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Preparation Manual for the Port Authority of New York and New Jersey Police Officer Physical Performance Test



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Introduction

The mission of the Port Authority of New York and New Jersey Police Department (PAPD) is to provide protective services to the users of New York/New Jersey airports, seaports, bridges, tunnels, bus terminal, train service (PATH), the World Trade Center, and all other properties belonging to the Port Authority. To provide these services, PAPD Police Officers must perform essential job tasks that are physically strenuous. These tasks include restraining or subduing resistive individuals, handcuffing resistive individuals, pulling/dragging suspects, running to get to an emergency scene or to pursue a suspect, and running up/down flights of stairs. The physical abilities needed to complete these essential tasks include muscular strength, muscular endurance, anaerobic power, and cardiovascular endurance.

The PAPD recognized the need for Police Officers to be capable of performing strenuous tasks. To ensure that Police Officer applicants possessed the required physical abilities, a physical performance test was developed, validated, and implemented. The physical performance test assesses the abilities needed to perform essential police officer tasks. The test consists of three components: 300 Meter Run, Push-Ups, and 1.5 Mile Run. This document provides information about each test and how to prepare and train for the physical performance test. The fitness program in this document has been specifically designed to improve your fitness to complete the physical performance test.

Medical Screening

Before you start this fitness program, evaluate your current health. As recommended by the American College of Sports Medicine, men aged 40 or greater and women aged 50 or greater need a medical exam and clearance before starting a new fitness program. If you are at risk for heart disease, it is extremely important that you consult your physician before you start a fitness program. If you have other medical conditions or musculoskeletal injuries, you should seek medical approval before starting a fitness program.

Testing Precautions

The test sessions will be set up to ensure safe participation by all participants. The tests you will be taking are physically strenuous.



Test Site Procedures

Wear comfortable PAPD Academy approved clothes such as sweatpants, shorts, t-shirts, and gym or other rubber soled shoes. No tobacco use will be allowed in any testing area. An administrator will provide test instructions and demonstrate the proper procedure for performing each physical test and answer any questions prior to beginning.

To ensure the safety of all participants, testing will be stopped if an applicant exhibits any sign of nausea, shortness of breath, chest discomfort, excessive sweating or dizziness. Applicants must also follow all testing rules such as not watching other applicants perform the tests. Failure to follow testing rules and directions may result in your being disqualified.

Physical Performance Test

Preparation

It is expected that all candidates be physically fit on Day 1 of the Police Academy. Training for the Police Academy should be performed well in advance of Day 1 to ensure compliance with the Police Academy standards (listed below). It is recommended that you utilize a training log to track your progress on the below exercises:

- 300 Meter Run
- Push-Ups
- 1.5 Mile Run

Candidates must strive to achieve 70 points or more on each test.

NOTE: On Day 1 of the Police Academy the recruit class will be training to the minimum standard for each assessed physical activity. Failure to adhere to the minimum standards will result in immediate placement in a remedial category with possibility of dismissal.

Physical Tests

The following tests will be administered during the physical performance test. The physical tests you will be taking are strenuous. Please read these descriptions carefully.

300 Meter Run

The purpose of this test is to evaluate your anaerobic power. The test involves running 300 meters as quickly as you can. This is one and a half laps on a 200-meter track or 100 meters less than one full lap on a 400-meter track. Your score is the time to complete the 300 Meter Run. Only one trial is given. Information on how to prepare/train for this test is provided in the subsequent sections of this manual.



Push Ups

The purpose of this test is to evaluate the muscular strength and muscular endurance in your upper body. The test involves performing push-ups, as many as possible, until exhaustion. Performing a correct push-up is described below as well as push-up errors.

Starting Position

1. The feet are 8 to 12 inches apart and the arms are fully extended, palms in contact with the floor, and slightly wider than shoulder width apart. The legs, buttocks, back, and shoulders must be in a straight alignment (Figure 1).

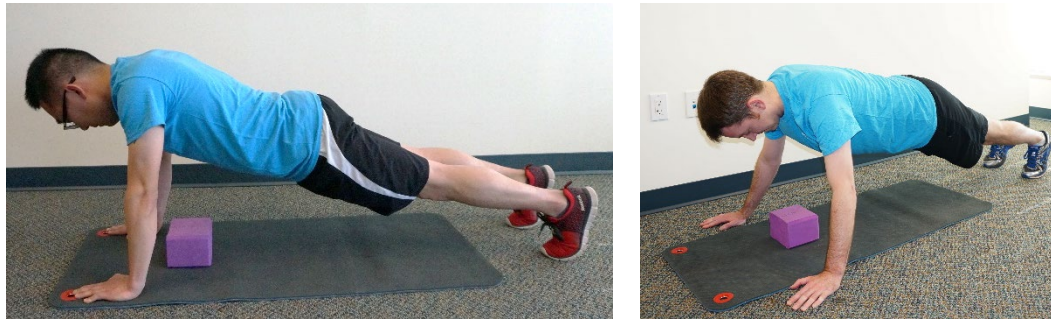


Figure 1. Starting push-up position.

