

# WEIGHT TRAINING

The major purpose of the weight-training program is to provide the student with the opportunity to condition the musculoskeletal system, using a variety of machines, free weights, and exercises which encourage improvement in strength, endurance, and flexibility.

Depending upon individual interest, alternative goals might include:

- Improvement of general appearance
- Increase in size of muscles
- Increase in proportion of lean muscle mass to body fat
- Increase or decrease in weight,
- Supplemental lifts for athletes doing work-outs after the school day
- Injury rehabilitation.

Most students want to increase **MUSCLE STRENGTH** (force) or **MUSCLE ENDURANCE** (length activity).

**TO DEVELOP STRENGTH:** Use a Low reps/Higher weight workout.

**TO DEVELOP ENDURANCE:** Use a High reps/Lower weight workout.

## ***TO BE SUCCESSFUL IN THE WEIGHT TRAINING PROGRAM YOU MUST:***

1. Set a goal
2. Stick to one program
3. Keep accurate records
4. Rest, Limit workouts of the same muscle groups to every other day
5. Limit increases in weight, reps., sets, go for long-term growth
6. Follow the safety rules.

## ***MISCONCEPTIONS ABOUT WEIGHT TRAINING***

\*Males and females develop the same way through weight training. **FALSE!**

Because of the male hormone, testosterone, men develop significantly larger muscles through strength training than women.

\*weight training causes spot reduction or the loss of fat in one area. **FALSE!**

If exercise had this effect, the body fat in a tennis player's racket arm would be significantly lower than the non-racket arm. This is **NOT** the case. Doing 500 sit-ups each day will not eliminate abdominal fat.

\*Weight lifting makes you gain a lot of weight. **FALSE!**

Calories make you gain weight. On a weight-training program you can gain, lose, or maintain your weight while changing the proportion of fat to muscle in your body. Muscle weighs more than fat, so 2 people of the same height and weight might wear a different size because one is fit while the other is fat. -

## **GENERAL VOCABULARY**

**Aerobic conditioning** - Exercising at the upper limits of the body's ability to provide adequate oxygen for muscular activities over an extended period of time.

(5 mile run).

**Anaerobic conditioning** - Exercising at an intensity so great that the body's demands for oxygen exceed the ability of the heart & lungs to supply it (repeated 200 M dashes).

**Barbell** - A long bar to which weights can be added.

Curl: 15 pounds

Short Olympic: 35 pounds

French: 25

Olympic: 45 pounds

"Junior Olympic": 20 pounds

**Cardiovascular endurance** - The combined efficiency of the blood vessels, heart and lungs to provide oxygen and glucose to the muscles for prolonged activity.

**Cheating** - Too much weight used on an exercise, causing the lifter to rely on surrounding muscle groups for assistance during the movement or a change of joint angles for more leverage (arching the back during bench press).

### **Contraction**

Concentric: The muscle shortens (pull-up).

Eccentric (Also called "Negatives): The muscle lengthens (the down of a push-up).

Plyometric: The muscle is lengthened prior to contraction (bounding).

### **Exercise**

Isokinetic: The muscle contracts maximally at a constant speed over a full range of the joint movement against a variable resistance (Nautilus).

Isometric: The muscle contracts against an immovable resistance (Bent arm hang).

Isotonic: The muscle contracts against a fixed load but the resistance varies due to change in joint angle (free weights).

**Free weights** - Weights not supported by a machine.

**Muscle** -Atrophy: The decrease of muscle size through lack of use.

-Hypertrophy: The increase of muscle size through overload.

**Muscle Fibers:** 'T' Red / Slow twitch adapted for endurance activity with a high capacity to use oxygen  
"fl" White / Fast twitch adapted for short-term, high-intensity exercise.

**Overload principle:** Applying a greater load than normal to a muscle to increase its capability (Milo of Crotona).

**Periodization:** A cyclical training program that prepares athletes for maximum performance during peak cycles.

**Plateau:** A point at which increases in weight lifted stop.

**Power:** The explosive strength a muscle can exert for one quick, total effort (vertical jump).

**Specificity:** Muscle and nerve adaptations occur during overload most efficiently if the exercise performed most closely resembles the movement required (Shot putters would not greatly benefit from a pitching workout).

