

1. Introduction

1.1 This manual aims at providing tips to prepare applicants for taking the Physical Fitness Test and the Job-related Performance Test (Tests) when applying for the posts of Station Officer (Operational), Ambulance Officer, Fireman/Firewoman (Operational/Marine) and Ambulanceman/Ambulancewoman. The suggestions provided here are simple and mainly focus on, but not limited to, the following aspects:

- (a) Mode of Training
- (b) Warm-up
- (c) Muscular Strength and Endurance Training
 - (i) Circuit Training
 - (ii) Resistance Training
- (d) Simulated Exercise Programme

1.2 In fact, the effectiveness of training will depend on the following elements:

- (a) Food and Nutrition
- (b) Level of Health and Wellness
- (c) Body Composition
- (d) Inherent Motor Abilities
- (e) Individual Differences

1.3 To adequately prepare for the Tests, you are advised to start your training at least **16 weeks** before the day of taking the Tests. Before commencing the training, you should assess your own physical condition by answering the questions of the Physical Activity Readiness Questionnaire and You ('PAR-Q & You' developed by the British Columbia Ministry of Health and revised by Canadian Society for Exercise Physiology, 2002) at the Appendix of this manual. Having answered all questions with 'NO', you are still advised to consult your physician before commencement of the training programme if you have reached the age of 40 and have been physically inactive. If you are not healthy and not physically able to withstand the stresses created by this very strenuous training and test taking, you may be risking your health, even chancing heart damage. If you are not completely certain of your own physical fitness and health condition, you must consult your physician. You should show

your physician the training methods of this guidebook to ensure that you are capable of dealing with the training. Finally, please be aware that you are taking part in the suggested training programme contained in this guidebook at your own risk. This Department will not be liable to any damage or injury you might sustain as a result of participating in the training programme.

2. Mode of Training

2.1 Training effectiveness will mainly depend on the frequency, duration, intensity and specificity of exercise coupled with the types of training such as endurance training, interval training, overloading and resistance training, circuit training etc. In order to achieve the passing standard of the Tests, applicants are advised to have at least 3 days of training per week with a training session of 45 - 60 minutes. The duration of an exercise session interacts with exercise intensity to achieve the health, fitness and weight management goals of the participant. When exercise intensity is above a minimum threshold (set lower for low-fit individuals and higher for high-fit individuals), the total volume of exercise becomes important in achieving and maintaining fitness. The American College of Sport Medicine (ACSM) recommends an exercise intensity of between 55% and 65% to 90% of maximum heart rate (HR max), which is transformed as $(220 - \text{Age}) \times (55-90\%)$. Specificity is the final factor in determining the effectiveness of training. Exercises should be tailor-made to perform the actual tasks required by the Tests.

2.2 You should adjust your workload progressively according to your physical capabilities and ensure that your body has sufficient time for rest and recovery. Without sufficient rest, over-training will occur. Signs of over-training include increased injury rate, increased resting heart rate, sustained muscle soreness, apathy, loss of appetite, either insomnia or excessive sleeping, drop in body weight, lack of adaptation to exercise and loss of strength. Over-training must be avoided. If over-training appears, you should stop training and take a rest until you have fully recovered. When resuming your training, you should reduce your workload.

2.3 The rate of progression in an exercise condition programme will depend on many factors, including functional capacity, medical and health status, age, individual's activity preferences and goals, and an individual's tolerance to the current level of training. For apparently healthy adults, gains in the endurance aspect of the

exercise have three stages of progression: initial, improvement, and maintenance.

2.4 Aerobic fitness is the basic requirement for an applicant who wishes to join the Fire Services Department. For aerobic activities, the intensity of the exercise should be adjusted to tax the oxygen demands of the working muscles. Aerobic activities like running, swimming, hiking and cycling over a duration of 45 minutes or more can enhance aerobic fitness.

2.5 Anaerobic exercises are also vital for applicants. For anaerobic activities, the intensity of exercise is higher and at a level whereby the working muscle's demand for oxygen exceeds the cardiopulmonary system's ability to deliver it. This type of intensive activity can only be short in duration. Sprinting is a good example of anaerobic activity.

3. Warm-up

3.1 Warm-up facilitates the transition from rest to exercise, stretches postural muscles, augments blood flow and increases the metabolic rate from the resting level to the aerobic requirements for endurance training. A warm-up may reduce the susceptibility to musculoskeletal injury by increasing connective tissue extensibility, improving joint range of motion and function, and enhancing muscular performance.

3.2 Stretching exercise is generally used for warm-up. Michael J. Alter (1996) mentioned that there were two phases of stretching. The first phase is the easy stretch. In this phase, you should hold the stretch for 10 seconds in a range of motion that produces only mild tension. This is followed by the second phase of developmental stretch. In this stage, you should move slightly further to the point where you feel a little bit more tension. This should be held for another 10 seconds.

3.3 When stretching, you should adhere to the following rules:

- (i) Stretch slowly
- (ii) No bouncing
- (iii) No pain
- (iv) No competition
- (v) Keep normal breathing
- (vi) Hold to an end point for 10 to 20 seconds

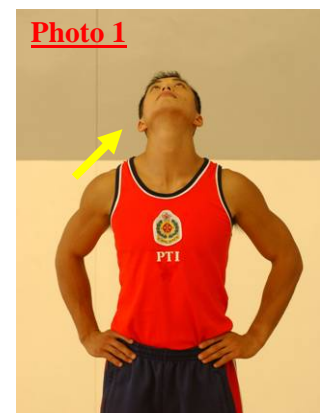
3.4 The common stretching exercises in the following sub-paragraphs are recommended for warm-up before performing circuit training, resistance training and simulated exercises. More stretching exercises for improving flexibility of low back will be introduced in order to cope with the sit and reach test of the Physical Fitness Test. Having completed stretching exercises, you are reminded to begin a proper warm-up coupled with a few minutes of the same type of activity that you are about to do at a very light exertion level. For example, if you are preparing to do resistance training, you should lift a lighter weight for a few repetitions at a very easy exertion before trying a heavier load. Should you need the details of stretching exercises, you could refer to any current reference books pertaining to stretching exercises.

3.5 Stretching Exercises

(Arrows show direction of force applied)

3.5.1 Anterior Neck (Photo 1)

- (i) Sit or stand upright and stretch your neck backward until you feel mild tension.
- (ii) Hold the stretch and relax.
- (iii) You should feel the stretch in the anterior part of the neck.



3.5.2 Posterior Neck (Photo 2)

- (i) Sit or stand upright.
- (ii) Exhale and pull your head downward and onto your chest until you feel tension.
- (iii) Hold the position and relax.
- (iv) You should feel the stretch in the posterior part of the neck.



3.5.3 Lateral Neck (Photo 3)

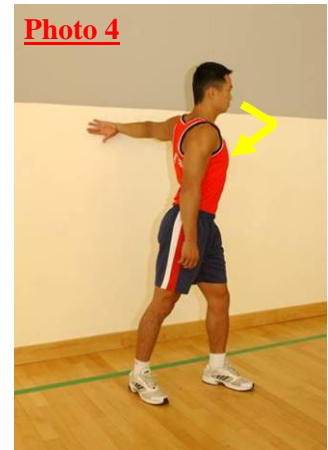
- (i) Sit or stand upright.
- (ii) Place your left hand on the upper right side of your head.
- (iii) Exhale, and slowly pull your head to your left shoulder (lateral flexion) until you feel tension.
- (iv) Hold the stretch and relax.
- (v) Repeat the above movements for alternate side.



(vi) You should feel the stretch in the lateral side of the neck.