Correct Performance of a Push-Up

1. Keep the body fully extended and lower the torso towards the foam block by flexing the elbows. Continue to lower the torso until the chest touches the foam block. The back, legs, and buttocks must remain straight during the descent.
2. Once the chest touches the foam block, return to the starting position by straightening the elbows to the fully extended position.
3. To complete a correct push-up, the chest must touch the foam block with the body in straight alignment (Figure 2) and return to the starting position.

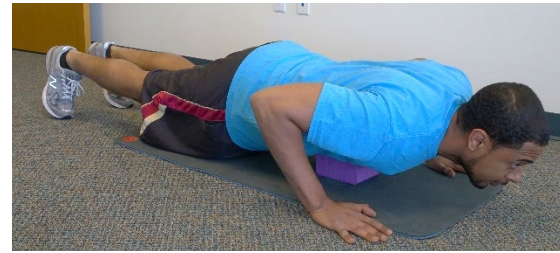


Figure 2. Completion of a push-up.

Push-Up Errors

1. Back, legs, buttocks, and shoulders are not in straight alignment (Figure 3).

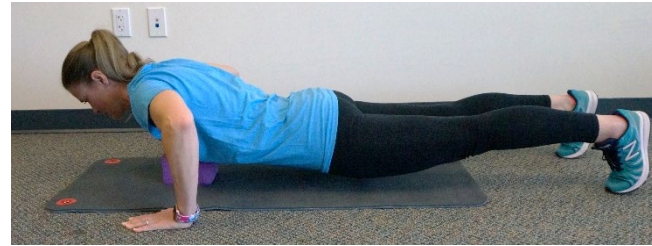
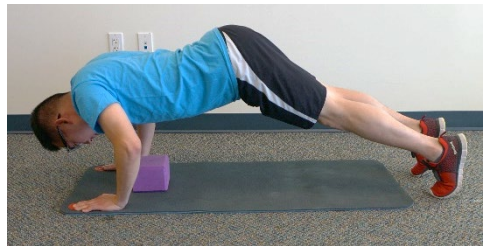


Figure 3. Push-up error: not in straight alignment.

2. Knees in contact with testing surface (Figure 4).



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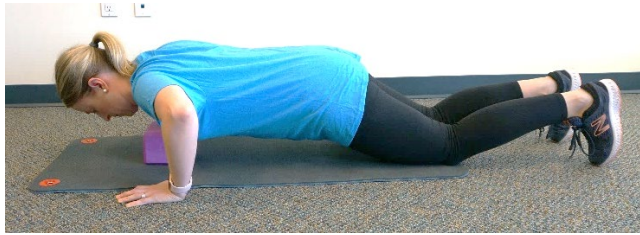


Figure 4. Push-up error: knees in contact with test surface.

3. Not returning to correct starting position with arms fully extended.\
4. Chest does not touch foam block.



Scoring

1. Your score is the total number of correctly performed push-ups completed. Only one trial is given.
2. Improperly performed Push-ups do not count. During the test, applicants will be informed when an improper push-up has been performed.

Information on how to prepare/train for this test is provided in subsequent sections of this manual.

1.5 Mile Run

The purpose of this test is to evaluate your aerobic capacity. The test involves running 1.5 miles as quickly as you can. During this test you will complete approximately 12 laps on a 200-meter track and approximately 6 laps on a 400-meter track. Your score is the time to complete the 1.5 Mile Run. Only one trial is given. Information on how to prepare/train for this test is provided in subsequent sections of this manual.

Police Academy Training Program

Candidates selected into the Police Academy will be required to meet academic, physical fitness (see below) and other standards. Only those candidates who meet the required achievement standards will graduate from the Academy and be considered for appointment to the Port Authority Police Force. Using the points table scoring below, a Police Recruits must attain a total score of 210 points across the three tests (300 Meter Run, Push-Ups, 1.5 Mile Run) and achieve 70 points or more on each test to meet academy graduation standards. Failure to do so by the third formal physical performance test of Academy Training will result in dismissal.

Points	300 Meter Run (Seconds)	Push-Ups (Number Completed)	1.5 Mile Run (Minutes:Seconds)
0	69 or slower	24 or less	14:25 or slower
70	68-67	25-27	14:24-14:15
75	66-62	28-38	14:14-13:07
80	61-57	39-49	13:06-11:59
85	56-51	50-61	11:58-10:51
90	50-45	62-73	10:50-9:43
95	44-39	74-85	9:42-8:35
100	38 or faster	86 or more	8:34 or faster

Based on the information above, at minimum, by the third formal PAPD Academy physical performance test, you must be able to:



- Complete the 300 Meter Run in 68 seconds or faster:
- Complete 25 or more Push Ups
- Complete the 1.5 Mile Run in 14 minutes and 24 seconds, or faster

General Training Principles

To improve physical fitness and your performance on these physical tests, you must exercise. There are three general training principles that should be incorporated into a fitness program. Adherence to these principles will enable you to meet your exercise goals. These principles are *overload*, *specificity*, and *motivation*.

Overload and Progression

To improve fitness, you must increase your physical activity. The exercises performed must be at a level that exceed or *overload* your current capabilities. To attain an overload, you must alter the **FITT parameters**.

