

MILFORD HIGH SCHOOL P.E.  
STRENGTH TRAINING HANDOUT

The human body has the ability to adapt its physical muscular-skeletal performance to its environment. If need be to develop physically stronger, the muscles and bones will develop based on the following fundamental abilities.

Muscular Endurance (M-E): To improve the ability to apply force for a long period of time. This type of training requires the least amount of load while exercising. It will require 4 to 5 sets of 20 repetitions for each exercise. The rest period is from 20 to 45 sec. **Sport example, cross-country runner.**

Strength: To develop pure strength that does not last long, high power. This type of training utilizes the heaviest load of all. This program requires 5 sets with 2-8 repetitions. The rest period varies from 1 to 2 minutes. **Sport example, Olympic weight lifting.**

Speed: A quick burst of energy from a jump or a fast twitch in a muscle. The training will be done with explosive repetitions in a short execution time (less than 1 sec.) and the recovery demands up to 7-15 sec. The force cannot be sustained at all. It would be like 5 + sets under 10sec. of repetitions. **Sport example, sprinters off the blocks.**

Power: Maximum strength and speed applied together produce power. 3 sets of 6-10 reps are used with at least 3 exercises per muscle group. The rest between sets is 1 ½ to 2 minutes. **Sport example, discus thrower.**

Hypertrophy (bulk): This will produce oversized muscle fibers. The muscles get stronger but they plateau very fast too. It requires 8-12 repetitions but the sets are going up to 5+. The purpose is to break down the muscle fibers. Once broken down they rebuild themselves bigger and stronger. The rest between sets is 1 ½ to 2 minutes. **Sport example, body builders.**

Strength & Hypertrophy combo (resistance): The objective is to increase performance on the ability to apply more force building up bigger muscles. It will require 6-12 repetitions at a 70-85% load based on the 1 Repetition Maximum (1RM) completing 3+ sets per exercise. It will also require at least 3 exercises for the same muscle. The rest period goes from 1 ½ to 2 minutes. **Sport example, rowing 10,000m.**

Putting the body through a physical stress by lifting weights causes the muscles fibers to break down and they will regenerate bigger. The pressure and stress put by the muscles on the bones also causes long term increase in bone density and shape (examples: wider shoulders, bigger joints). Muscles adapt fairly quickly and a change can be expected within 4 to 6 weeks. The neuromuscular system also develops and acquires better performance in synchronizing the influx from the brain to all the muscles motor units.

The Exercises:

A person has to set a goal and objectives to attain the desired results. The exercises chosen should reflect the goals you are trying to attain. An exercise can trigger one or more muscle groups. When more than one muscle group are necessary to complete an exercise motion, one can still identify the benefit of the action to one main muscle group. For example, completing a military press will require action from the deltoids, triceps and trapezes, but the main targets are the trapezes. For all exercises presented in class, refer to the posters in the weight room. The anatomy and the biomechanics of the human body are simple. Most muscle groups in the body apply force across a joint by contracting themselves, they get shorter therefore they pull on their attachment points creating motion.

Flexor: A muscle that creates a flexion between two body parts and a joint.

Flexion: When two body parts get closer together through an articulation point (joint).