3.5.4 Biceps Brachii (Photo 4)

- (i) Stand upright with shoulder against a wall.
- (ii) Place one hand against the wall with your arm internally rotated at the shoulder, forearm extended and your hand pronated with your thumb pointing down.
- (iii) Exhale and attempt to roll your biceps so they face upward until you feel tension.
- (iv) Hold the stretch and relax.
- (v) Repeat the above movements with the other arm.
- (vi) You should feel the stretch in the biceps brachii.



3.5.5 Triceps Brachii (Photo 5)

- (i) Stand upright with one arm flexed, raised overhead with elbow next to your ear and your hand resting on your opposite shoulder blade.
- (ii) Grab your elbow with the other hand.
- (iii) Exhale and pull your elbow behind your head until you feel tension.
- (iv) Hold the stretch and relax.
- (v) Repeat the above movements with the other arm.
- (vi) You should feel the stretch in the triceps brachii.



3.5.6 Brachioradialis (Photo 6)

- (i) Kneel on all fours, flex your wrists and place the tops (dorsa) of your hands against the floor with fingers pointing toward your knees.
- (ii) Exhale and lean against the floor.
- (iii) Hold the stretch and relax.
- (iv) You should feel the stretch in the brachioradialis.



3.5.7 Pectorals (Photo 7)

- (i) Stand upright facing open doorway.
- (ii) Raise elbows to shoulder height at your sides, bend elbows so that your forearms point straight up and place palms against the doorframe to stretch the internal section of the pectorals muscles on both sides.
- (iii) Exhale and lean your entire body forward until you feel tension.
- (iv) Hold the stretch and relax.
- (v) You should feel the stretch in the upper chest (pectorals).



3.5.8 Lateral Shoulder (Photo 8)

- (i) Stand upright with one arm raised to shoulder height.
- (ii) Flex one of your arms across to the other shoulder.
- (iii) Grab your raised elbow with the other hand.
- (iv) Exhale and pull your elbow toward your back until you feel tension.
- (v) Hold the stretch and relax.
- (vi) Repeat the above movements with the other arm.
- (vii) You should feel the stretch in the lateral shoulder.



3.5.9 Shoulder Abductors (Photo 9)

- (i) Stand upright with one arm flexed behind your back.
- (ii) Grab the elbow (or wrist if unable to reach elbow) from behind with the other hand.
- (iii) Exhale and pull the elbow across the midline of your back until you feel tension.
- (iv) Hold the stretch and relax.
- (v) Repeat the above movements with the other arm.
- (vi) You should feel the stretch in the posterior part of the shoulder.



3.5.10 Gastrocnemius and Achilles Tendon (Photo 10)

- (i) Stand upright slightly more than an arm's length from a wall.
 - (ii) Bend one leg forward and keep the opposite leg straight.
 - (iii) Lean against the wall maintaining your head, neck, spine, pelvis, rear leg and ankle are in straight line.
 - (iv) Keep the heel of your rear foot down, sole flat on the floor and foot pointing straight forward.
 - (v) Exhale, bend your arms, lean toward the wall and shift your weight forward.
 - (vi) Exhale and flex your forward knee toward the wall until you feel tension.
 - (vii) Hold the stretch and relax.
 - (viii) You should feel the stretch in the calf and achilles tendon.
- (Note: To stretch the soleus, flex the rear at the knee.)



3.5.11 Quadriceps (Photo 11)

- (i) Stand upright with one hand stretching out for balance.
- (ii) Flex one knee and raise your heel to your buttocks.
- (iii) Slightly flex the supporting leg.
- (iv) Exhale, reach behind and grab your raised foot with one hand.
- (v) Inhale and pull your heel toward your buttocks without overcompressing the knee.
- (vi) Hold the stretch and relax.
- (vii) Repeat the above movements for the other leg.
- (viii) You should feel the stretch in the quadriceps.



3.5.12 Hamstrings (Photo 12)

- (i) Sit upright on the floor with both legs straight at an angle of 90°.
- (ii) Flex one knee and slide the heel until it touches the inner side of the

other thigh.

- (iii) Lower the outer side of the thigh and calf of the bent leg onto the floor.
- (iv) Exhale, while keeping the extended leg straight, bend at the hip and lower your extended upper torso from the hips onto the extended leg until you feel tension.
- (v) Hold the stretch and relax.
- (vi) Repeat the above movements with the other leg.
- (vii) You should feel the stretch in the hamstrings.



3.5.13 Adductors (Photo 13)

- (i) Sit upright on the floor with your legs flexed and straddled and heels touching each other.
 - (ii) Grab your feet or ankles and pull them as close to your groin as possible.
 - (iii) Exhale, lean forward from the hips without bending your back and lower your chest to the floor until you feel tension.
 - (iv) Hold the stretch and relax.
 - (v) You should feel the stretch in the groin (adductors).
- (Note: A common error is bending the back.)



3.5.14 Hip Flexors (Photo 14)

- (i) Stand upright with the legs straddled (spread sideways) about 60cm apart.
- (ii) Flex one knee, lower your body and place the other knee on the floor.
- (iii) Roll the back foot so that the top of the instep rests on the floor.
- (iv) Place your hands on your hips (some people may prefer placing on the forward knee and one hand on the buttocks) and keep the front knee bent at a 90° angle as much as



possible.

- (v) Exhale and slowly push the front of the hip of the back leg toward the floor until you feel tension.
- (vi) Hold the stretch and relax.
- (vii) Repeat the above movements with the other leg.
- (viii) You should feel the stretch in the upper thigh.

3.5.15 Buttocks and Hip (Photo 15)

- (i) Sit upright on the floor with the hands behind your hips for support and your legs extended.
- (ii) Flex your left leg, cross your left foot over your right leg and slide your heel toward your buttocks.
- (iii) Reach over your left leg with your right arm and place your right elbow on the outside of your left knee.
- (iv) Exhale and look over your left shoulder while turning your trunk and pushing back on your right knee with your right elbow until you feel tension.
- (v) Hold the stretch and relax.
- (vi) Repeat the above movements with the other leg.
- (vii) You should feel the stretch in the buttocks and hip



3.5.16 Buttocks, Hips and Trunk (Photo 16)

- (i) Sit upright on the floor with the outside of your left leg resting on the floor in front of you with your knee flexed and your foot pointing to your right.
- (ii) Cross your right leg over your left leg and place the foot flat on the floor.
- (iii) Exhale, round your upper torso and bend forward until you feel tension.
- (iv) Hold the stretch and relax.
- (v) Repeat the above movements with the other leg.
- (vi) You should feel the stretch in the buttocks, hips and trunk.



3.5.17 Abdomen and Hip Flexors (Photo 17)

- (i) Lie face down on the floor with your body extended.
- (ii) Place your palms on the floor by the sides of your hips with your fingers pointing forward.
- (iii) Exhale, press down on the floor, raise your head and trunk and arch your back while contracting the gluteals to prevent excessive compression on the lower back.
- (iv) Hold the stretch and relax.
- (v) You should feel the stretch in the abdomen and upper thighs.



3.5.18 Lower Back (Photo 18)

- (i) Sit upright on a chair with your legs spreading slightly apart.
- (ii) Exhale, extend your upper torso, bend at the hip and slowly lower your stomach between your thighs until you feel tension.
- (iii) Hold the stretch and relax.
- (iv) You should feel the stretch in your lower track.



3.5.19 Lateral Trunk (Photo 19)

- (i) Hang from a chin-up bar with your arms straight and your body slightly flexed in a C shape.
- (ii) Exhale, place your chin on your chest and sink in your shoulders until you feel tension.
- (iii) Hold the stretch and relax.
- (iv) You should feel the stretch in the lateral trunk and upper back.