- F or frequency of exercise per week (e.g., 3 times per week to 4 times per week)
- I or intensity of the exercise (e.g., run a mile in 9 minutes rather than 10 minutes)
- T or time spent exercising (e.g., duration of bicycle ride 20 to 30 minutes)
- T or type of exercise (e.g., sit-ups to plank)

One or a combination of the **FITT** parameters may be increased to overload the body. For example, if you wish to increase muscular strength, you can increase exercise intensity by increasing the amount of weight lifted and decreasing the number of times the weight is lifted. To increase aerobic capacity (aerobic fitness) you can increase the time spent performing the activity and/or the frequency of the activity (e.g., running).

Specificity

The human body responds to the specific demand placed upon it. To improve performance of physical tests involving upper body strength, one must select exercises that use the muscles in the upper body. For example, to effectively train to improve push-up performance, you need to perform exercises that involve the muscles in the chest, triceps, and shoulders. Since the body's response to training is specific, the exercises in your fitness program must place **specific demands** upon the same physiological systems and muscle groups used in the test and to perform police officer tasks.



Motivation

To achieve the desired fitness level you must be motivated to participate on a scheduled basis and use the overload principle. Staying motivated is the key to success and can be achieved if you select exercise activities you enjoy. If motivation is a problem (1) set aside a specific time to exercise, (2) vary your program (e.g., use different strength exercises to train the same body parts), (3) keep a record of your progress, and (4) exercise with a partner. It is widely accepted that an exercise partner will encourage improvement and participation.

Applying the FITT principles will increase your fitness level. However, remember that some discomfort such as sore muscles and/or breathing heavily will be experienced as you increase the intensity and duration of your exercises. If muscle soreness and/or fatigue occur on a frequent basis, you may take a multiple day rest period. If these signs are persistent, contact a medical professional.



Fitness Training Program

Exercise Session Phases

Exercise sessions are defined as each time you participate in some type of training. An exercise session should consist of three phases: (1) warm-up, (2) workout, and (3) cool down. Completion of these three exercise phases will decrease the risk of injury and muscle soreness. The purpose and activities included in each phase are described below, along with a list of precautions to observe before each exercise session.

Exercise sessions consist of flexibility, strength, anaerobic, and/or aerobic activities. Each training session should include stretching exercises in the warm-up and cool down phases to improve flexibility.

The workout phase of an exercise session can include strength, anaerobic, and/or aerobic components. If an exercise session includes a strength training workout, it should be designed to improve muscle strength in several body areas (e.g., upper and lower body). Strength training workouts should be included in the exercise session on nonconsecutive days (e.g., Monday, Wednesday, and Friday; or Tuesday, Thursday, and Saturday). To avoid injury and enhance strength development, always allow at least 48 hours of rest after each strength training workout.

Exercise sessions that include an aerobic workout are designed to improve cardiovascular endurance. Aerobic workouts should be included in the exercise session three times per week. The aerobic workout may be completed on the same day as the strength training workout, (before or after strength training) or on a separate day.

Anaerobic workout sessions are designed to promote strength, power, and speed. Anaerobic specific exercises should be included in the exercise session a minimum of two times a week. The anaerobic workout may be completed on the same day as strength training, but not on the same day as aerobic training. Like aerobic training, it should be performed after the strength training portion of a workout.

Warm-Up

The warm-up includes dynamic stretching exercises for the upper and lower body, and back and core, along with light aerobic activities (e.g., jogging in place). Warm-up activities increase blood flow and body temperature which prepares the body for exercise and reduces the risk of muscle and joint injuries during the workout.

The stretching exercises improve flexibility. Improved flexibility reduces the risk of muscle soreness and injury after performing physically demanding exercises or job tasks. Increased flexibility of lower back and upper leg muscles also helps to alleviate low back pain.



Workout

The workout is the most strenuous phase of the exercise session and includes muscular strength, muscular endurance, anaerobic power, and aerobic fitness exercises. Muscular strength and endurance consist of the ability of the muscles to exert force for a single activity (e.g., lift and carry items weighing 30-50 lbs.) or a continuous activity (e.g., physically restrain suspect). Muscular strength and endurance are increased through weight/resistance training. The workout also includes aerobic activities that increase the efficiency of your cardio-respiratory system. These aerobic activities are rhythmical, use large muscle groups, and can be sustained for a given period. Aerobic activities include running, walking, stair climbing, swimming, rowing, and bicycling. Workout activities vary with the goals of the fitness program. Anaerobic activities include running/sprinting for shorter distances (e.g., 300 meters) and exercises involving all-out physical effort for brief time periods.

If you experience dizziness, nausea, a rapid heart rate, chest pains, or difficulty breathing during the workout, gradually stop all exercise. Notify your exercise partner of your condition and seek medical assistance. However, remember that some discomfort will be experienced (e.g., breathing heavily) as you increase the intensity of your exercises.

Cool Down

The cool down includes light aerobic activities and static stretching exercises. The light aerobic activities precede the stretching to prevent blood from pooling in the arms and legs and reduce the likelihood of dizziness and fainting. The stretching exercises improve flexibility which reduces the risk of muscle soreness after the workout.



