Aerobics Purpose of Aerobic Activity

To fully appreciate the value of an aerobic conditioning program, one should understand what happens to your body during an aerobic workout and the importance and benefits of the workout. The external effects are generally the components of physical fitness: flexibility, muscular, strength, and endurance, cardio-respiratory endurance and body composition. These areas will show improvement with regular participation and a nutritional diet. But what are the internal effects from aerobic exercise that are not visibly apparent?

1) Heart- During an aerobic workout, both the rate at which the heart beats (heart rate) and the amount of blood the heart pumps per beat (stroke volume) increases. Basically an improvement in the cardiac output occurs due to a continuous exercise regimen. The cardiac output is the product of the heart rate times the stroke volume.

2) Lungs- During aerobic exercise the body demands more oxygen, so the lungs must deliver more oxygen to the working muscles through the blood. As the depth of breathing increases, exchange of oxygen and carbon dioxide between the lungs and the blood occurs more rapidly and efficiently. Regular exercise increases the lungs capacity to deliver oxygen.

3) Metabolism- Metabolism is the body's process of converting food into energy through numerous chemical reactions. During an aerobic workout; as the muscles' need for oxygen increases, more energy is expended, which increases the metabolic rate. Increased metabolic rate allows the body to use more energy, or calories, during aerobic activity, and even at rest.

4) Blood Transport- With aerobic training, blood volume and hemoglobin increase, facilitating the delivery of oxygen. The exercising muscles' ability to extract and use oxygen from the blood improves with regular aerobic exercise. Finally, the amount of breathing needed to perform aerobic exercise decreases, and blood transport increases. These benefits continue during rest and every day living.

NOTE: Cramps may occur if you are not dressed appropriately, you are dehydrated, not properly warmed up, or calcium or potassium deficient.

5. It is better to exercise before a meal than right after a meal. Allow at least 1/2 to an hour between eating and the exercise program.

6. Allow sufficient time (5-10 minutes) to "cool down" after exercise before taking a hot shower. This may be accomplished by slow walking at the temperature at which the exercise was performed.

7. Ideally, exercise should be done in the temperature range of 40 to 85 F., with humidity less than 60%. Rubber or plastic suits are not recommended.

American College of Sports Medicine (ACSM) Position Statements

The Recommended Quantity and Quality of Exercise for Developing and Maintaining Fitness in Healthy Adults

Increasing numbers of persons are becoming involved in endurance training and thus the need for guidelines for exercise prescription is apparent.

Based on the existing evidence concerning exercise prescription for healthy adults and the need for guidelines, the American College of Sports Medicine makes the following recommendations for the quantity and quality of training for developing and maintaining cardio-respiratory fitness and body composition in the healthy adult:

1. **Frequency of training:** 3 to 5 days per week.
1. 2. **Intensity of training:** 60 % to 80% of maximum heart rate reserve, or 50% to 85% of maximum oxygen uptake (VO2 max).
2. 3. **Duration of training:** 15 to 60 minutes of continuous aerobic activity. Duration is dependent on the intensity of the activity, thus lower intensity activity should be conducted over a longer period of time. Because of the importance of the "total fitness" effect and the fact that it is more readily attained in longer duration programs, and because of the potential hazards and compliance problems associated with high intensity activity, lower to moderate intensity activity of longer duration is recommended for the non-athletic adult.
3. 4. **Mode of activity:** Any activity that uses large muscle groups, that can be maintained continuously and is rhythmical and aerobic in nature, e.g. jogging, walking, hiking, swimming, skating, bicycling, rowing, cross-country skiing, rope skipping, and various endurance game activities.

American College of Sports Medicine. "Position Statement: The Recommended Quantity and Quality of Exercise for Developing and Maintaining Fitness in Healthy Adults." *Medicine and Science in Sports and Exercise* 10 (1978): vii-x.

Bioenergetics of Exercise

Body cells require a continuous supply of energy to function. Ultimately, the food we eat supplies this energy. However, our cells do not directly use the energy released from our food: rather, they use a chemical compound called adenosine triphosphate or **ATP**. ATP is the immediately usable form of chemical energy needed for cellular function, including muscular contraction. The foods we eat are made up of carbohydrates, fats, and proteins. The process of digestion breaks down these nutrients into their simplest components (glucose, fatty acids, and amino acids, respectively), which are absorbed into the blood and transported to metabolically active cells such as muscle, nerve, and liver cells. There, on location, these components either enter a metabolic pathway to produce ATP, or they are stored in body tissues for later use. Some of the ATP formed is used immediately to carry on cellular function, and some is stored in the cells for future use. Most food energy is stored in some other form, however, because the body's storage capacity for ATP is quite limited. Excess carbohydrates can be stored as glycogen in muscle liver cells, and fats that are not immediately used for energy production can be stored as adipose tissue. In contrast, relatively little of the protein we eat is used for energy production. Instead, it is used primarily for the growth or repair of cellular structures, or it is excreted in our waste products. (However, ultimately an excess of any kind of food product is stored as fat deposits.)