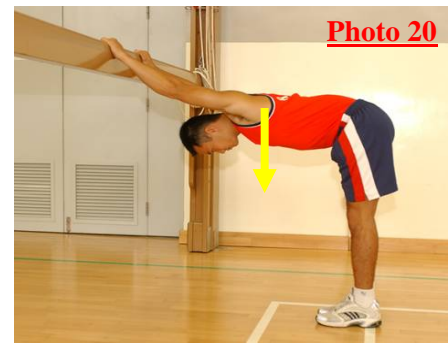


3.5.20 Upper Back (Photo 20)

- (i) Stand upright, feet together, about 1m from a supporting surface

approximately of waist height.

- (ii) Exhale, keep your arms and legs straight, flex at the waist, flatten your back and grab the supporting surface with both hands.
- (iii) Exhale and press down on the supporting surface to produce an arch in your back until you feel tension.
- (iv) Hold the stretch and relax.
- (v) You should feel the stretch in your upper back.



4. Muscular Strength and Endurance Training

4.1 Muscular strength refers to the maximal force that can be generated by a specific muscle or a group of muscle whereas muscular endurance is the ability of a group of muscle to execute repeated contractions over a period of time and sufficiently to cause muscular fatigue, or to maintain a specific percentage of the maximum voluntary contraction for a prolonged period of time. Simple field tests such as a curl-up test or the maximum number of push-ups may be used to evaluate the endurance of the abdominal muscle groups or upper body muscles respectively.

4.2 Muscular strength and endurance are the basic fitness components of fire services personnel who are required to perform the fire-fighting and rescue jobs. The test items in the Physical Fitness Test are used to test these physical abilities. In this respect, applicants may consider to use the following circuit training and resistance training programme at least 3 times a week coupled with endurance running on the alternate days to enhance their physical fitness level so as to prepare for the Tests. Applicants are advised to perform the circuit training first to build up their physical fitness level to meet the requirement. With built-up strength and stamina, applicants may start the resistance training programme.

4.3 Circuit Training

4.3.1 Although it is easier to improve muscular strength and endurance with weight equipment, it is also possible to accomplish this with some simple exercises with the body weight. These exercises require little equipment and it is very

convenient for the participants to perform the exercise at anywhere and at any time. You may choose to start with any exercise (suggested duration for each exercise is 30 seconds). You may have 30 seconds to 1-minute rest between each exercise. The training may be started with one circuit. The circuit could be performed according to the order of presentation. Having adapted to one circuit, you may increase to 2 - 3 circuits. Circuit training has been proven to be a very effective and efficient way to improve muscular strength, muscular endurance and cardiovascular endurance. Remember to jot down the finish time and the number of repetitions so as to monitor your improvement. For safety reason, it is recommended that you should perform the circuit training with a partner and do not over exert yourself in the first few sessions. Progression is the key to safety and effectiveness. Below are the examples of circuit training.

4.3.1.1 Press-ups (Photos 21-24)

- (i) Place both hands on ground with shoulder width apart.
- (ii) Keep feet together and back straight.
- (iii) Lower the body until the upper arms and the lower arms are at an angle of 90° or less.
- (iv) Push yourself up to the starting position with arms straight.
- (v) Inhale while lowering down and exhale while pushing up.
- (vi) Do 10 or more repetitions within 30 seconds depending on your physical ability.
- (vii) If you are not able to perform the normal press-up, you may perform a modified press-up (Photos 23-24) by kneeling down and repeating the above movements. When you have adapted to the modified press-up, you should perform the normal press-up.



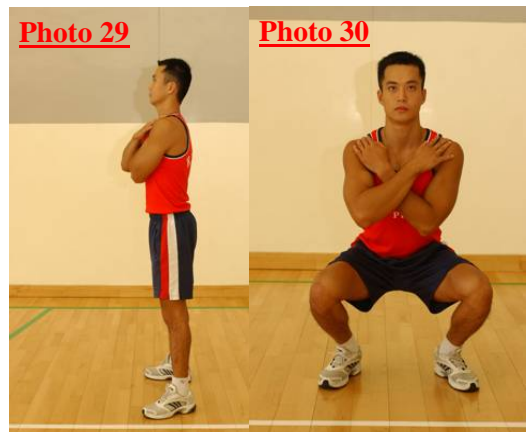
4.3.1.2 Bent-knee Sit-ups (Photo 25-28)

- (i) Lie on a mat with knee at 90° and hands fully placed on ears.
- (ii) Feet are held to the floor by a partner and or hooked to a wall bar.
- (iii) Curl up smoothly with head leading (no jerking movement).
- (iv) Turn the upper torso with elbows touching the knees and then return to the starting position.
- (v) Exhale while curling up and inhale while lowering down.
- (vi) Do 10 or more repetitions within 30 seconds depending on your physical ability.
- (vii) If you are unable to perform the normal curl-up, you may perform a modified curl-up by placing your hands across the chest and repeat the same movements (Photos 27-28). When you have adapted to the modified curl-up, you should perform the normal sit-up.

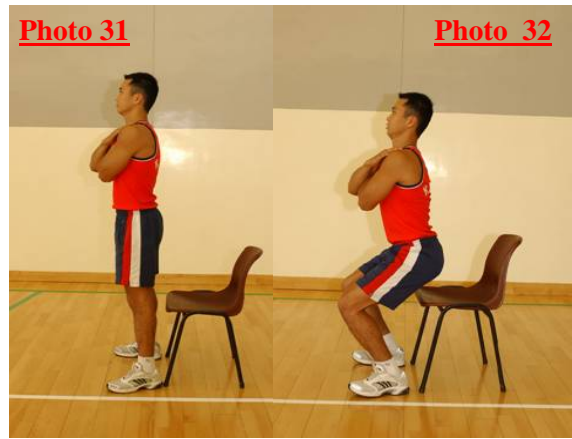


4.3.1.3 Squat (Photos 29-32)

- (i) Stand upright with legs slightly apart at shoulder's width and arms across the chest.
- (ii) Slowly squat down until the buttocks touching the heels and return to normal position.
- (iii) Keep your head in a neutral position with eyes looking forward.
- (iv) Inhale while lowering down and exhale while standing up.



- (v) Do 10 or more repetitions within 30 seconds depending on your physical ability.
- (vi) If you are not able to perform the full squat, you can do the half squat by slowly lowering your buttocks onto the chair just placed below (Photo 31-32).
- (vii) Having taken up this skill, you should perform the full squat.



4.3.1.4 Chin-ups (Photo 33-36)

- (i) Grip a horizontal bar with pronated grip and hands at about shoulder's width apart.
- (ii) Hang from the bar with arms fully extended.
- (iii) Pull upward until the chin is above the bar.
- (iv) Do not kick or swing your legs.
- (v) The body cannot move forward and backward more than 5°.
- (vi) Return to the starting position.
- (vii) Inhale while lowering down and exhale while pulling up.
- (viii) Do 10 or more repetitions within 30 seconds depending on your physical ability.
- (ix) If you are not able to complete 3 chin-ups, elevate yourself to the bar with the help of a stool or a partner and lower down in a slow and controlled fashion.
- (x) If you are too weak to perform the chin-ups, a modified chin-up with a horizontal bar at a height slightly more than your arm's length is recommended. Lie flat with chest underneath the bar, arms straight with both hands holding the bar and legs straight touching the ground. Pull up and



then lower down.

- (xi) Having taken up the skill, you should perform the normal chin-up.



4.3.1.5 Curl-ups (Photos 37-38)

- (i) Lie on a mat with knee at 90° and hands fully placed on the thighs.
- (ii) Eyes look at the ceiling.
- (iii) Curl up smoothly until the hands touching on the knees and return to the starting position.
- (iv) Exhale while curling up and inhale while lowering down.
- (v) Do 10 or more repetitions within 30 seconds depending on your physical ability.