**Spotting** - Partner aided lifts to ensure proper technique &/or safety.

**Supersets** - System where an exercise for the agonist is followed immediately by one for the antagonist muscle group.

### **Training** -

Circuit training: A combination of strength and endurance exercises performed in sequence at various stations.

Interval: Alternate short periods of intense effort with periods of rest. Training Effect: Changes in muscle performance due to increased demands.

## **MOVEMENT VOCABULARY**

**Abduction** - Moving a body part away from the midline (Side leg raises)

**Adduction** - Moving a body part towards the midline (Side leg lowers)

**Agonist**. A muscle which contracts concentrically (shortening) to produce a movement at a joint (bicep during curl).

**Antagonist** - A muscle whose contraction produces a joint action exactly opposite to that of the **agonist** (tricep during bicep curl).

**Dorsi flexion** - Toe "Up" toward shin

**Plantar flexion** - Toe "Down" as in calf raises

**Eversion** . The sole of the foot moves outward

**Inversion** - The sole of the foot moves inward

**Flexion** - Decreasing the angle at a joint (down on squat)

**Extension** . Increasing the angle at a joint (up on squat)

**Hyperextension** - Continuation beyond normal extension (arching back)

**Pronation** - Rotation at the radioulnar joint toward the body (as in a hook in bowling)

**Range of motion**: The amount or degrees of movement which can take place at a joint.

**Supination** - Rotation at the radioulnar joint away from the body (as in palms up)

**Prone position** - Lying face down

**Supine position** - Lying face up

## **EQUIPMENT**

**Free Weights** - barbells & dumbbells used to provide fixed resistance (weight remains the same, effort varies) for isotonic, concentric & eccentric muscle contraction exercises.

**Fixed resistance machines** - Cables are attached to weight stacks to duplicate free weight lifts, but support the weight should the lifter fail (Universal, most home fitness equipment).

**Variable resistance machines** - Cams position the weight to provide maximum resistance throughout the full range of motion (Nautilus, dynabands).

**Isokinetic** - Machines which produce resistance equal to the force exerted. Concentric contractions only (usually found in rehab facilities).

Electronic, variable resistance, individually programmed machines - [Lifecircuit].

### **Advantages / Disadvantages:**

Free weights require balance, thus working adjacent muscle groups and they also allow for very specific training, but require spotters, and take time to adjust.

Fixed resistance machines accommodate a lot of lifters, do not take much time to adjust, and do not require spotters. but they are designed to work only one muscle group.

Variable resistance machines increase demands on the muscles throughout the full range of motion, but still work only one muscle group and are far more expensive.

Isokinetic machines are excellent for rehabilitation, but very specific.

Electronic machines are "State of the Art" for providing maximum benefits in minimal time, but are quite expensive.

## ***Physical Fitness Study Guide***

**Wellness** comes from a commitment to a lifestyle of managing stress, eating healthy, and exercising regularly. Physical fitness is one component of wellness.

**Physical fitness** is the ability to perform the most work with the least effort.

Improved fitness requires an exercise program for **cardiovascular endurance, flexibility, muscular endurance, and muscular strength**. People who exercise regularly are stronger, more flexible, recover from hard work or illness more quickly, live longer, and, more importantly, have a better quality of life. A fit person is at a low risk for both fatigue and hypokinetic disease. (Hypokinetic diseases include, but are not limited to, heart disease, hypertension, arthritis, etc.) A fit person looks good, feels good, enjoys physical activity, and effectively deals with the stress of daily life. A commitment to fitness has been shown to:

- Relieve tension and stress
- Stimulate the mind
- Reduce body fat
- Control appetite
- Boost self-image
- Improve muscle tone and strength
- Improve performance
- Lower blood pressure
- Improve sleep
- Improve flexibility
- Lower cholesterol
- Increase resistance to illness

### ***How to recognize and measure fitness***

There are eleven components that measure fitness. Six of these components are related to skill and sport, and five of these components are related to health. The fitness tests given by High School District 211 measure health-related fitness.

#### **Measures of Health-Related Fitness:**

**Body-composition** is the make-up of the body in fat, muscle, bone, and other tissue. Fat is expressed in percent (%) of body fat. The total of all other components is expressed in percent (%) of lean body mass.

**Cardiovascular fitness** is the ability of the heart, lungs and blood vessels to supply blood and oxygen to the body during long periods of exercise. The mile run measures cardiovascular fitness.