Designing Your Daily Exercise Program

This fitness program is divided into three types of exercise sessions: (1) strength exercises, which may help to improve scores on the push-ups test, (2) aerobic exercises, which may help to improve 1.5 mile run time, and (3) anaerobic exercises, which may help to improve 300-meter run time. Strength training exercises may be combined with either aerobic or anaerobic specific training. However, aerobic and anaerobic exercise should be performed on separate days. Flexibility exercises should be incorporated the warm-up and cool down of every bout of exercise.

The order in which the strength or flexibility exercises are performed is important. The dynamic flexibility exercises should be performed during the warm-up, and static flexibility exercises should be performed during the cool down. Strength exercises should be performed starting with larger muscle groups that involve multi-joint exercises then moving to exercises that target the smaller muscle groups. Appendix B presents a training recording sheet that can be used to keep track of workouts and monitor improvements. If you elect to perform both strength and aerobic or anaerobic training exercises on the same day, it is suggested that you complete the strength training exercises before completing the aerobic or anaerobic training activity. For example, your exercise session may consist of dynamic flexibility exercises and light aerobic activities, followed by a strength training for the total body. Strength training is then followed by an aerobic or anaerobic training workout, such as a long-distance run or 10 minutes of 100-meter sprint intervals, and a cool down consisting of light aerobic and static flexibility exercises.

Warm Up Program

The warm-up for each exercise session consists of dynamic stretching and light aerobic exercises. Follow the "General Directions" listed below to complete the warm-up.

General Directions

1. Dynamic stretches should be continuous in movement, do not hold for more than 3-5 seconds.
2. Do not bounce.
3. Do not hold your breath.
4. Concentrate on feeling the stretch in the muscle groups described for the exercise.
5. Perform the light aerobic activities before or after the dynamic stretching exercises.

Precautions

1. Do not stretch recently injured muscles or joints.
2. Do not stretch to a point where you feel pain, or the muscle group being stretched begins to quiver.



Dynamic Warm-Up Exercises

Examples of Warm-Up exercises are listed below. Appendix C presents an explanation of each exercise.

1. Standing or Walking Knee Hug
2. Standing or Walking Quad Stretch
3. Straddle Stretch
4. Standing or Walking Forward Hip Flexor Lunge
5. "Saw" Arm Swings
6. Calf Stretch
7. Seated Single Leg Hamstring Stretch
8. Laying Figure 4 Stretch
9. Arm Cross
10. Anterior Shoulder and Chest Stretch

Cool Down Program

The cool down consists of the light aerobic activities and stretching exercises, as performed in the warm-up. The light aerobic activities must be completed first to gradually bring the heart rate down to normal levels. Follow the "General Directions" listed below to complete the cool down.

General Directions

1. For all flexibility exercises assume the correct start position and slowly move into the stretched position.
2. Hold the stretched position for 5-15 seconds. Do not bounce. Do not hold your breath. When you begin, hold the stretch for 5-10 seconds. As you progress hold the stretch for 10-15 seconds.
3. Concentrate on feeling the stretch in the muscle groups described for the exercise.

Precautions

1. Do not stretch recently injured muscles or joints.
2. Do not stretch to a point where you feel pain, or the muscle group being stretched begins to quiver.



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Cool Down Exercises

Begin with light aerobic exercise such as jogging in place or a brisk walk for 1-2 minutes. Then follow the directions in Appendix C for each exercise.

1. Standing or Walking Knee Hug
2. Standing or Walking Quad Stretch
3. Straddle Stretch
4. Standing or Walking Forward Hip Flexor Lunge
5. "Saw" Arm Swings
6. Calf Stretch
7. Seated Single Leg Hamstring Stretch
8. Laying Figure 4 Stretch
9. Arm Cross
10. Anterior Shoulder and Chest Stretch



Muscular Strength and Muscular Endurance Training

Resistance training is one of the best methods to develop muscular strength and endurance. Improvements in muscular strength and endurance may improve your performance on the Push-Ups test as well as the 300 Meter Run. Your initial strength training workouts will be used to determine the amount of weight to lift for each exercise. To determine the weight to use for each strength training exercise follow the instructions listed below. Remember that it is better to use lower weights in the beginning and gradually build to heavier weights. The strength training instructions provide guidance related to increasing the exercise weight and the number of repetitions. The following instructions provide tips for performing each exercise correctly and will assist in determining whether the weight should be increased. The "General Directions" outline how to perform the strength training exercises. The guidelines for determining the amount of weight to lift and how to safely increase the weight lifted are described in "Starting Weight Level Determination". Remember that including the actual Push-Ups test in strength training workouts can improve your performance.

General Directions

1. Make sure to assume the correct starting position and lift and lower the weight through the full range of motion.
2. If you use an Olympic bar with adjustable weight plates or adjustable dumbbells, attach collars to each end of the bar to secure the plates.
3. Lift and lower the weights with slow controlled movements. Take 1-2 seconds to lift the weight and 2-3 seconds to lower it.
4. DO NOT hold your breath during any phase of the exercise. Exhale as you lift and inhale as you lower the weight.
5. Complete 8-12 repetitions of each exercise then rest for 45-60 seconds. This series of repetitions is called a set.
6. Complete 3 sets of each exercise with a 45-60 second rest between each set. When you first begin the program, you may only be able to complete 2 sets, but the goal is to work until you can complete 3 sets at a specific weight.
7. After completing the strength training workout, perform the cool down light aerobic exercises followed by static stretching exercises.