4.3.1.6 Step-ups (Photos 39-42)

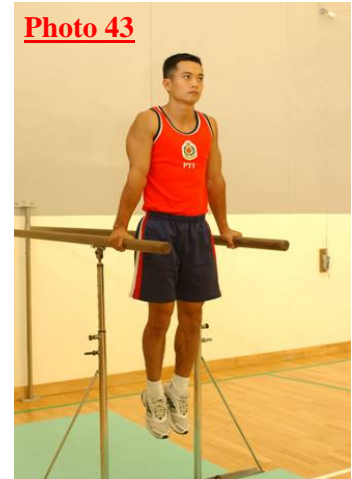
- (i) Use a step or bench of 15cm - 45cm high.
- (ii) Stand upright with eyes looking forward.
- (iii) Place right foot flat on the bench with the left foot flat on the floor.
- (iv) Push down with the right foot on the bench and step up until both legs are straight on the bench.
- (v) Slowly lower your back down with left foot and the right foot back to the starting position.



- (vi) Exhale while pushing up and inhale while lowering down.
- (vii) Repeat entire sequence to start with the left foot.
- (viii) Do 3 minutes at a rate of 24 steps per min.

4.3.1.7 Arm-dips (Photos 43-46)

- (i) Support your body with arms straight holding the parallel bars.
- (ii) Keep your body straight with eyes looking forward.
- (iii) Lower down the body with the upper and lower arms making an angle of 90° or less and then return to the starting position.
- (iv) Do not swing the body forward and backward more than 5°.
- (v) Exhale while lowering down and inhale while pushing up.
- (vi) Do 10 or more repetitions within 30 seconds depending on your physical ability.
- (vii) If you are unable to perform the arm-dip, you are recommended to do a modified arm-dip (Photos 45-46) by supporting the body with hands holding onto a chair at the back and legs straight touching the ground.



- (viii) Flex your elbows and lower your body so that your buttocks are close to the floor (but not touching). Return to the starting position, keeping your body straight.
- (ix) Perform the normal arm-dip when you master the modified arm-dip.



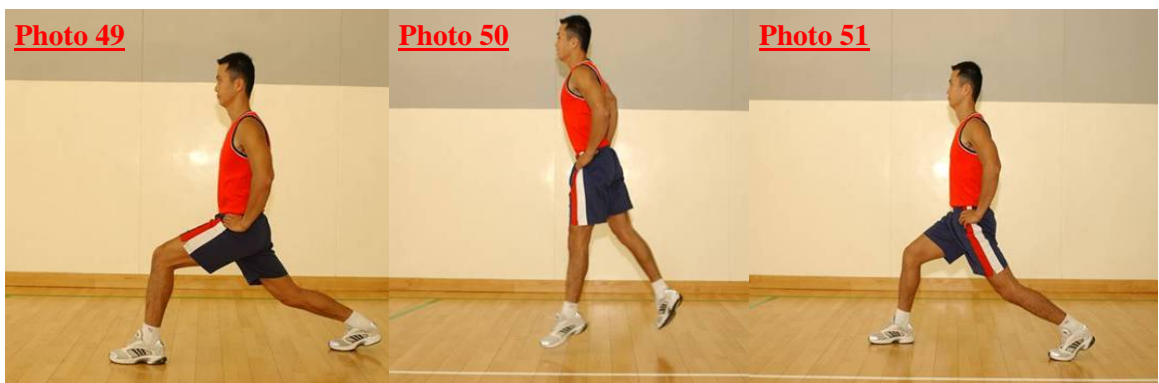
4.3.1.8 Curl-ups with Legs on Bench (Photos 47-48)

- (i) Lie on the mat with legs placing on a bench of 45cm high.
- (ii) Put palms on the ears.
- (iii) Curl up smoothly with head leading (no jerking movement) until the elbows touch the knees and then return to the starting position.
- (iv) Exhale while curling up and inhale while lowering down.
- (v) Do 10 or more repetitions within 30 seconds depending on your physical ability.



4.3.1.9 Split-Squats (Photos 49-51)

- (i) Keep back straight and arms down at side with hands on hips and eyes looking forward, slowly lower right knee straight down onto the floor.
- (ii) Inhale while lowering and exhale while pushing back up into upright position.
- (iii) Keep forward leg vertical throughout motion, with knee directly over ankle. If knee tends to move forward over the toes, adjust back foot further backward.
- (iv) Repeat the above with other leg.
- (v) Do 20 or more repetitions within 1 minute depending on your physical ability.



4.3.1.10 Burpee (Photos 52-55)

- (i) Stand erect and lower the body to a squat-rest position.
- (ii) Lean forward and place both hands on the floor in front of the feet.
- (iii) Thrust the legs backward as far as possible and keep your body straight with arms fully extended.
- (iv) Return to the squat-rest position and then to the standing position.
- (v) Inhale and exhale evenly throughout the exercise.
- (vi) Do 10 or more repetitions within 30 seconds depending on your physical abilities.



4.3.1.11 Chest Raise (Photos 56-57)

- (i) Take a front lying position with the hands behind the back.
- (ii) The legs are held by a partner or hooked by a wall bar.
- (iii) Raise the chin as high as possible from the floor and then lower the chest to the floor.
- (iv) Exhale while raising and inhale while lowering.
- (v) Do 10 or more repetitions within 30 seconds depending on your physical ability

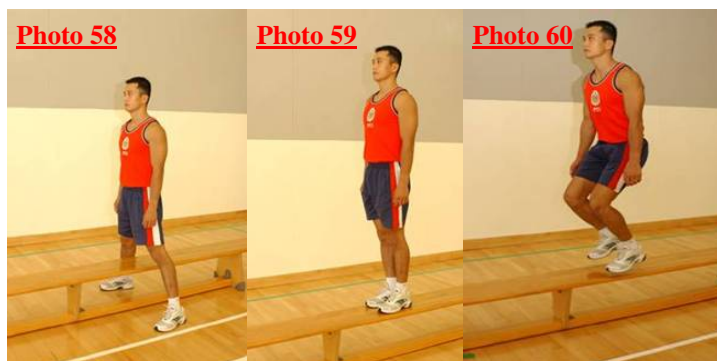


4.3.1.12 Astride Jump (Photos 58-60)

- (i) Stand astride over a bench of 45cm high.
- (ii) Jump onto the bench with both legs and then return to the starting

position.

- (iii) Exhale while jumping up and inhale while descending.
- (iv) Do 20 or more repetitions within 30 seconds depending on your physical ability.



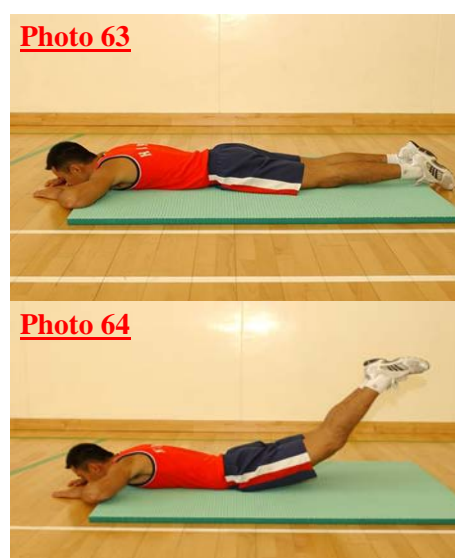
4.3.1.13 Hand Grippers (Photos 61-62)

- (i) Stand erect.
- (ii) Place a tennis ball in a palm.
- (iii) Slowly squeeze the tennis ball.
- (iv) Repeat the above with the other hand.
- (v) Do the repetition as much as possible within 30 seconds depending on your physical abilities.



4.3.1.14 Double Backward Leg Raise (Photos 63-64)

- (i) Take a front lying position with the arms placing on the floor and the palms facing downward.
- (ii) Hold the chest down.
- (iii) Lift both legs upward with the leg held straight to clear the thighs from the floor.
- (iv) Exhale while legs raising and inhale while lowering down.
- (v) Do 10 or more repetitions within 30 seconds depending on your physical ability.