The Phosphogen System This system relies on ATP and creatine phosphate stored in the muscle (called "phosphogens") to produce instantly, without oxygen. There are enough of these compounds stored to produce energy for about 10 seconds worth of all-out energy before another source is needed.

The Lactic Acid System (anaerobic glycolysis) When large bursts of energy are needed over longer periods of time (about 1-3 minutes), the cardiorespiratory system cannot provide oxygen rapidly enough, so energy must be released anaerobically. Glucose is broken down to release ATP for energy and lactic acid. The formation of lactic acid poses a problem because its accumulation causes painful muscular fatigue until it is removed by breaking down into other compounds in the presence of oxygen.

The Oxygen System (aerobic glycolysis or fatty acid oxidation) ATP can be produced for long-lasting activities when oxygen is brought to the cells by the bloodstream ("aerobic" means with oxygen). Glucose (carbohydrate) is broken down to produce ATP for energy, carbon dioxide, and water. Large amounts of ATP can be produced this way.

During rest, the body uses both glucose (carbohydrate) and fats for energy production via aerobic pathways. The cardio-respiratory can easily supply the oxygen necessary for this low level of energy metabolism. With exercise, however, supplying the required oxygen quickly enough becomes more difficult. Because glucose metabolism utilizes less oxygen than fat metabolism, the body will use more glucose for energy

production and less fat as exercise intensity increases. Significant amounts of fat will only be used to produce energy when relatively low-intensity exercise is sustained over a long period (20 minutes or more), because the nervous system must stimulate the release of fats into the blood from fat storage sites before fat oxidation can occur. In summary, with low-intensity, long duration exercise, aerobic metabolism uses primarily fats as a fuel source. With higher-intensity, shorter-duration exercise, the primary fuel source for aerobic metabolism is glucose.

Wells, Christine. "Exercise Physiology", **Aerobic Dance-Exercise Instructor's Manual**, San Diego: IDEA Foundation, 1987, pp. 3-33

Notes on Physical Fitness

Physical Fitness, According to the American Medical Association is: "the general capacity to adapt and respond favorably to physical effort." Individuals are physically fit when they meet the ordinary and unusual demands of daily life safely and effectively without being overly fatigued, and have energy left for leisure and recreational activities.

Components of Physical Fitness

1. **Cardiovascular Endurance:** the ability of the lungs, heart and blood vessels to deliver adequate amounts of oxygen to the cells to meet the demand of prolonged physical activity.
2. **Muscular Strength:** maximal amount of resistance (one repetition maximum) that an individual is able to lift in a single effort.
3. **Muscular Endurance:** the ability of a muscle to exert sub maximal force repeatedly over a period of time.
4. **Body Composition:** Lean body mass + fat mass = 100%
    - A. Lean body mass: Skeletal muscle, internal organs, fluids, connective tissue, and bones.
    - B. Fat mass: Adipose. Total fat mass is made up of two types:
        1. **Essential Fat:** needed for physiological functions, without it, health deteriorates Men- 3% of Total Body Fat. Women- 10-12% of Total Body Fat.
        2. **Storage Fat:** fat that is stored in adipose tissue, beneath the skin (subcutaneous fat) and around major organs in the body.
    - C. Three basic functions of fat.
        1. Insulator to retain body heat.
        2. Energy source for metabolism.
        3. Padding against physical trauma to the body.

Body Fat Classification% of Body Fat

Level		Men	Women
1.	At risk	< 6	< 14
2.	Excellent	12	14-18
3.	Good	12-16	18-20
4.	Acceptable	17-20	21-25
5.	Fair	21-23	26-29
6.	Unacceptable	24+	30+
7.	Obesity	25	30%

Body Composition (Jackson – Pollock Tables)

D. Physical classification of the body.

1. Ectomorph

a. small bones
b. long and lean body

2. Endomorph

a. minimal definition of muscle tone
b. soft and round body

3. Mesomorph

a. muscular
b. square shape body

5. **Flexibility:** the ability of a joint to move freely through its full range of motion. Changes in muscular temperature can increase or decrease flexibility by as much as 20%. Two things that determine flexibility are age and genetics.
Aerobic – with oxygen – to produce energy. Uses fat as energy source. Movement is rhythmic, continuous and sustained. Examples: aerobic dancing, walking jogging, swimming, cycling, rope-jumping, cross-country skiing, step aerobics.