Starting Weight Level Determination

When using weights in an exercise, follow the steps listed below to determine the weight to use that is appropriate with your fitness level. If a strength training exercise does not involve a weight, perform it as listed in the instructions.

1. Choose a weight that feels comfortable to complete 10 repetitions, with the last three repetitions being harder than the prior repetitions.
3. If you cannot complete 10 repetitions, drop down to the next lower weight (e.g., 20 lbs. to 15 lbs.).



4. If you complete 10 repetitions with the weight, choose a heavier weight (e.g., 20 lbs. to 25 lbs.).
5. Rest 30 to 45 seconds and attempt to perform 10 repetitions with the heavier weight. If you are unable to perform 10 repetitions, this is your starting point.
6. Example for choosing the correct starting weight for bicep curls using dumbbells.
 - a. If adjustable dumbbells are used, place the weight plates (e.g., 2.5 lbs.) on each end of the bar and lock them in place with a clip or collar. Remember, that the bar weight is approximately 4 to 5 lbs. If unit weighted dumbbells are used, select the weight you think you can curl (e.g., 5, 10, 12, 15, 20, 30 lbs.).
 - b. Stand in an erect position with the knees slightly flexed and perform the curling motion. If it is a struggle to complete one curl remove weight from the dumbbell or select a lighter dumbbell (e.g., 20 lbs. to 15 lbs.).
 - c. If it was very easy to perform one repetition, increase the weight (e.g., 15 lbs. to 20 lbs.).
 - d. Perform 10 repetitions with the adjusted (lower or higher) weight level.
 - If you are unable to perform one repetition using the proper form, reduce the weight a second time.
 - If you can perform two or more repetitions but are unable to perform 10 repetitions (e.g., 7 completed), this is your starting weight.
 - If you can easily perform 10 repetitions using the proper form, increase the weight a second time and repeat this process. When able to complete less than 10 repetitions using the proper form, this is the starting weight.

Strength Training Session

After determining the starting weight for each strength training exercise, begin the training session. The goal is to perform three sets of each exercise. For example, if you are performing chest presses, attempt to complete 8-12 repetitions in the first set, rest 45-60 seconds and complete the second set of 8-12 repetitions. This is followed by a second rest period and the third set of 8-12 repetitions. It is normal to be unable to complete 8-12 repetitions for each set. However, it is important to complete the three sets. When you can comfortably complete three sets, increase the weight as outlined in steps 2-6 above. Use this procedure each time you need to increase the weight. The strength training workout may be performed in different routine structures. They may be performed as a total body workout, upper and lower body splits, or a circuit format.

Precautions

1. If you have high blood pressure or other cardiovascular problems, obtain medical clearance from your physician before starting the strength training program.



2. Complete the exercises that use large muscle groups first (e.g., chest press, squats). Next perform the exercises that use smaller muscle groups (e.g., curls, heel raises).
3. Complete the full range of motion for each exercise, but DO NOT lock the joints (e.g., elbows, knees) when the exercising limbs are in the extended position.

Strength Training Exercises

Strength training exercises are listed in Table 1 and explained in Appendix D. The following exercises were chosen specifically to improve performance on the four physical tests. Alternate exercises can be added to the program after 3-6 weeks depending upon your improvement. These exercises either use your own body weight (BW), dumbbells (DB), or barbells (BB). Appendix D provides directions on how to perform each exercise in Table 1. For Push-Ups, follow the instructions provided earlier. Appendix E provides an example exercise schedule that includes weight, aerobic, and anaerobic training.

Table 1. Primary Strength Training Exercises

Upper Body	Lower Body	Total Body	Core
Triceps Dips (BW)	Split Squats (BW)	Burpee/Squat Thrust (BW)	Plank (BW)
Chest Press (DB, BB)	Body Weight or Weighted Squat (BW, BB)	Farmer’s Carry (DB)	Crunches (BW)
Bent Over Row (DB, BB)	Step Ups (BW)		Flutter Kicks (BW)
Shoulder Press (DB, BB)	Heel Raises (BW, BB)		Superman (BW)
Biceps Curl (DB)			
Triceps Extension (DB)			
Push-Ups (BW)			

The upper body exercises listed above all target the muscle that are involved in performing a push-up. The core exercises will aid in improving the push-ups score. The lower body exercises will help to build strength in the legs, which will aid in the 300 Meter and 1.5



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Mile Runs. Burpee/squat thrusts will help with training for the Push-Ups and 300 Meter Run tests. While the farmer's carry will support the Push-Ups test.

Recording Your Progress

Appendix B contains an exercise recording form. The form provides spaces to record the weight and the number of repetitions completed for each set within an exercise. This form allows for four weeks of exercise. To continue recording after the four-week period, photocopy a blank form.



Aerobic Capacity Training

Aerobic or cardiovascular fitness can be improved by regular participation in aerobic activities. Improved aerobic fitness may improve your 1.5 Mile Run time.