4.3.1.15 Sitting Tucks (Photos 65-66)

- (i) Take a long lying position with the arms straight and palms down on the floor behind the hip.
- (ii) Lift the heels 15cm off the floor.
- (iii) Flex both legs and bring the knees toward the chest, keeping heels together.
- (iv) Straighten the legs and keep the heels off the floor.
- (v) Do 20 or more repetitions within 1 minute depending on your physical ability.



4.4 Resistance Training

4.4.1 The gold standard of dynamic strength testing is the 1-repetition maximum (1-RM), this means the heaviest weight you can lift only once in good form. For muscular strength and endurance, it is recommended to perform 70%-80% of your 1RM. The following resistance programme is designed to improve your total body strength and endurance. If you are not familiar with lifting, have any joint pain or feel uncomfortable in performing these exercises, you should seek advice from a professional trainer.

4.4.2 Unless you are a competent weightlifter, you are advised to do one complete cycle first. If you do not have muscle soreness in 24 – 48 hours after exercise, you may start to perform two cycles and then gradually progress to three cycles in the following days. You are also recommended to do the exercise stations in the order as presented. If you feel sustained and excessive muscle soreness, you should reduce the weights and the number of cycles.



4.4.3 When you start this resistance programme, you should work out the 1 RM of each type of exercise station and then lift at each

exercise station for 8 – 12 repetitions from 1 to 3 sets depending on your physical ability. Rest between each exercise should not exceed 30 seconds unless you are experiencing some discomfort. This resistance programme is recommended to be performed three sessions per week for a session of at least 45 minutes. You should first do the stretching exercises coupled with 15 minutes cycling and/or jogging on the exercise cycle (Photo 67) and treadmill (Photo 68) respectively. For overall fitness improvement, these exercises should be performed in conjunction with a moderate to high intensity aerobic training programme on the alternate days. The endurance running like 1-mile run, 1.5-mile run or 3-mile run should be kept at a speed of 7 min to 9 min per mile.



Photo 68

4.4.4 For safety precautions, you should adhere to the following rules:

- (i) Always lift with a partner.
- (ii) Ask for help from an expert if you are a layman.
- (iii) Progress slowly to avoid injury.
- (iv) Ensure weight machines are properly adjusted to suit your body size.
- (v) Never be over confident by attempting to lift a heavier weight than you normally do.
- (vi) Use proper lifting technique when lifting weight plates and dumbbells.
- (vii) Never drink alcohol or take medications that may cause drowsiness prior to lifting weights.
- (viii) Breathe in when you lower a weight and breathe out when you lift a weight.
- (ix) Protect your back from dangerous positions.
- (x) Lift weights from a stabilized position either on seats or rollers.
- (xi) Fasten body-belts securely if your machine has one.
- (xii) Stay away from moving parts and weight plates.
- (xiii) Perform exercises through a full range of motion.

4.4.5 Below are examples of resistance training:

4.4.5.1 Bench Press (Photos 69-70)

- (i) Lie on a bench and put your feet on the end of the bench, and use a



Photo 69

weight suitable for you.

- (ii) Push the bar until your arms are almost fully extended.
- (iii) Lower the bar to the chest.
- (iv) Keep your lower back flat.



Photo 70

4.4.5.2 Bent-knee Sit-ups (Photos 71-72)

- (i) Sit on the mat with knees bent at 90°.
- (ii) Keep feet flat on the mat and hands at your sides, slowly curl your torso so that chin approaches your chest.
- (iii) Do not raise torso to more than 45° off the floor.
- (iv) Return slowly and slightly above your starting position, keeping tension on abdominal muscles at all times.
- (v) Exhale while curling up and inhale while lowering torso down.
- (vi) Do 10 or more repetitions within 30 seconds depending on your physical ability.



Photo 71



Photo 72

4.4.5.3 Leg Press (Photos 73-74)

- (i) Sit on a seat with knees bent at 90° and use a weight suitable for you.
- (ii) Push the pedals forward until your legs fully extend and then return to the starting position.



Photo 73



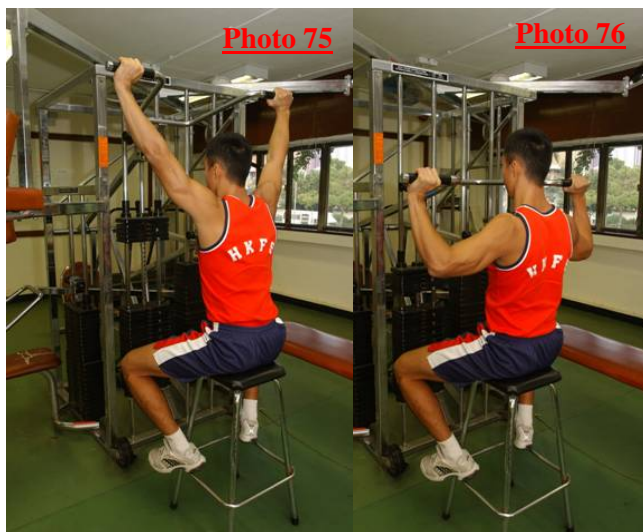
Photo 74

4.4.5.4 Shoulder Press (Photos 75-76)

- (i) Sit on a bench with the feet fully stepped on the chair or on the

ground.

- (ii) Push bar overhead until arms fully extended and then return to the starting position.
- (iii) Do not arch your back.



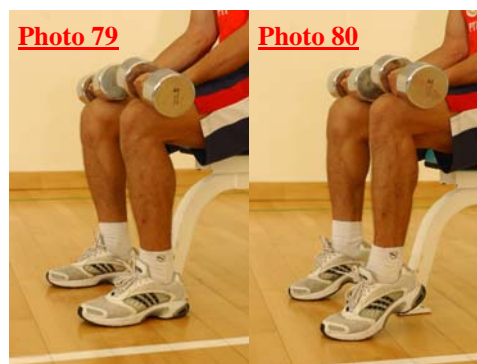
4.4.5.5 Chest Raise (Photos 77-78)

- (i) Take a front lying position with the hands behind the back.
- (ii) Legs are held by a partner or hooked by the wall bar.
- (iii) Raise the chin as high as possible from the floor and then lower the chest to the floor.
- (iv) Exhale while ascending and inhale while descending.
- (v) Do 10 or more repetitions within 30 seconds depending on your physical ability.



4.4.5.6 Seated Calf Raise (Photos 79-80)

- (i) Sit on a seat with soles fully stepped on the floor and hands holding dumbbells of weight suitable for you.
- (ii) Lift up the ankles and then return to the starting position.



4.4.5.7 Biceps Curl (Photos 81-82)

- (i) Stand upright with legs at shoulder's width apart and eyes looking forward.
- (ii) Keep elbows close to your sides.
- (iii) Lift the dumbbells of weight suitable for you up towards your shoulders and then return to the starting position.



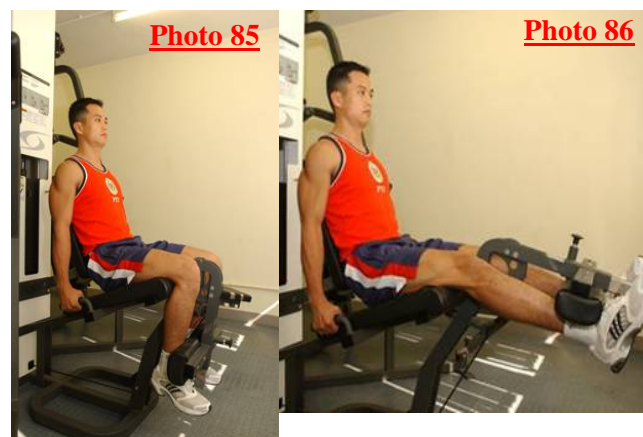
4.4.5.8 Leg Raise (Photos 83-84)

- (i) Support the body with elbows fully placing on the pads and eyes looking forward.
- (ii) Raise both knees to your chest with bent legs and then return to the starting position.



