice or assistance should consult his or her orthopaedic surgeon.*



## Knee Conditioning Program STRENGTHENING EXERCISES

3 sets of 10

**Main muscles worked:** Quadriceps

You should feel this exercise at the front of your thigh

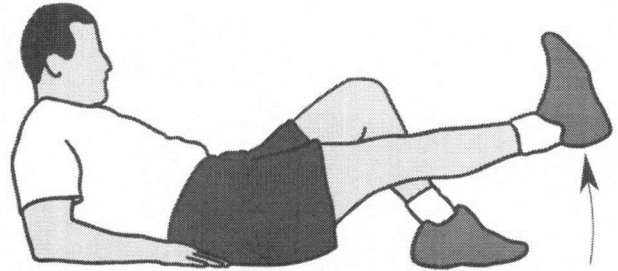
**Days per week**

4 to 5

**Equipment needed:** As the exercise becomes easier to perform, gradually increase the resistance by adding an ankle weight. Begin with a 5 lb. weight and gradually progress to a greater level of resistance, up to a 10 lb. weight. If you have access to a fitness center, this exercise can also be performed on a weight machine. A fitness assistant at your gym can instruct you on how to use the machines safely.

### Step-by-step directions

- Lie on the floor with your elbows directly under your shoulders to support your upper body.
- Keep your affected leg straight and bend your other leg so that your foot is flat on the floor.
- Tighten the thigh muscle of your affected leg and slowly raise it 6 to 10 inches off the floor.
- Hold this position for 5 seconds and then relax and bring your leg to the floor. Repeat.



**Tip** Do not tense up in your neck and shoulders.

### 9. Straight-Leg Raises (Prone)

**Repetitions**

3 sets of 10

**Main muscles worked:** Hamstrings, gluteus

You should feel this exercise at the back of your thigh and into your buttock

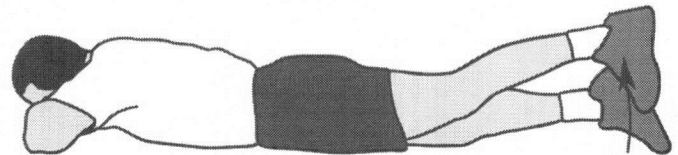
**Days per week**

4 to 5

**Equipment needed:** As the exercise becomes easier to perform, gradually increase the resistance by adding an ankle weight. Begin with a 5 lb. weight and gradually progress to a greater level of resistance, up to a 10 lb. weight. If you have access to a fitness center, this exercise can also be performed on a weight machine. A fitness assistant at your gym can instruct you on how to use the machines safely.

### Step-by-step directions

- Lie on the floor on your stomach with your legs straight. Rest your head on your arms.
- Tighten your gluteus and hamstring muscles of the affected leg and raise the leg toward the ceiling as high as you can.
- Hold this position for 5 seconds.
- Lower your leg and rest it for 2 seconds. Repeat.



**Tip** Keep your pelvic bones on the floor.

### 10. Hip Abduction

**Repetitions**



## Knee Conditioning Program STRENGTHENING EXERCISES

3 sets of 20

**Main muscles worked:** Abductors, gluteus

You should feel this exercise at your outer thigh and buttock

**Days per week**

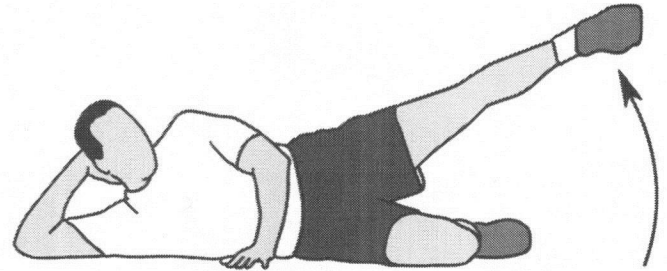
4 to 5

**Equipment needed:** As the exercise becomes easier to perform, gradually increase the resistance by adding an ankle weight. Begin with a 5 lb. weight and gradually progress to a greater level of resistance, up to a 10 lb. weight.

### Step-by-step directions

- Lie on your side with your injured leg on top and the bottom leg bent to provide support.
- Straighten your top leg and slowly raise it to 45°, keeping your knee straight, but not locked.
- Hold this position for 5 seconds.
- Slowly lower your leg and relax it for 2 seconds. Repeat.

**Tip** Do not rotate your leg in an effort to raise it higher.



### 11. Hip Adduction

**Repetitions**

3 sets of 20

**Days per week**

4 to 5

**Main muscles worked:** Adductors

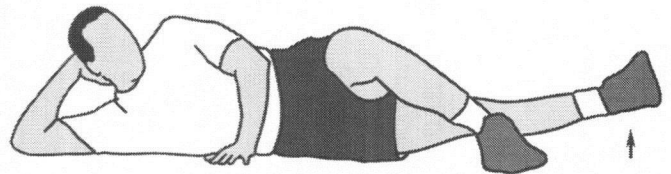
You should feel this exercise at your inner thigh

**Equipment needed:** As the exercise becomes easier to perform, gradually increase the resistance by adding an ankle weight. Begin with a 5 lb. weight and gradually progress to a greater level of resistance, up to a 10 lb. weight.

### Step-by-step directions

- Lie down on the floor on the side of your injured leg with both legs straight.
- Cross the uninjured leg in front of the injured leg.
- Raise the injured leg 6 to 8 inches off the floor.
- Hold this position for 5 seconds.
- Lower your leg and rest for 2 seconds. Repeat.

**Tip** Place your hand on the floor in front of your stomach for support.



### 12. Leg Presses

**Repetitions**

3 sets of 10

**Main muscles worked:** Quadriceps, hamstrings

You should feel this exercise at the front of your hip, and the front and back of your thigh



## Knee Conditioning Program STRENGTHENING EXERCISES

**Days per week**

4 to 5

**Equipment needed:** This exercise is best performed using an elastic stretch band of comfortable resistance. As the exercise becomes easier to perform, gradually increase the level of resistance. Do not use ankle weights with this exercise. If you have access to a fitness center, this exercise can also be performed on a weight machine. A fitness assistant at your gym can instruct you on how to use the machines safely.

**Step-by-step directions**

- Place the center of the elastic band at the arch of your foot and hold the ends in each hand. Lie on the floor with your elbows bent.
- Tighten the thigh muscle of your affected leg and bring your knee toward your chest.
- Flex your foot and slowly straighten your leg directly in front of you, pushing against the elastic band.
- Hold this position for 2 seconds. Relax and bring your leg to the floor. Repeat.

**Tip** Keep your abdominals tight throughout the exercise.