General Directions

1. Start with continuous running, walking, or a combination of the two for a minimum of 15 minutes.
2. Complete the warm-up exercises before the aerobic workout. If both aerobic and strength training are performed in the same session, complete the strength training first. Further, the warm-up exercises only need to be performed one time in a session if aerobic and strength training are completed.
3. Start the aerobic workout slowly and continue the activity for at least 15 minutes without stopping. Your workout time will vary with your fitness level. If your current aerobic fitness is low, your initial duration may be 10 minutes.
4. To train specifically for the test, as endurance increases try to complete a distance of 1.5 miles of running, walking, or a combination of both.
5. Exercise at a pace or intensity that allows you to carry on a normal conversation without gasping for air. This pace should produce a heart rate within 5 beats of the training heart rate. Training heart rate is the number of times your heart beats per minute when performing aerobic exercise. The number of beats per minute indicates your exercise intensity. To calculate your training heart rate, refer to the next section *Training Heart Rate Calculation*.
6. After completing the aerobic workout perform the cool down light aerobic activities followed by the stretching exercises found above in the “Warm-up” section.
7. To make improvements aerobic training should be performed 3-4 times per week. Appendix E shows an example training schedule that includes weight, aerobic, and anaerobic training.

Precautions

1. Monitor your exercise intensity, particularly if you exercise outside in hot, humid weather. If at any time you feel lightheaded, dizzy, or nauseous, slow down and then stop all exercise. Inform your exercise partner how you feel.
2. To avoid dehydration, drink small amounts of water before, during, and/or after aerobic workouts.

Training Heart Rate Calculation

When performing aerobic exercises, your heart rate should be between 60% and 85% of your maximum heart rate. To calculate this range, follow the steps listed below.



1. 220 minus your age = _____
2. Calculate 60% of your answer in #1: Answer #1 X 0.60 = _____. This is your training heart rate lower limit.
3. Calculate 85% of your answer in #1: Answer #1 X 0.85 = _____. This is your training heart rate upper limit.
4. For a 32-year-old the training heart rate range is: $220-32=188$; $188 \times 0.60=113$ (112.8); and $188 \times 0.85=160$ (159.8). Thus, the training heart rate range is 113 to 160.

When performing aerobic exercises, your heart rate should be between your upper (calculation #2) and lower (calculation #3) limits. To increase aerobic capacity, the heart rate should be closer to, but not greater than the upper limit.



Anaerobic Training

Anaerobic fitness can be improved by regular participation in like activities. Improved anaerobic fitness may improve your 300 Meter Run time.

General Directions

1. Perform exercises in a high intensity interval training (HIIT) format for at least 15 minutes. Examples of anaerobic HIIT formats include alternating running and walking and 100 Meter sprint intervals.
2. To train specifically to the test, include the 300 Meter Run as part of an anaerobic workout at least once a week.
3. Complete the warm-up exercises before the anaerobic workout. If both anaerobic and strength training are performed in the same session, complete the strength training first. Further, the warm-up exercises only need to be performed one time in a session if anaerobic and strength training are completed.
4. Start the workout slowly and continue the activity for at least 15 minutes without stopping. Your workout time will vary with your fitness level. If your current anaerobic fitness is low, your initial duration may be 10 minutes.
5. After completing the anaerobic workout perform the cool down light aerobic activities followed by the stretching exercises found above in the "Warm-up" section.
6. To make improvements anaerobic training should be performed 2-3 times per week. Appendix D shows an example training schedule that includes weight, aerobic, and anaerobic training.

Anaerobic Exercises

Examples of anaerobic exercises are listed below. These programs are in a HIIT format. They were selected because they do not require special equipment and are known to be effective in making anaerobic gains in a relatively brief period of training.

1. 100 Meter Sprint Intervals: Resting 30 to 60 seconds between sprints.
2. Running Intervals: Run 1 to 2 minutes, walk 30 seconds, then repeat.



Appendix A: Workout Recording Chart

Date:

	Set 1			Set 2			Set 3			Set 1			Set 2			Set 3		
	Rp/Wt	Rp/Wt	Rp/Wt	Rp/Wt	Rp/Wt	Rp/Wt	Rp/Wt	Rp/Wt	Rp/Wt	Rp/Wt	Rp/Wt	Rp/Wt	Rp/Wt	Rp/Wt	Rp/Wt	Rp/Wt	Rp/Wt	
Upper:																		
Lower:																		
Total:																		
Core:																		
Stretch:																		



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Appendix B: Warm-Up and Cool-Down Exercises