4.4.5.9 Leg Extension (Photos 85-86)

- (i) Sit on the seat with the back of the knees against the pad and the instep against the pad of the pedals, and use a weight suitable for you.
- (ii) Hold the sides of the bench by hands.
- (iii) Fully extend the knees and then slowly lower the weight to the starting position.



(Note: This exercise should not be performed by participants who have undergone reconstructive knee surgery.)

4.4.5.10 Tricep Extension (Photos 87-88)

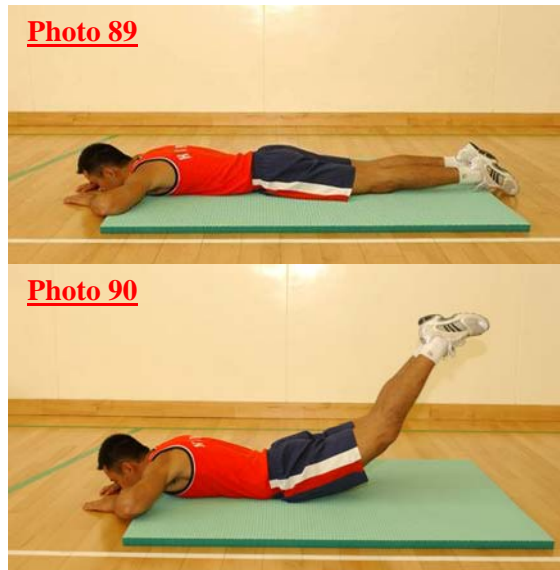
- (i) Stand up with knees slightly bent and use a weight suitable for you.

- (ii) Place hands on the bar with 15cm apart.
- (iii) Keep upper arms close at sides.
- (iv) Extend the arms until they are almost straight and the bar is at mid-thigh.
- (v) Slowly return the bar to the starting position.
- (vi) Upper arms should remain in contact with sides.
- (vii) Do not allow elbows to move forward and away from the body.



4.4.5.11 Double Backward Leg Raise (Photos 89-90)

- (i) Take a front lying position with arms placing on the floor and the palms facing downward.
- (ii) Hold down the chest.
- (iii) Lift both legs upward with the legs holding straight to clear the thighs from the floor.



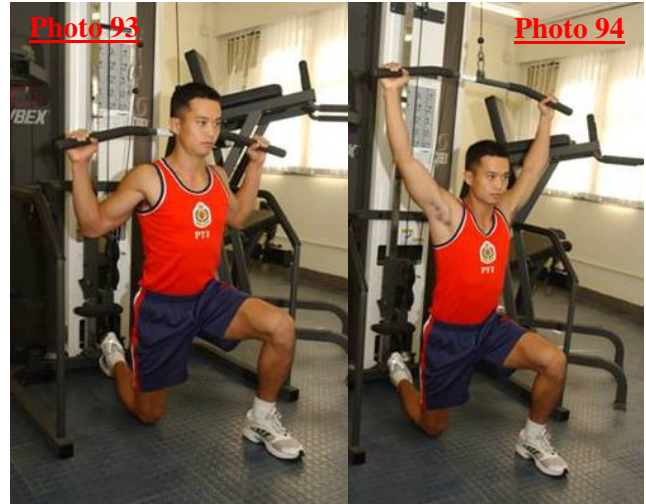
4.4.5.12 Leg Curl (Photos 91-92)

- (i) Lie flat on machine bench with top of knees just off the pad and ankle roller situated on the heels and use a weight suitable for you.
- (ii) Flex the knees until ankle roller reaches the buttocks.
- (iii) Keep hips down and stomach in contact with pad throughout the motion.
- (iv) Lower the weight slowly to the starting position.



4.4.5.13 Lat Pull Down (Photos 93-94)

- (i) Adjust the position of legs to allow full range of motion and use a weight suitable for you.
- (ii) Hold the bar in reverse grip with the palms facing forward.
- (iii) Pull the bar straight down to the shoulder and then slowly return to the starting position.



4.4.5.14 Dumbbell Side Bend (Photos 95-96)

- (i) Stand upright with feet at shoulder's width apart and eyes looking forward.
- (ii) Each hand holds the dumbbells of weight suitable for you.
- (iii) Bend the body to one side and then to the other.



4.4.5.15 Half Squat over a Bench (Photos 97-98)

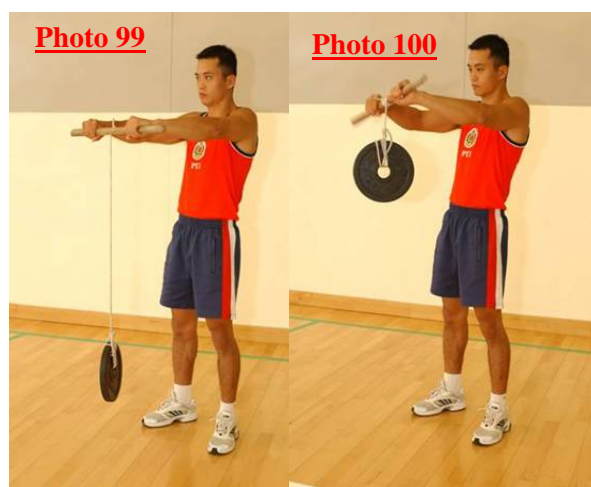
- (i) Sit on a bench about calf's height with feet about shoulder's width apart and toes slightly outward.
- (ii) Place the barbell with weights suitable for you on the back of the neck with support from the shoulders.
- (iii) Hold the barbell at the end of the bar by both hands.

- (iv) Stand up and then slowly squat down onto the bench and then repeat.
(Note: This exercise should be performed with a partner for safety reason)



4.4.5.16 Wrist Rollers (Photos 99-100)

- (i) Stand erect.
- (ii) Grab a bar hinging a weight suitable for you by a string with both palms facing the floor.
- (iii) Alternately roll each wrist to wind up and then lower the weight.
- (iv) Repeat the actions with palms upward.



4.4.5.17 Hyperextension (Photos 101-102)

- (i) Take a front lying position with legs hooked on the pedals and eyes looking at the floor and arms across the chest.
- (ii) Flex the upper part of the body and then return to the starting position.



4.4.5.18 Half Squat (Photos 103-104)

- (i) Stand erect with feet at shoulder's width apart and turn your feet slightly outward.

- (ii) Place the barbell with weights suitable for you across your shoulder.
- (iii) Hold the barbell at the end of the bar by both hands.
- (iv) Keep your back straight at all times.
- (v) Keep the head straight or slightly upward without looking down.
- (vi) Descend slowly until reaching the sticking point, halfway to the bottom. Push upward and return to the starting position. The thighs should be parallel to the floor with the head looking up.



(Note: This exercise should be performed with a partner and the participant should wear a waist belt for protection.)

4.4.5.19 Underhand Wrist Curl (Photo 105)

- (i) Kneel down and put an arm on a bench with a dumbbell of weight suitable to you in hand and palm facing upward.
- (ii) Curl up the weight and slowly return to the starting position.
- (iii) Repeat the above movements with the other hand.



4.4.5.20 Reverse Wrist Curl (Photo 106)

- (i) Kneel down and put an arm on a bench with a dumbbell of weight suitable to you in hand and palm facing downward.
- (ii) Curl up the weight and slowly return to the starting position.
- (iii) Repeat the above movements with the other hand.