**Flexibility** is the ability to move a joint through a full range of motion. The sit and reach test measures flexibility of the lower spine.

**Muscular endurance** is the ability of a muscle or muscle group to continue work over a long period of time. The one minute sit-up test measures muscular endurance of the abdominals.

Muscular strength is the maximum amount of force a muscle or muscle group can exert. The pull-up test measures upper-body strength.

### Measures of Skill-Related Fitness:

**Agility** is the ability of the body to change direction quickly. Dodging a tackle in football or soccer is an example.

**Balance** is the ability of the body to maintain equilibrium while stationary or moving. Performing a handstand (stationary) or skiing (moving) are examples of skills that use balance.

**Coordination** is the ability to combine muscles and/or muscle groups with the senses (sight, touch, etc.) to complete complex tasks. Juggling or hitting a ball are skills that require coordination.

**Power** is the combination of strength and speed. The volleyball spike is a power skill,

**Reaction time** is the amount of time between sensing and responding. The time needed to respond to a starter's gun to take-off for a race is an example of reaction time.

**Speed** is the ability to perform a movement in a short period of time. The 100 meter dash measures speed.

## *How to design an exercise program*

### **AEROBIC TRAINING**

**Aerobic** activities improve the fitness level of your cardiovascular system. This is the first step in any exercise program. Running, walking, swimming, and cycling at a continuous pace, maintained for 20 minutes or more in the Target Heart Rate (THR) zone, are all examples of aerobic exercise. Activities that use the larger muscles of the body over an extended period of time require an increase in the use of oxygen. To deliver more oxygen, the heart must pump more blood to the muscles. This increases the heart rate, and the body's adaptation to this change increases cardiac fitness.

The **training effect** from an aerobic exercise program occurs when the heart is overloaded by work for an extended period of time. An overload of 60-85% of the individual's maximum heart rate (MHR) determines the target heart rate zone (THR). The calculation of THR zone is the same for both male and females and is determined by age and current resting heart rate. Heart rate calculations are based on counting your pulse for one minute. The fit person's heart works more efficiently pumping at a slower rate because it pumps more blood with each beat. This means that a fit person will have to work harder (higher intensity) to increase his heart rate and his cardiovascular fitness. To determine THR zone based on your age and current fitness level:

1. Establish MHR by subtracting age from the scientific standard of 220.
2. Subtract resting heart rate (RHR) from of MHR. RHR is taken before getting out of bed in the morning.
3. First, multiply this number by .60 (60%) and then again by .85 (85%).
4. To each of these numbers add the RHR used in number 2.
5. These two numbers establish the lower and upper ends of the Target Heart Rate zone.

### **Aerobic Training: The Target Heart Rate (THR) Zone**

|                                      | Low End,    |             | High End    |             |
|--------------------------------------|-------------|-------------|-------------|-------------|
|                                      | Example     | You         | Example     | You         |
| Scientific Standard                  | 220         | 220         | 220         | 220         |
| Subtract age                         | -14         |             | -14         |             |
| 1. Maximum Heart Rate (MI-fR)        | =206        |             | =206        |             |
| 2. Subtract resting heart rate (RHR) |             |             | -76         |             |
|                                      |             |             | =130        |             |
| 3. Multiply by work intensity 60-85% | <u>x.60</u> | <u>x.60</u> | <u>x.85</u> | <u>x.85</u> |
|                                      | =78         | =           | =110.5      | =           |
| 4. Add resting heart rate (RHR)      | + 76        | +           | + 76        | +           |
| THR training zone for example        | 154         |             | 187         |             |
| 5. <b>Specific THR training zone</b> | =           | to          | = _____     | *           |

\*A quick way to estimate the middle of the training zone is to subtract age from 185.

When counting a heart rate for ~ a full minute, always count the first beat as zero. This prevents an overestimation of heart rate when multiplying.

The **F I T Formula** determines the amount of exercise an individual gets in his fitness program. **F** stands for frequency-how often he exercises. **I** stands for intensity-how hard he exercises. **T** stands for time (duration)-how long he exercises. To maintain current aerobic (cardiovascular) fitness, exercise at a frequency of 3 times per week, at an intensity based on individualized goals and target heart rate, for a 20-30 minute duration.