Anaerobic – without oxygen – the intensity is so high that oxygen is not utilized to produce energy for short periods of time. Uses glycogen as energy source. Examples: 100, 200, 400 meters in track and field, 100 meters in swimming, gymnastic routines, weight training.

Anaerobic threshold – point at which person shifts from aerobic to anaerobic metabolism. The energy source changes from fat to glycogen.

Aerobic Exercise:
1. Utilizes large amounts of oxygen (O2) in working muscles.
2. (O2) transport (or delivery) is improved.
3. Movement is rhythmic, continuous and sustained.
4. Long duration, low to moderate intensity.
5. Adaptations occur:
    a. In the cardiovascular system because of (O2) demands
    b. In the muscular system because of (O2) demands

Anaerobic Exercise:

1. Oxygen needs of working muscle are not being met.
2. Short term/high intensity
3. Speed/power/force (rather than rhythmic, continuous, sustained).
4. Adaptation occur:
    a. Changes in the muscular system
    b. Term or immediate energy transfer systems

Four Principles of Training: Relate to both aerobic and anaerobic training:

1. **Overload Principle:** if you want adaptations in cardiovascular or muscle, work at level above which system has become accustomed.
    a. Duration (repetitions)
    b. Intensity
    c. Anaerobic
        i. Increase repetitions
        ii. Increase weight (intensity)
2. **Specificity of Training:** Specific exercise results in specific adaptation creating specific training effects. Note: Cross training does not conflict with specificity benefits derived from participating in one sport. Example: runner who cycles will be a stronger runner.
3. **Individual Differences:** Everyone is genetically unique and training benefits are maximized when a program is planned to meet specific needs. Evaluation is important.
4. **Reversibility:** Exercise benefits are transient and reversible.
    a. Five years of continued exercise takes a long time before a person reverses.
    b. Benefits of exercise become part of physiology.
    c. Age can affect reversibility.

Rest is critical (Gail Weaver, M.S.)
1. Body adaptations occur while you rest.
2. Body ability to adapt decreases by not resting.

Causes of Low Back Pain (is preventable)

1. Physical inactivity
2. Weak abdominals
3. Poor posture and body mechanics
4. Excessive body weight

Exercise Physiology: is the study of the functioning body at work (exercise) at the cellular and biochemical level. Three areas studied:

1. Energy transfer
2. Cardiovascular system
3. Muscular system

Class Format

Class Format For Aerobics Class

The following is a suggested format for an aerobics workout class. A detail description of each area is also provided.

WARM-UP – The warm-up exercises should begin slowly; gradually increase the intensity until a moderate pace is reached. Perform rhythmic movements that flow from one movement to the next. Remember that the warm-up must do just that - warm the students up and prepare them for the next segment.

STRECH – Stretching techniques should involve a long sustained static stretch rather than a ballistic bouncing stretch. Muscles have a stretch flex – when you bounce, the reflex causes the muscles to react by tightening. When you are stretching, got to the point of mild tension, relax and hold for 10 to 309 seconds. Stretch all the muscles involved in the workout activity.

PRE-AEROBIC WORKOUT – The pre-aerobic workout phase is very similar to a low impact routine. This is called utilizing the rehearsal effect. The pre-aerobic, low impact workout, offers the opportunity to rehearse moves that may be encountered in the aerobic workout. The pacing should be low to moderate.

AEROBIC WORKOUT – The aerobic workout routines are the main challenge and excitement of the aerobic class. The routines are performed to improve cardiorespiratory fitness. Generally 20 minutes or longer in length.

HEART RATE CHECK – This creates the opportunity to monitor the student's heart rate to observe whether they are receiving the training effect. We use a 10-second pulse count.

COOL-DOWN – The cool-down prepares the body for rest, just as the warm-up prepares the body for action. The cool-down is a relaxing combination of exercises and movements, preformed at a lower intensity, which allows the body to gradually return to its pre-activity state.

FLOOR EXERCISES – Also called "body toning", this phase is devoted to specific muscle groups. Specific exercises to work certain muscle groups (arms, abdomen, and etc.) should be blended into this workout.