1. Static or Walking Knee Hug
 - Stand tall with legs straight and arms at sides.
 - Lift one knee up, bringing it as high as comfortable.
 - Grasp it with both hands and gently pull it up slightly higher, hugging into body.
 - Slowly lower, repeat with the opposite side.
 - Take a step in between each side to make this stretch “dynamic.”
2. Static or Walking Quad Stretch
 - Stand tall with your feet hip-width apart, pull your abdominals in, and relax your shoulders.
 - Bend your leg, bringing your heel toward your buttocks, and grasp the foot with opposite hand.
 - Take a step in between each side to make this stretch “dynamic.”
3. Straddle Stretch
 - Sit upright with legs straight and spread apart as far as you comfortably can.
 - Keeping legs straight bend forward at the waist, reaching hands towards toes.
 - Hold 3-5 seconds for a warm-up stretch, or 15-30 seconds for a cool down stretch.
 - Slowly return to starting position.
 - Repeat stretch by bending torso to the right to hold, then to the left to hold.
 - Do not lock out knees during stretch.
 - Do not bounce during stretch
4. Static or Walking Forward Hip Flexor Lunge
 - Start in lunge position, with back knee on ground and front foot flat.
 - Gently push hips forward while pressing into front foot, bending the front knee to 90-degrees.
 - Reach arms over head for added stretch.
 - Take a step in between each side to make this stretch “dynamic.”
5. “Saw” Arm Swings
 - Stand straight, bend elbows to 90-degrees at sides with palms facing each other.
 - Keeping elbows bent, move from the shoulder to swing arms.
 - Allow shoulder blades to lift and squeeze during back swing
 - Allow momentum to build to keep the arms swing moving.
 - While arms are swinging adjust palms to face up, down, then back to start position several times.



6. Calf Stretch

- Stand facing the wall at approximately arm's length away.
- Place hands on the wall at shoulder height.
- Step back with the one leg, keeping it straight but allowing the knee of the other leg to flex.
- Keep both heels on the floor and both feet pointed directly towards the wall.
- Bend the knee of the forward leg and slowly lean to the wall until feel stretch in calf.

7. Seated Single Leg Hamstring Stretch

- Sit on the floor with your legs together and toes pointing up. The knees should not be locked.
- Slowly reach forward toward the ankles, while keeping the back flat and knees slightly bent.
- Grasp legs or toes and move the chest toward the knees.
- Keep head up, back flat, and toes pointed up.
- Only go as far in the knee extension as is comfortable.
- Hold 3-5 seconds for a warm-up stretch, or 15-30 seconds for a cool down stretch.

8. Laying Figure 4 Stretch

- Lay on ground with both knees bent to 90-degrees.
- Place right ankle on left thigh above knee.
- While keeping both hips evenly pressed into ground, use right hand to push on right thigh to increase stretch.
- Option to reach right arm through legs and left arm around left leg to grab hands behind left thigh and pull left thigh into chest while keeping torso on the ground.
- Gently release after 15-30 second hold and repeat on other side.

9. Arm Cross

- Stand straight with feet shoulder width apart.
- Place left arm in front of body at shoulder height, elbow straight, palm down.
- Grasp left elbow with right hand.
- Slowly pull left arm across body towards right shoulder, keeping left arm straight and the palm down.
- Do not twist the trunk.



10. Anterior Shoulder and Chest Stretch

- Stand straight with feet shoulder width apart.
- Clasp both hands together at low back, trying to press arms straight.
- Use a stretching strap or towel if you are not able to straighten arms or clasp hands together.
- Keeping torso and arms straight lift hands up and away from lower back.



Appendix C: Strength Training Exercises

1. Triceps Dips (Pectorals, Deltoids, Triceps)
 - Place hands shoulder width apart on bench or chair behind you with legs straight in front. Bend knees to 90 degrees. If exercise is too difficult with legs straight.
 - Bend arms and lower body with control until elbows are bent to 90 degrees.
 - Straighten arms to return to starting position.
 - Inhale while lowering, exhale while pushing up.
2. Chest Press (Pectorals, Deltoids, Triceps)
 - Lie on bench or stability ball with feet flat on floor.
 - Extend arms straight up, holding dumbbells with hands shoulder width apart or slightly wider.
 - With control, lower dumbbells to mid chest line, keeping hands in line with elbows, and stopping when elbows bend to 90 degrees.
 - Push arms straight, return to starting position.
 - Inhale while lowering, exhale while pushing up.
3. Bent Over Row (Latissimus Dorsi, Rhomboids, Posterior Deltoids, Trapezius, Biceps)
 - Stand on the right side of the bench, place left knee on the bench and support upper body with left hand on the bench.
 - Keep spine and head in a straight neutral position.
 - Hold dumbbell in right hand, pulling it up from the ground into waist area. Avoid twisting at waist when pulling up dumbbell.
 - Lower dumbbell back to starting position.
 - Inhale while lowering, exhale while lifting.
 - Repeat sequence on opposite side.
4. Shoulder Press (Deltoids, triceps, Trapezius)
 - Hold two dumbbells at shoulder height.
 - With palms facing forward, alternate pushing each dumbbell to the ceiling to arm is extended straight. Be careful not to lock elbow joint when arm is straight.
 - Exhale when pushing hand to ceiling, inhale on the way back to starting position.
5. Biceps Curl (Biceps, Forearms)
 - Start seated or standing with arms down at sides and palms facing forward.
 - Alternate sides, start by bending right elbow bringing the dumbbell towards right shoulder.
 - Slowly lower dumbbell back to starting position.
 - Repeat with left arm.
 - Exhale while raising weight, inhale while lowering.



6. Triceps Extension (Triceps)

- Lean forward with a straight back and head.
- Holding dumbbells, bend elbows to 90 degrees keeping hands in line with shoulders and upper arms pressed into torso.
- Only moving from the elbow, extend hands back and up to straighten arms.
- With control, bend elbows back to 90 degrees.
- Exhale while straightening arms, inhale while bending arms.