4.4.5.21 Seated Rowing (Photos 107-108)

- (i) Sit upright with legs slightly bent in front.
- (ii) Pull bar towards your body at waist level and return to the starting position.



4.4.5.22 Split-squats with Weight (Photos 109-111)

- (i) Hold dumbbell in each hand of weight suitable for you and stand with feet together, then step backward with one foot about 65cm away from the body.
- (ii) Keep back straight and arms down at side with eyes looking forward, slowly bend both legs.
- (iii) Lower slowly until your backward knee barely touches the floor.
- (iv) Keep forward leg vertical throughout motion with knee directly over ankle. If knee tends to move forward over the toes, adjust back foot further backward.
- (v) Repeat the above movements with the other leg.



5. Simulated Exercise Programme

5.1 Apart from performing the preceding stretching exercises, circuit training and resistance training, applicants should do exercises similar to the Physical Fitness

Test and the Job-related Performance Test for specificity and adaptation. Practice and training in the specific activity is crucial because much of the improvement in muscular strength and endurance depends on skill learning and new muscular adaptation required for the physical tasks. As you get used to the tests, you would feel more comfortable and confident in taking the tests and be able to avoid some unnecessary mistakes.

5.2 The simulated exercises are designed to improve your physical abilities to pass the Physical Fitness Test and the Job-related Performance Test. The simulated exercises are as follows:

5.2.1 **Physical Fitness Test**

5.2.1.1 Yo-Yo Endurance Test

The Yo-Yo Endurance Test assesses your aerobic fitness. The passing standard of the test has been set at level 7:1. This is the minimum aerobic fitness required to perform fire-fighting and rescue jobs. The passing level equates approximately to a running distance of 1000m within a specific time of about 7 minutes 30 seconds.

With a view to improving the aerobic fitness, you may perform the field tests such as the 9-min walk run, 12-min walk run, 15-min walk run, 1-mile run, 1.5-mile run and 3-mile run. Finally, you should practise a shuttle run with 20m apart in a basketball court and run for 50 times within the specified time. You can use any part of your body to touch the end lines.

5.2.1.2 Pronated Chin-up

With exercises mentioned in the circuit training and the weight training such as hand grip, wrist rollers and wrist curls, you are reminded to do more back exercises such as chin-ups, deadlifts, shoulder press and rows to develop of grip strength and upper body strength. For specificity, you can perform the pronated chin-up in the public playground as indicated in Photo 112.



5.2.1.3 Vertical Jump

With the use of the prior training programmes to build up your muscular strength and endurance, you are advised to perform the vertical jump. For safety, you perform the test and land on a mat with a partner standing in front of you as a supporter .

5.2.1.4 Parallel Bar Dip

Similar exercises such as arm-dips and triceps extension have been included in the preceding training programmes. Applicants should try to perform the arm-dips as required in the fitness club or the public playground installed with the parallel bars.

5.2.1.5 Bent-knee Sit-ups

Many abdominal and back exercises have been indicated in the preceding circuit training and weight training programmes. Such exercises are adequate for you to cope with the Bent-knee Sit-ups of the Tests.

5.2.1.6 Push-ups

Having built up muscular strength and endurance in the preceding training programme, applicants are advised to do push-up action to the required standard.

5.2.1.7 Sit-and-Reach

Applicants are encouraged to do more stretching exercise especially on lower backs and lower limbs highlighted in the warm-up for improvement of hip and low back flexibility. Before you try the sit and reach exercise, you should do adequate warm-up exercises and then perform a transitional sit and reach exercise by sitting on a bench with one leg straight and one bent leg (Photo 113). Flex your upper limb with hands stretching to touch a distance as far as possible and then repeat the movement with the alternate leg (Photo 114). Finally, you should perform the sit and reach exercise to the required standard.



5.2.1.8 Burpee (Photos 115-118)

Having taken up the skill, you are advised to do smooth burpee action progressively.



5.2.2 Job-related Performance Test for Fire and Ambulance Streams

There are four job-related performance tests for each fire and ambulance streams. The tests are designed to simulate the physical demands of a firefighter's and an ambulanceman's job which requires muscular strength and endurance, flexibility, dynamic balance, cardiovascular efficiency, agility and inherent motor abilities. The job-related performance tests are:

5.2.2.1 Job-related Test Items for Fire Stream

5.2.2.1.1 Stair Climb

Depending on the rate of travel, the cardiovascular fitness level and the size of the individual, the energy systems necessary to support this activity could be aerobic or anaerobic. In match with the time required to perform this task, applicants should do more practice for improving the anaerobic energy system.

Stair-climbing exercises, particularly practising under a loaded condition have the most effectiveness on the preparation for this task. But



any form of aerobic fitness training such as endurance running and stepping mentioned in the preceding topics is beneficial. Unloaded stair-climbing, and resistance exercises that improve lower body strength such



as squats and deadlifts, will also be helpful. You may practise stair-climbing with load on a staircase machine as indicated in Photo 119. Finally, you should wear a rucksack carrying a load with a weight of about 26kg as indicated in Photo 120-121 to practise climbing staircase up to 3/F.

5.2.2.1.2 Ladder Climb

Applicants are advised to practise ladder climb with a rucksack of about 11kg load in a gymnasium as indicated in Photo 122-123 or a public playground installed with a ladder. However some inherent motor abilities such as attitude to height cannot be overcome by means of practice,

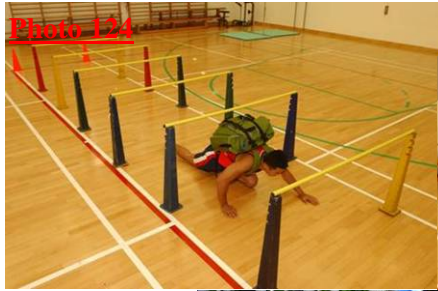


applicants are not recommended to practise ladder climb to a height of 7.8m or above without safety measures and supervision.

5.2.2.1.3 Tunnel Crawl (Photos 124-125)

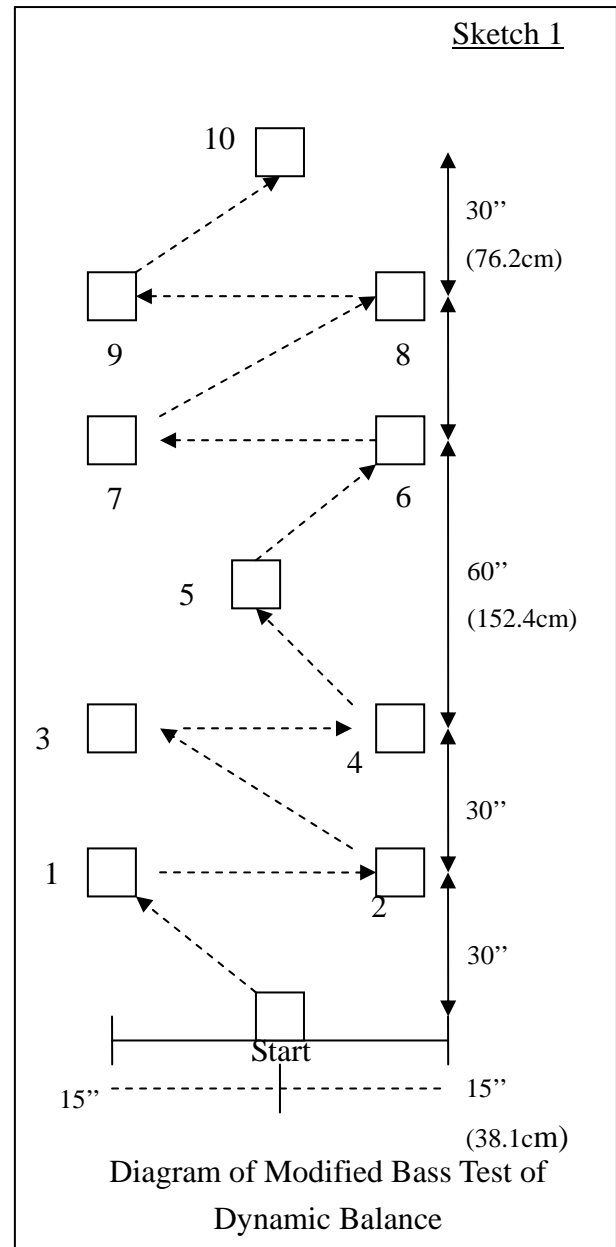
Applicants are advised to practise crawling on hands and knees (wearing sweat pants and kneepads) for a distance of at least 10m. You should keep your body low so as not to contact an object 0.9m (diameter of the tunnel used in the test) above the ground. When you feel comfortable and able to take up this skill, you should wear a rucksack with a weight of about 11kg on your back for crawling practice as indicated in Photos 124-125. However some of inherent motor abilities such as attitude to confined space cannot be overcome by ways of practice, applicants with fear of working in a confined space should be accompanied by a partner practising tunnel crawl. Photos 126-127 below show the types of tunnel in

