Fitness Prescription
By Jarrod, Denis, Lachy and Emma

Principles of Training
- Progressive Overload: The need to train above a stimulus threshold for chronic training adaptation's.
- Specificity: Training should be based on the specific demands or needs of a sport/event.

- Individual differences: The training program must consider the specific needs and abilities of the individual for whom it is designed. Differences include genetics, gender, age and training goals.
- Reversibility: Refers to detraining, partial or complete loss of training adaptation's due to dramatic decrease in training load.

Warm Up and Cool Down
- A 5 minute warm-up consists of a light jog to increase body temperature. This will help the body perform a range of stretches, either static or dynamic as the muscles will be warm and more flexible. This reduces the likelihood of injury.
- A cool down aids the body in the break down of waste products such as lactic acid.
- Complete inactivity allows heart rate to return to it’s resting level.

Flexibility Training
- Without regular stretching the muscles tend to lose flexibility so that when called upon to perform an extreme movement, they are less able to extend to their full range of motion often resulting in damage to the muscle tissue.
- Proper stretching even for short periods, can help in the following ways:
  - Prevent injuries.
  - Improve biochemical efficiency.
  - Increase extensibility of muscles.
  - Improve co-ordination between muscle groups.
  - Improve relaxation of muscles.
  - Decrease muscle tightening after movement.
  - Counteract the possible restricting effects of hypertrophy training.

- Passive stretching: Also referred to as static stretching, is the gradual stretching of a muscle to a point where it is held, without bouncing for 15-30 seconds.
- Used for: General stretch, the early stages of recovery from injury and the cool down phase following a vigorous exercise program.
- Range of motion stretching: Also referred to as R.O.M stretching, involves the rhythmical movement of the major muscles that will be used in the exercise program. R.O.M stretches should be gentle repetitions of the types of the types of movement that will be experienced during the workout.
- Used for: Stretching immediately before a period of vigorous activity and stretching the muscle groups that cross the major joints.
Resistance Training

Types of Training
- Isotonic: Movement of a set (free weights such as dumbbells) through a ROM (Range of movement).
- Isokinetic: (fixed resistance) resistance training in which the rate of movement is kept constant through a range of motion.
- Isometric: the speed of the action is controlled while the subject exerts maximum force. Holding a barbell at a 100 degree angle, the limb is immobilized, yet the subject is holding the maximum amount of weight.

Types of Muscular Contractions
- Concentric - a muscle action where the muscle shortens.
- Eccentric - a muscle action where the muscle lengthens.
- Isometric - a muscle action where there is no change in muscle length yet there is tension in the muscle.

Interval Training
- Is broadly defined as repetitions of high-speed/intensity work followed by periods of rest or low activity. E.g. 12 repetitions of 400 meters with a 200-meter jog between each. It is believed by many in the fitness industry that this method of training is more effective at inducing fat loss than simply training at a moderate intensity level for the same duration.

Continuous Training:
- Continuous training means the person training is using 60%-70% of their energy for a long period of time. This method suits long distance runners and joggers because it means that their endurance levels will increase, and it is the way which they would normally compete. Continuous training is a good way for an athlete to build up their cardiovascular endurance levels.

Endurance Training Methods
- Aerobic Endurance:
  - The body is working at a level that demands for oxygen & fuel can be met by the body's intake. The only waste product formed, are carbon dioxide & water. These are removed as waste (water) and by breathing out (carbon dioxide). 65% max heart rate is when the aerobic system starts to work. Duration of each session per day =>
    - 1st Day - 20 minutes
    - 2nd Day - 25 minutes
    - 3rd Day - 20 minutes
  - The main requirements needed for significant endurance improvements are:
    - A heart rate of between 50-60% => 90% during exercise.
    - 3-5 days a week = optimal frequency needed.

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<th>Resistance training can focus on four different emphasis, strength, hypertrophy power and endurance. The focus can determine the frequency, intensity and load.</th>
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Methods cont.
- Fartlek Training: is a form of conditioning which puts stress mainly on the aerobic energy system due to the continuous nature of the exercise. The difference between this type of training and continuous training is that the intensity or speed of the exercise varies, meaning that aerobic and anaerobic systems can be put under stress. Fartlek sessions last a minimum of 45 minutes and can vary from aerobic walking to anaerobic sprinting. Fartlek training is generally associated with running, but can include almost any kind of exercise.
- Circuit Training: is a type of interval training in which strength exercises andendurance exercises are combined. This type of training gives benefit to both cardiovascular endurance and muscle strength. It is called circuit training because of the various stations involved within the activity. There may between 6-12 different activities for each “circuit”.

Strength Training cont.
- Ballistic stretching: This form of stretching is bounce stretching, where the muscle is taken to its end of ROM, and then over stretched by bouncing. In the past this was a common way of stretching, but has now been discarded because of knowledge of the intra-muscular damage that may occur as a result of the ‘stretch reflex’.
- PNF stretching: PNF stands for Proprioceptive Neuromuscular Facilitation. It involves a static stretch followed by a strong isometric contraction of a muscle against an immovable resistance (a partner). The Golgi’s tendon organ is stimulated, allowing the muscle to relax. Each isometric contraction is held for about 6 seconds.
- Following precautions must be observed before PNF stretching:
  - Attempt after a total body warm up.
  - Isometric contraction should never be explosive.
  - The partner should only apply resistance during the isometric phase and mild assistance during the static stretch phase.
  - The isometric contraction should increase the gradual effort in the first 2 seconds, which is then sustained for an additional 4 seconds.

Types of muscular contractions
- Isometric- is a muscle action where there is no change in muscle length yet there is tension in the muscle.
- Concentric- is a muscle action where the muscle shortens.
- Eccentric- is a muscle action where the muscle lengthens.
- Isokinetic: (fixed resistance) resistance training in which the rate of movement is kept constant through a range of motion.
- Isotonic: Movement of a set (free weights such as dumbbells) through a ROM (Range of movement).
### Anaerobic Training

An anaerobic training program will increase the body's ATP-PC energy stores and glycolytic enzymes. This will allow these systems to function longer during high-intensity exercise, resulting in improvements in anaerobic power and an increase in lactate tolerance during high-intensity exercise.

#### ATP-PC Energy System
- **Type:** ATP-PC uses phosphate as its source of energy.
- **Exercise:** 85-100% intensity for exercise.
- **Interval Training:** High energy bouts of exercise (sprints) 6-8 sec (40-60m) or high/moderate bouts of energy 20-30 sec.
- **Rest Period:** 3-5 minute rest period between exercises so phosphate stores are replenished.
- **Improvements:** Improvements in anaerobic power and anaerobic capacity (increase in ATP-PC energy stores).

#### Lactate System
- **Type:** Lactate system uses glycogen in the absence of oxygen for energy.
- **Exercise:** 75-90% intensity.
- **Interval Training:** Moderate/high intensity levels of exercise (1-2 min).
- **Rest Period:** Recovery periods should be between 30 sec – 3 min so that the blood lactate levels don't decrease too much. (1 min of activity to 2 min of rest)
- **Improvements:** Increase glycolytic enzymes and increase lactate tolerance during high-intensity exercise.

### Other Information

- **Over training:** Heavy exercises should always be followed by light recovery sessions, this avoids injury, muscle fatigue, and loss of motivation.

- **Lactate threshold:** Is the point at which blood lactate begins to accumulate significantly above resting concentrations during exercises. Ultimately as the intensity of the exercise increases so does your blood lactate levels. When an athlete is working below the lactate threshold they are said to be using their aerobic energy system.