STRETCH AND RELAXATION – As stated earlier in the "stretch" phase, static stretching should be utilized. This portion should concentrate on stretching the same areas that were exercised previously.

A MEDICAL PERSPECTIVE: Nutritional Needs

Adapted from Donna Terbizan, BS, MA
The Ohio Runner

Everyone has a requirement for food, from the person who sits behind his desk to the athlete who trains three or more hours a day. The body works and moves by using energy that comes from the food we eat. The food we eat consists of different nutrients we need to survive to be active. There are two separate classes of nutrients: energy nutrients (carbohydrates, fats and proteins), and others (vitamins, minerals, electrolytes and water) needed for the digestion of the energy nutrients.

Carbohydrates are found in a variety of foods, in the form of complex carbohydrates (starches) and simple carbohydrates (sugars). Carbohydrates are the first group of nutrients to be called upon by the body to supply energy. When they are digested, glucose (which is a simple sugar that provides energy for muscular contraction and for proper function of the brain) is formed. Each gram of carbohydrate provides 4 calories. It is recommended that carbohydrates, particularly complex carbohydrates, make up approximately 50% of one's daily calories.

Fats (lipids) are the major source of stored energy in the body, the most concentrated source of food energy and the nutrient that takes the most time to be digested by the body. Some fat in and on the body is required, because it makes up certain structures (some hormones), because some vitamins are fat-soluable, and because it protects body organs. Unsaturated and polyunsaturated fats (plant oils, with the exception of palm and coconut oil) are preferred to saturated fats (animal fats), because the latter is associated with coronary heart disease. Fats provide 9 calories per gram, and the daily diet should consist of no more than 30% fat.

Proteins are used in cell growth and repair, but are a very inefficient source of energy. Complete proteins (containing all 8 essential amino acids needed by humans) come from animal sources, while incomplete proteins from plant sources can be combined to provide for human needs. Proteins provide 4 calories per gram, and should provide 15-30% of the daily calories in most cases. A rule of thumb is that an active person needs about 1 gram of protein (about the weight of a paper clip) per kilogram (2.2 lbs) of body weight.

Vitamins and **minerals** act as catalysts in the chemical reactions that occur in the body. The water-soluable vitamins (B and C) are not stored in the body, but must be supplied daily. Excesses of these are excreted in the urine. The fat soluable vitamins (A, D, E, and K) are stored in the body and can be dangerous if taken in large amounts. Vitamins do not need to be added to a well-balanced diet, but should be taken when recommended by a qualified professional.

Water is an essential nutrient because a continuous supply is needed for digestion, absorption, energy production, temperature regulation and elimination of wastes. The total body weight is about 60% water, and the requirement for water depends on the body size, the activity level, and the external environment. Physical activity produces heat, and the body loses heat primarily through perspiration. The normal recommendation is 8 glasses of water per day, with more to replace that lost by active individuals.
Any food ingested soon before an activity will remain in the stomach, and be of no use for energy production, until the activity is concluded because the blood is directed to the working muscles instead of toward the digestive tract. Water replacement is important, however. Water can be consumed at anytime - pure water is better able to be transported to the tissues than a sugary solution.

The need for calories is highly variable – depending on basal metabolism, environment, and activity level. In general, 3500 calories translates into 1 pound of body fat, whether stored or utilized.

When you start to slide out of shape, you really look out of shape before your bathroom scales give you a clear warning. That's because each pound of fat you put on bulges out 18% bigger than lean. (1.1 liters compared to 0.9)

American Health Vol I, No IV, p 17, Sept/Oct 1982.

Despite the sports drink hoopla, water is still the best liquid replacement for ordinary mortals who work out for less than 90 minutes. To stay hydrated, drink six to eight ounces 15 minutes before exercise, sip throughout and drink another two cups afterward. Don't wait until you're thirsty; by the time you feel it, you're already partially dehydrated. You'll know your drinking enough if your urine is clear and you make trips to the restroom every two to three hours during the day. If your workout goes longer than 90 minutes or you're a heavy sweater, a sports drink may be called for.

Replace fluids, energy and electrolytes (sodium, potassium and magnesium) with water, diluted fruit juice, nonfat yogurt, bananas, raisins, pretzels, and baked potatoes. All totaled, you'll need at least 200 calories worth of carbohydrate rich snacks per workout.

It's also important to know what not to eat prior to a workout. Be wary of gas forming foods like broccoli, onions, corn, kidney beans, and fatty foods—nuts, potato chips, ice cream—which take longer to digest, settle like a lead balloon and may trigger queasiness.