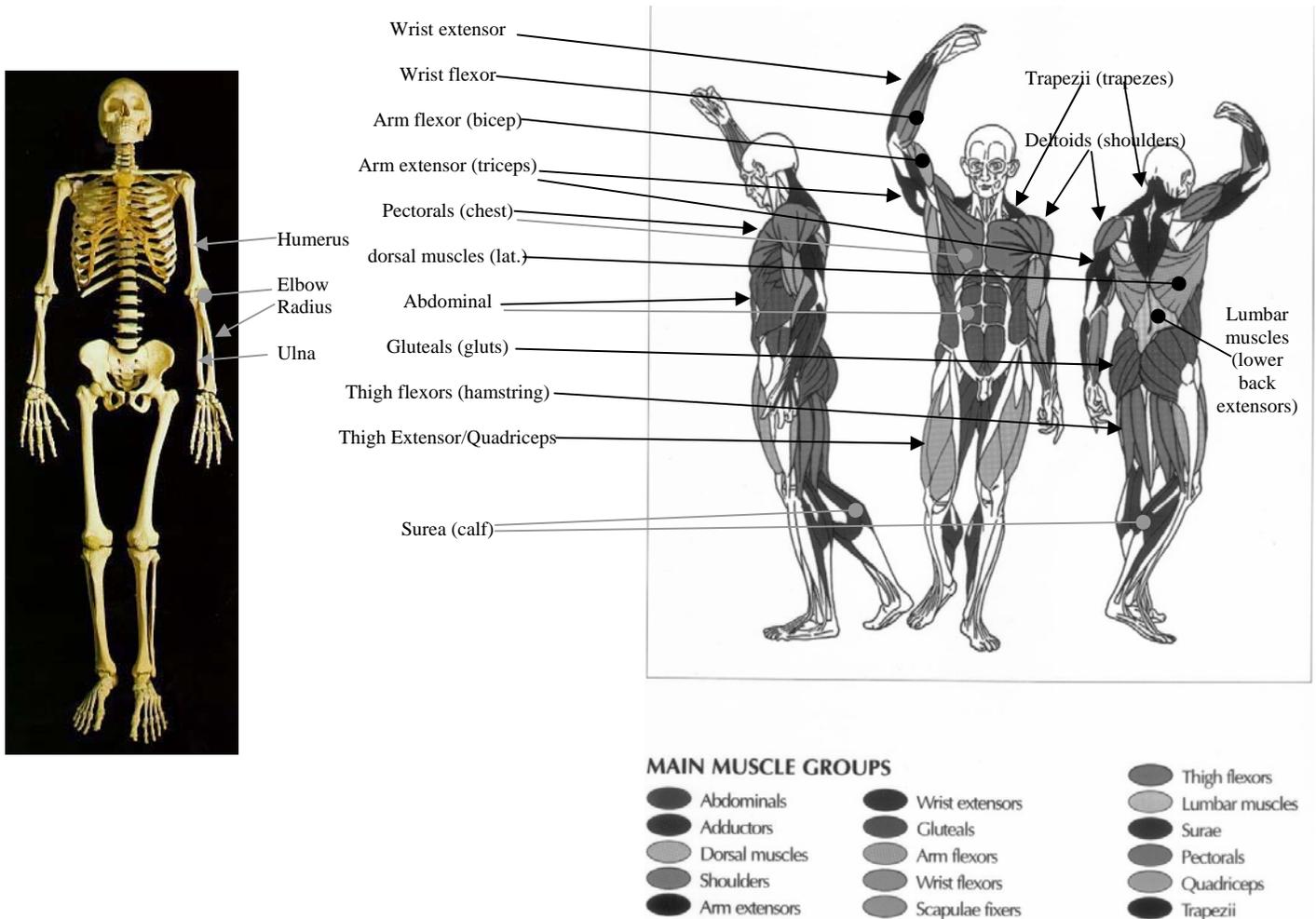
Extensor: A muscle that creates an extension between two body parts and a joint.

Extension: When two body parts get away from each other through an articulation point (joint).

Rotator: Muscles that create a rotation or a twist of the body or parts of its structures.

Rotation: When the body or parts of its structures move in a full or partial circular motion.

For each flexor muscle there is an opposite extensor muscle. As an example, the bicep muscle makes a **flexion** around the elbow between the arm (Humerus bone) and the forearm (Radius and Ulna bones). The triceps muscle does the **extension** between the same structures; it works the opposite way of the bicep.



**Training:** To be efficient, a strength training program must be followed 3 X per week. Close monitoring of the loads must be done regularly to keep challenging the progress made by the muscles. Change the routine every 3 months. Warming up before and stretching after exercising is very important to avoid any strain on the muscle tissues. Allow 48 hours rest between sessions involving the same muscle group to favor proper regeneration and avoid over-training. Follow the proper rest times between sets.

During each repetition, breathing is very important. With every contraction (muscle pulling under tension) breath out.

Make sure you have good ethics and proper hygiene. Workout safely and ask questions when in doubt.

Never hesitate to ask for a spotter to help you complete an exercise under heavy load.

For best results one must get at least 8-10 hours of sleep per day. Pay attention to the type of “fuel” you are putting into your body. Maximize your training effort by eating right and getting plenty of sleep.