7. Push Ups (Pectorals, Deltoids, Triceps, Abdominals, Low Back)

- Place hands on floor shoulder width or slightly more apart.
- Keep feet together and back straight throughout entire movement.
- With control, lower body towards ground until elbows are bent to 90 degrees.
- Straighten arms to push up to starting position.
- Inhale while lowering, exhale while pushing.

8. Split Squats (Glutes, Quadriceps, Hamstrings, Calves)

- Stand with feet together then step forward about 26" behind or in front of other foot.
- Keeping arms by your side, back straight, and neutral head, slowly lower back knee to the floor.
- Front knee should not go beyond front ankle when lowering.
- Push evenly through both feet to return to starting position.
- Alternate sides; can be performed in walking sequence or statically.
- Inhale while lowering, exhale while pushing up.

9. Body Weight Squats (Glutes, Quadriceps, Hamstrings)

- Place arms straight out in front or cross arms in front by placing opposite hands to shoulders.
- Slowly lower buttocks, stopping when knees are bent to 90 degrees, pushing through your heels immediately stand up to starting position.
- Exercise can be performed with added weight by using a barbell.
- Inhale while lowering, exhale while standing up.

10. Step Ups (Glutes, Quadriceps, Hamstrings, Calves)

- Use a stable step or bench 6" to 18" high.
- Place left foot flat on the step, keeping right foot flat on the ground.
- Push down with the left foot to step up until both legs are straight.
- Slowly lower yourself back down to the starting position.
- Repeat sequence with other leg up on the bench.



- Exhale while pushing up, inhale while lowering down.

11. Heel Raises (Gastrocnemius, Soleus)

- Stand with heels hanging off a 2-6" high platform, feet shoulder width apart, and toes facing forward, keeping a straight back and neutral head.
- Press through ball of foot to extend up as far as possible.
- With control, lower body down so heels drop below edge of surface.
- Exercise can be performed with added weight by using a barbell.
- Knees should be straight, but not be locked out.

12. Burpee/Squat Thrust (Pectorals, Deltoids, Triceps, Abdominals, Glutes, Quadriceps)

- Start standing straight with feet together.
- Quickly bend knees until hands reach the floor in front of you.
- Press hands into the floor, engage abdominals and jump feet back to the starting position of push up.
- Keeping abdominals engaged and hands on floor, jump feet back to hands.
- Stand up to starting position.

13. Farmer's Carry (Deltoids, Trapezius, Abdominals)

- Using dumbbells, or other alternative weights, be in a standing position with a straight back.
- Keep arms straight by sides while squeezing shoulder blades together and begin to walk.
- Walk 50-100 meters without setting dumbbells down

14. Plank (Transverse Abdominus, Gluteus Medius and Minimus, Obliques)

- Place hands or elbows directly under shoulders with feet 8-12 inches apart and forearms on ground.
- Get into a straight alignment with only toes, forearms, and hands in contact with the ground.
- Hold straight position as long as you are able.

15. Crunches (Abdominals)

- Lie on your back with knees bent to 90 degrees and feet flat on the ground.
- Keep hands at sides, slowly lift shoulder off ground to curl your torso so chin approaches your chest.
- Do not raise shoulders more than a 45-degree angle off ground.
- Slowly return to slightly above starting position, always keeping tension in the abs.



16. Flutter Kicks (Abdominals, Hip Flexors)

- Lie on your back with your legs extended and your arms by side, palms down.
- Lift legs 4 to 6 inches off the floor. Press your low back into the mat.
- Keep legs straight as you rhythmically raise one leg higher, then switch. Move in a fluttering, up and down motion.

17. Superman (Erector Spinae, Glutes)

- Lie face down with forehead on the ground, feet together, and arms overhead.
- Keeping arms and legs straight lift both off the ground at the same time.
- Keeping neck neutral lift head off ground.
- Hold for count of 3, lower arms and legs back to ground.



Appendix D: Example of Exercise Schedule

Monday	Tuesday	Wednesday	Thursday	Friday
Upper body and core strength training exercises and 30-60 Minutes of Aerobic Exercise (Walking/Jogging or 1.5 Mile Run).	Anaerobic high intensity interval training (HIIT) (Run 30 seconds at hard pace then walk or jog 30 seconds at light pace. Repeat for total distance of 1 mile or total time of 15-20 minutes)	Lower body and core strength training and 30-60 Minutes of Aerobic Exercise (Walking/Jogging or 1.5 Mile Run).	Anaerobic high intensity interval training (HIIT). Run 30 seconds at hard pace then walk or jog 30 seconds at light pace. Repeat for total distance of 1 mile or total time of 15-20 minutes.	Combination of upper body, lower body, and core strength training and 30-60 Minutes of Aerobic Exercise (Walking/Jogging or 1.5 Mile Run).

General Notes:

- The number and duration of HIIT intervals may be changed depending on fitness level.
- Schedule does not have to be Monday-Friday, total days of exercise should be 5 days out of a week.
- Remember there needs to be one day between strength training for the SAME muscle groups.
- Aerobic or anaerobic training may be performed with strength training, however aerobic and anaerobic training should not be combined.