NOTES ON NUTRITION AND WEIGHT LOSS

Carbohydrate	= = = = =	4 calories/gram 4	50-60% daily intake 10-15% daily
Protein Fat		calories/gram 9	intake >30% daily intake
Alcohol Water		calories/gram 7	
		calories/gram 0	
		calories/gram	

1 lb. = 3,500 calories

To lose one pound per week, eliminate 500 calories per day.

It is advisable to lose weight gradually. A loss of body fat of up to 1 pound per week is within acceptable medical limits. This is partially based on the fact that those who have been successful in losing and maintaining a desirable body weight, lost no more than 1 pound per week. WEIGHT LOSS PER WEEK: 1/2 –1 POUND.

Some rules to lose weight by:

1. Minimum DCI (DAILY CALORIC INTAKE): 1200-1500 CALORIES
2. Do not drop intake by more than 500 calories less than your usual daily caloric intake.
3. Cut out the fat in your DCI (keep it above 10%)
4. Do not weigh yourself – go by the fit of your clothes.
5. Do not skip meals. It's better to eat less, more often. (4-6 times a day).

SAFETY AND INJURY PREVENTION

TYPES OF INJURIES

The injuries and conditions commonly associated with aerobic exercise classes can be extremely disabling. If injury awareness and safety is not emphasized, a student can be damaged mentally and physically. To prevent aerobic exercise injuries the following areas must be understood.

Overuse - Overuse means an excessive amount of activity of exercise; a practice that is potentially harmful to involved body parts. Overuse is the primary cause of aerobic exercise injuries. By placing too much stress on one area of the body over an extended period of time causes a break down. This is more commonly known as a "breaking point." Excessive, repeated stress causes failure, which usually results in chronic injury.

Chronic Injury – Chronic problems have a gradual onset, without history of a specific incident of injury. They last for several weeks, often getting neither better nor worse. Generally symptoms of discomfort, swelling or limited motion persist. If a chronic injury continues to be stressed, it may become an acute injury. (Shin splints is a chronic injury.)

Acute Injury – An acute injury occurs when an area already stressed and weakened is pushed beyond its limits and further injury results. Acute injury has a more sudden onset, usually characterized by a specific incident. The symptoms are specific pain, swelling, limited motion and inability to use the injured area normally. Acute injuries may also occur without being related to chronic injuries, as in an ankle sprain. (Stress fracture is an acute injury resulting from a shin splint.)

Stress Fractures – Stress fractures occur in major weight-bearing locations of the body, especially the foot and lower leg. It is an impending fracture due to excessive stress (overuse) of a bone. Stress fractures occur gradually. There is usually a specific area of pain directly over the affected bone. The affected area always tender to the touch, and the pain is sharp and radiating. Pain may persist in varying degrees for 4-12 weeks.

Muscle Strain – A muscle strain is the overstretching of a muscle, which damages the muscle fibers or surrounding tissue. Once fiber of a muscle has been damaged, scar tissue forms; scar tissue is much weaker than muscle tissue. Injury can occur in the belly of the muscle, in the muscle fascia and in the tendons of the muscles that attach the muscles to the bones.

Sprain – More serious than a strain, a sprain is a sudden or violent twisting or wrenching of a joint, causing the ligaments to stretch or tear and often the blood vessels to rupture, with hemorrhage (bleeding) into the surrounding tissue. Symptoms are swelling, inflammation, area tenderness, and discoloration. Ankle sprains are the most common in aerobic exercise.

SAFETY AND INJURY PREVENTION (CONTINUED)

SELF-CARE INJURIES

Stitch Pain - A pain in he side from running is called a stitch pain, which is the result of a spasm in the diaphragm. A stitch pain usually occurs due to a lack of oxygen and/or a buildup of carbon dioxide from poor rhythmical breathing, as well as improper preparation such as warm-up or the body trying to digest food.

- **Treatment** – Bend over in the direction of the stitch and slowly perform inhale/exhale breathing, or walk slowly compressing and massaging area while performing inhale/exhale breathing.

Blisters – A blister, caused by friction, is an escape of tissue fluid from beneath the skin's surface. A blister generally occurs on the toes or foot area of the exerciser, therefore proper fitting footwear and socks is recommended.

- **Treatment** – Never pop or drain a blister unless it interferes with your daily activity to a point where it has to be drained. If this occurs, clean the area with antiseptic, then lance the blister with a sterile needle at several points, then drain. As it dries, do not peel off top skin. Keep area clean and well covered when exercising.