## **FLEXIBILITY TRAINING**

Flexibility training is a stretching program for muscles or muscle groups. Stretching is necessary so that all joints of the body can achieve and maintain their full range of motion. With age, flexibility decreases due to lack of activity. Aerobic exercise should precede flexibility training, because warmed muscles stretch more easily. Joints should be taken through their full range of motion as part of a warm up for activity or training. Also, flexibility training is used after exercise as part of a cool down. This helps prevent muscle cramping from strenuous use.

There are three types of stretches. A slow stretch held for 6-30 seconds is referred to as a static stretch. Static stretching is considered safe and effective to increase range of motion in a joint. **Proprioceptive neuromuscular facilitation (PNF) stretching** is also recommended as both safe and effective for increasing range of motion. PNF stretching uses a contraction of the muscle prior to the stretch. Most PNF stretches require the use of a partner. This may make PNF stretching less practical for all flexibility training situations. Ballistic stretching is sometimes used, but not recommended as a means of improving flexibility. The bouncy, jerky movement used in ballistic stretching increases the likelihood of injury.

## ***ANAEROBIC TRAINING: RESISTANCE & SPEED TRAINING***

After achieving aerobic fitness and flexibility, the body is ready for anaerobic training. **Anaerobic training** can refer to resistance (strength weight training) or sprinting (speed~ training). **Resistance training** can be aimed at increasing muscle endurance or muscle strength. Muscle endurance is increased when a low resistance is moved many times. This is referred to as low resistance, high repetition. Muscle strength is developed when maximal resistance is moved, sometimes only one or two times. This is referred to as high resistance, low repetition. Weight training can be performed aerobically~ but for increasing strength it is usually done anaerobically. Forty-eight hours of rest should be allowed before heavy lifting is repeated for the same muscle or muscle group.

**Sprinting or speed training improves** cardiac fitness. When short term; high intensity sprints are randomly placed within a normal aerobic workout, cardiac efficiency is challenged and eventually improved as the body adapts to change. Anaerobic sprints overload the body so that the demand for oxygen cannot be met. Therefore, the exercise intensity (resistance or speed) must be lowered or discontinued. High intensity work cannot be maintained for long periods of time in the absence of oxygen. Aerobic means continuous with oxygen, and anaerobic means short duration because no oxygen is available. Muscles can continue high intensity work for only a minute or two in the absence of oxygen.

## ***NON-AEROBIC ACTIVITIES***

Some activities are low intensity, and yet encourage general muscle strength, endurance, and/or flexibility. Climbing one flight of stairs, bowling, playing volleyball or tennis doubles are non-aerobic activities. Non-aerobic activities provide general exercise for the body, but do not challenge the body to improve fitness level.

## ***How to choose a training format***

Just like variety of food is important to nutrition, variety of training formats is important to exercise. Since the body increases its fitness level through the process of adaptation, change within the training format can improve the fitness level. There are three training formats:

**Circuit training** involves a series of exercises at different stations. In the weight room, moving from machine to machine is a weight circuit; in the CV fitness center, moving from bike to stepper to slide board is an aerobic circuit. Weight circuits can be done aerobically (to maintain or improve muscular and cardiac endurance or anaerobically (to improve muscular strength). When a series of lifts are followed by a one-minute aerobic activity, an aerobic weight circuit is created. Cross training refers to meeting the exercise fitness goals with a variety of different activities. Running on Monday, biking on Wednesday, and hiking on the weekend is an example of a cross training program. Cross training prevents overuse syndrome (overusing the same muscles or muscle groups to the point of exhaustion followed by injury). Interval training simply alternates high intensity work with moderate or low intensity work. Sprint training used randomly within an aerobic workout is an example of interval training designed to increase the body's fitness level.

**Regular participation in a variety of activities that emphasize different types and formats of training is necessary for total fitness.**

## ***NUTRITION***

Nutrition is the foundation necessary to support a life of movement. While it is exercise that tears down the cells of the body, it is nutrition that supports the rebuilding that eventually improves fitness and Wellness. **Nutrition has six components.**

1. **Carbohydrates** can be both simple (sugars) and complex (starches). They are found in fruits, vegetables, and grains and supply the primary source of energy for high intensity anaerobic activity. Carbohydrates should comprise 58% or more of the diet, with less than 10 % coming from simple sugars.
2. **Fats** are plentiful in the diet and are the primary source for long duration aerobic activity. The American Heart Association recommends that 30% or less of caloric consumption come from fat, with 10% or less from saturated fat.
3. **Proteins** are found in meats and dairy products, as well as in combinations of complex carbohydrates. Proteins are used by the body to repair body tissue and regulate chemical function. Vitamins and minerals are found in a variety of complex carbohydrates, dairy products, and certain fish, meat, and poultry.
4. **Vitamins and minerals** are often suggested as a food supplement, but are not necessary when a balanced diet using a variety of foods is eaten daily.
5. **Water** is the final component of good nutrition. Eight, eight ounce glasses of water should be consumed daily. Water is important and necessary to hydrate the aerobic participant.