Cramp – A cramp is a painful spasmodic muscle contraction. Muscle cramps commonly occur in the back of the lower leg (calf), the back of the upper leg (hamstring) and the front of the upper leg (quadriceps). Cramps are related to fatigue, muscle tightness, or water, salt, and potassium or calcium imbalance.

- **Treatment** – Gently stretch and/or massage the cramped muscle area. Discontinue exercise that may be contributing to the cramp. Increase your potassium intake (citrus juices, bananas) naturally.

Lactic acid formation is associated with muscle fatigue. If removal of lactic acid by the circulatory system cannot keep pace with its accumulation in the muscle, temporary muscle fatigue occurs with painful symptoms (usually called "the BURN").

Muscle Soreness and Stiffness: *Acute Soreness* after exercise is believed to be related to a lack of blood (oxygen) flow and general fatigue of muscles that were exercised. *Delayed Soreness* after approximately 12 hours and lasting 2-4 days may be related to actual minute tears in muscle tissue, muscle spasms that increase fluid in retention that stimulate painful nerve endings and overstretching or tearing of connective tissue in and around the muscles and joints. *Prevention:* proper stretching before and after exercise, progressing gradually into the exercise program. Avoid doing too much, too soon.

SAFETY AND INJURY PREVENTION (CONTINUED) SAFETY AND INJURY PREVENTION (CONCULDED)

R-I-C-E: The Recipe for First Aid

Every athlete faces the risk of injury, and the aerobic exerciser is no exception. Some injury may require medical attention with professional diagnosis and treatment. Other injuries, and even the serious ones, require the first aid treatment that quickens the healing process called R-I-C-E.

Rest – Stop using the injured area as soon as you experience pain.

Ice – Ice reduces swelling and alleviates pain. Apply ice immediately to the injured area for 15 to 20 minutes.

Compression – Firmly wrap the injured body part with an elastic or compression bandage between icings.

Elevation – raise he injured part above the heart level to decrease the blood supply to the injured area.

You must let the injury heal completely before resuming activity and follow these 5 tips of injury recovery offered by Dr. Bob Goldman, President of the National Academy of Sports Medicine.

1) Limit your activities to things you can do comfortably. Avoid any activities that cause pain at the site of injury.

2) Gently try to reestablish range of motion. For example, if you have an ankle sprain, write the alphabet with your big toe.

3) Rebuild your strength by lifting weights. Go to a gym to advice on how to start your program.

4) Maintain your fitness level with rapid walking or swimming, or using a stationary bicycle, stair climbing, cross-country skiing or rowing machine. You shouldn't feel pain during or after the activity.

5) For minor aches and pains use an over-the-counter medication such as ibuprofin to reduce pain.

FINDING YOUR TARGET HEART RATE (KARVONEN FORMULA)

RESTING HEART RATE:

- "Average" is 70 beats per minute
- A low resting heart rate is an indication of fitness
- Other factors can affect your resting heart rate
- Count your pulse for 60 seconds when you wake up, before getting out of bed.
- My *resting heart rate* is _____ beats per minute

MAXIMUM HEART RATE:

- Maximum heart rate declines with age
- Maximum heart rate can be estimated by subtracting your age from 220
- My estimated *maximum heart rate* is _____ beats per minute

HEART RATE RESERVE:

- To find heart rate reserve, subtract the resting heart rate from the estimated maximum heart rate
- My *heart rate reserve* is _____

TARGET HEART RATE:

- The American College of Sports Medicine recommends exercising at 60-80% of your heart rate reserve
- Figure your target heart rate at 60% and 80% (Use the space below.)

SAMPLE:

A 30-year old with a resting heart rate of 70 beats per minute wishes to exercise at an intensity of 60%. To calculate:

60%
80%

220 (Everyone starts with the number *220*) 220 -30 (Subtract the *age*) -30 190 (This is the estimated *maximum heart rate*) 190 -70 (Subtract the resting heart rate) -70 120 (This is the *heart rate reserve*) 120

* x.6 *(Multiply by 60% intensity) or **(Multiply by 80% intensity) x.8 72 (This is the 60% of heart rate reserve)

96.0

+70 +70 (Add the *resting heart rate*)

142 **This is the target heart rate for one minute** 166

Now divide by 6 to yield a count for 10 seconds. (A 10 second count is taken during the

class) 60% is 142 divided by 6 = 23.680% is 166 divided by 6 =27.4

*** Find your target heart rate at 60%:**
**** Find your target heart rate at 80%:**