## ***FAT: TOO MUCH OR TOO LITTLE***

The biggest problem with health maintenance comes from inactivity or a sedentary lifestyle. Aerobic activities have been shown to decrease body fat. Sedentary lifestyles combined with poor nutritional habits have increased body fat percentages beyond a healthy standard. The American College of Sports Medicine states that adult males in excess of 20% body fat and adult females in excess of 27% body fat may need reduction of body fat to reduce the risk of health problems, especially coronary heart disease and diabetes. While too much fat (obesity) causes these diseases, too little body fat (anorexia nervosa) can result in loss of bone and muscle mass, coronary heart disease, and kidney damage. Fat is necessary to provide long term energy, to carry fat-soluble vitamins, to protect internal organs, and to maintain body temperature.

## ***VOCABULARY***

**Aerobic exercise** - fitness training that lasts a minimum of 20 consecutive minutes with increased heart rate in the Target Heart Rate zone.

**Anaerobic exercise** - fitness training that incorporates activities which: 1) require a short term demand for energy, or 2) push the body to a level where the muscular demand for oxygen is greater than the circulatory system's ability to deliver.

**Carbohydrates** - one of six components of nutrition, carbohydrates come from sugar and starches and are recommended to contribute 58% or more of a person's caloric intake.

**Cool down** - the third and final stage of a workout where the heart rate returns to resting, and stretching is used to prevent cramping from strenuous exercise.



Streamwood High School

**Fat**- one of the six components of nutrition used by the body as stored energy; there are 9 calories per gram, and less than 30% of caloric intake should come from fat.

**Fit Formula** -the amount of exercise you are getting in your fitness program. **F** stands for *frequency-how often* you exercise. **I** stands for *intensity-how-hard* you work. **T** stands for *time-duration* of long you work out. The time of day is not important, but rather the commitment to a minimum of three times per week, at 60-85% of THR, for 20-30 minutes uninterrupted.

**Heart rate** - the number of times the heart beats per minute,when counting a heart rate for less than one minute, always count the first beat as zero.

**Hypokinetic disease** - a health disorder caused by lack of movement.

**Non-aerobic activities** - movement or sport that improves general muscular strength. endurance, andior flexibility without elevating the heart rate to the target zone.

**Obesity** - extreme over-fatness.

**Overload principle** - a systematic increase in workload which forces the body to adapt to change and increases the current fitness level.

**Protein** - one of six components of nutrition, used to build and repair body tissue and to regulate chemical functions of the body; 12-15% of caloric intake should come from protein.

**Pulse** - the movement of blood with each beat of your heart. Easiest to take at carotid artery next to the throat, or the radial artery in the wrist.

**Recovery rate** - the speed at which the heart rate returns to normal after exercise; as fitness level improves it takes less time to recover.

**Target Heart Rate Zone** - 60-85% of an individual's **Maximum Heart Rate (MHR)** that must be maintained for a consecutive number of minutes (not less than 20) in order to maximize oxygen use. THR zone is determined by the use of the scientific standard of 220, age, and the resting heart rate (RHR).

**Threshold** (aerobic) - the lowest increase in activity needed to begin getting benefits from exercise.

**Warm-up** - the first stage of a workout beginning with aerobic activity to warm the body and continuing with stretching the muscles to allow the joints full range of movement (flexibility).

**Weight training** - referred to as strength and/or resistance training, using free weights or weight machines to increase muscle strength and/or endurance.

**Wellness** - a holistic result of a commitment to fitness, a state of mental, emotional, social, spiritual, and physical harmony; operating easily and naturally with optimum performance.

## **Body Parts**

See your teacher for the handouts.

**Modification:** Balance *on* the *elbows* and knees, hips squared, neck and head aligned with the spine. Do not lift the working leg higher than the level of the hips, which can cause the bad< to hyperextend. For added back safety, keep the body in the position of being draped over a barrel. ~Siderants (gluteal lifts down while lying on the side) can be substituted for liydrrant flfts Many gluteal exercises can also be done standing against a wall.

**EXERCISE AND MOVEMENT ANALYSIS FOR MAJOR MUSCLE GROUP**

| <u>MUSCLE</u>                     | <u>FUNCTION</u>   | <u>EXERCISE</u>  |
|-----------------------------------|---|--|
| <u>Sternocleidomastoid</u>        | Flexes head<br>Rotates head to opposite side<br>Head ABDIABB  | Chin to chest<br>Look right/left<br>Ear to shoulder  |
| <u>Trapezius</u>                  | Raises or lowers shoulders<br>Tilts head back<br>Elevation, retraction and depression of shoulder blade                                     | Shoulder shrugs<br>Behind neck press,<br>upright rows  |
| <u>Pectoralis Major</u>           | Flexes upper arm<br>Horizontal flexion - draws arm across the body<br>Adducts arm   | Chest press<br>Crossovers<br>Vertical fly<br>Straight arm pullover<br>Bench press<br>Push up<br>Chinning |
| <u>Lptissimus Dorsi</u>           | Extends upper arm - draws arm down and backward<br>Adducts upper arm<br>Horizontal Extension<br>Inward Rotation                             | Crawl stroke   |
| <u>Rhomboid Major and Minor</u>   | Draws scapula down and back towards the spine<br>Helps to elevate the scapula   | Chinning<br>Crawl stroke   |
| <u>Erector Spinae</u>             | Extension,<br>Adduction and Rotation of the trunk   | Provide stability and<br>Maintain erect posture of the trunk   |
| <u>Rectus Abdominis</u>           | Flexes the spine<br>Abduction of the trunk<br>Compression of the abdominal cavity<br>Pulls on the ribs<br>Pelvic Tilt                       | Curl up<br>Crunch<br>Reverse curl<br>Double crunch   |
| <u>External/Internal Obliques</u> | Right side of the muscle rotates torso to left and the left side of the muscle rotate torso to the right<br>Compresses the abdominal cavity | Twisting curl up<br>Waist twist  |

| <u>MUSCLE</u>                                 | <u>FUNCTION</u>   | <u>EXERCISE</u>   |
|---|---|---|
| <u>Deltoid</u>                                | Abducts upper arm<br>Flexion, extension<br>Inward rotation of upper arm<br>Horizontal flexion | Front, side and rear are raises<br>Push up<br>Military press<br>Upright rows<br>Dumbbell press<br>Arm curl<br>Elbow can be down or side<br>Kickbacks<br>French press<br>Push up<br>Pushdowns<br>Rear leg lift<br>Squats<br>Lunges<br>Elbow/knee leg lift<br>Running<br>Stair climbing<br>Lateral leg lift |
| <u>Biceps</u>                                 | Flexion of the elbow<br>Supinates forearm and hand  | Clams<br>Knee lifts   |
| <u>Triceps</u>                                | Elbow extension<br>Shoulder extension   |   |
| <u>Gluteus Maximus</u>                        | Extends and hyperextends thigh at the hip<br>Outward rotation                                 |   |
| <u>Gluteus Medius</u>                         | Abducts thigh at the hip<br>Rotates outward at the hip  |   |
| <u>Iliopsoas</u><br>(iliacus and psoas major) | Flexes thigh at the hip and trunk   |   |
| <u>Quadriceps Group</u>                       |   |   |
| • Rectus Femoris                              | Flexes thigh at the hip<br>Extends leg at the knee  | Leg extension<br>Squats   |
| • Vastus Lateralis                            | Extension of the knee   | Leg presses   |
| • Vastus Medialis                             | Extension of the knee   | Lunges  |
| • Vastus Intermedius                          | Extension of the knee<br>(pulls directly upward on the patella)                               |   |
| <u>Hamstring Group</u>                        |   |   |
| Semitendinosus                                | Flexes leg at the knee<br>Extends thigh at the hip  | Leg curls<br>Squats   |
| • Semimembranosus                             | Inward rotation   |   |
| • Biceps Femoris                              | Outward rotation<br>(flexion of the knee, extension of the thigh)                             |   |