public playground.



5.2.2.1.4 Obstacle Course

Applicants are advised to practise the “Modified Bass Test for Dynamic Balance” according to the diagram at Sketch 1. You stand on the right foot on the starting point and then hop to the first tape mark with the left foot and hold a static position for 5 seconds. After this, you hop to the second tape mark with the right foot and hold a static position for 5 seconds. You continue with alternate foot hopping and holding a static position for 5 seconds until the course is completed. The sole of your foot must completely cover each tape mark so that it cannot be seen. A successful performance consists of covering each tape much smaller in size than the sole of the foot, without



touching the floor with your heel or any other part of the body, and holding a static position on each tape mark for 5 seconds without exposing it.

For a simulated training, the applicant can perform the obstacle course on a basketball court at a distance of 23m by wearing a rucksack of 11kg in weight and carrying a load of about 6kg to step over two swimming buoys placed about 8m from the starting line and pass through a bar at a height of 1.5m and then cross the finishing line (Photo 128-130).



5.2.2.2 Job-related Test Items for Ambulance Stream

5.2.2.2.1 Locate Equipment (Photos 131-132)

Applicants should run upstairs for 2 to 3 steps to fetch an overhead object and then run downstairs and for a further distance of 15–20m to a finishing line.



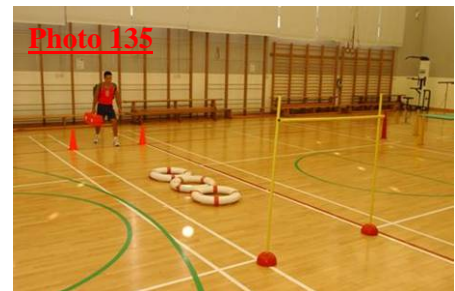
5.2.2.2.2 Peg Test (Photos 133-134)

Applicants can practise a modified simple test by standing upright with one hand holding an overhead bar of about 2m in height and the other hand fully placing on a table about 30cm in height. Whilst the hand holding firmly the overhead bar, you pick up a bean with the other hand and place it into a bottle. You repeat until you finish a total of 10 beans.



5.2.2.2.3 Obstacle Test (Photo 135)

Applicants can follow the principle and setup of the Obstacle Test of fire stream with a shorter distance of 10m and stepping in and out of three swimming buoys for practice.



5.2.2.2.4 Stair Climb

Applicants can follow the same principle and setup of Stair Climb of fire stream for practice.

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1. Don R. Kirkendall, Joseph J. Gruber, Robert E. Johnson (1987).
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3. ACSM's Guidelines for Exercise Testing and prescription (6th ed.), 2000.
4. The Fire Services Joint Labor Management Wellness/ Fitness Initiative
(1999). Candidate Physical Ability Test.

PAR-Q & YOU

(A Questionnaire for People Aged 15 to 69)

Regular physical activity is fun and healthy, and increasingly more people are starting to become more active every day. Being more active is very safe for most people. However, some people should check with their doctor before they start becoming much more physically active.

If you are planning to become much more physically active than you are now, start by answering the seven questions in the box below. If you are between the ages of 15 and 69, the PAR-Q will tell you if you should check with your doctor before you start. If you are over 69 years of age, and you are not used to being very active, check with your doctor.

Common sense is your best guide when you answer these questions. Please read the questions carefully and answer each one honestly: check YES or NO.

- | YES | NO | |
|--------------------------|--------------------------|--|
| <input type="checkbox"/> | <input type="checkbox"/> | 1. Has your doctor ever said that you have a heart condition <u>and</u> that you should only do physical activity recommended by a doctor? |
| <input type="checkbox"/> | <input type="checkbox"/> | 2. Do you feel pain in your chest when you do physical activity? |
| <input type="checkbox"/> | <input type="checkbox"/> | 3. In the past month, have you had chest pain when you were not doing physical activity? |
| <input type="checkbox"/> | <input type="checkbox"/> | 4. Do you lose your balance because of dizziness or do you ever lose consciousness? |
| <input type="checkbox"/> | <input type="checkbox"/> | 5. Do you have a bone or joint problem (for example, back, knee or hip) that could be made worse by a change in your physical activity? |
| <input type="checkbox"/> | <input type="checkbox"/> | 6. Is your doctor currently prescribing drugs (for example, water pills) for your blood pressure or heart condition? |
| <input type="checkbox"/> | <input type="checkbox"/> | 7. Do you know of <u>any other reason</u> why you should not do physical activity? |

If
you
answered

YES to one or more questions

Talk with your doctor by phone or in person BEFORE you start becoming much more physically active or BEFORE you have a fitness appraisal. Tell your doctor about the PAR-Q and which questions you answered YES.

- You may be able to do any activity you want — as long as you start slowly and build up gradually. Or, you may need to restrict your activities to those which are safe for you. Talk with your doctor about the kinds of activities you wish to participate in and follow his/her advice.
- Find out which community programs are safe and helpful for you.

NO to all questions

If you answered NO honestly to all PAR-Q questions, you can be reasonably sure that you can:

- start becoming much more physically active — begin slowly and build up gradually. This is the safest and easiest way to go.
- take part in a fitness appraisal — this is an excellent way to determine your basic fitness so that you can plan the best way for you to live actively. It is also highly recommended that you have your blood pressure evaluated. If your reading is over 144/94, talk with your doctor before you start becoming much more physically active.

DELAY BECOMING MUCH MORE ACTIVE:

- if you are not feeling well because of a temporary illness such as a cold or a fever — wait until you feel better; or
- if you are or may be pregnant — talk to your doctor before you start becoming more active.

PLEASE NOTE: If your health changes so that you then answer YES to any of the above questions, tell your fitness or health professional. Ask whether you should change your physical activity plan.

Informal Use of the PAR-Q: The Canadian Society for Exercise Physiology, Health Canada, and their agents assume no liability for persons who undertake physical activity, and if in doubt after completing this questionnaire, consult your doctor prior to physical activity.

No changes permitted. You are encouraged to photocopy the PAR-Q but only if you use the entire form.

NOTE: If the PAR-Q is being given to a person before he or she participates in a physical activity program or a fitness appraisal, this section may be used for legal or administrative purposes.

"I have read, understood and completed this questionnaire. Any questions I had were answered to my full satisfaction."

NAME _____

SIGNATURE _____

DATE _____

SIGNATURE OF PARENT
OR GUARDIAN (for participants under the age of majority) _____

WITNESS _____

Note: This physical activity clearance is valid for a maximum of 12 months from the date it is completed and becomes invalid if your condition changes so that you would answer YES to any of the seven questions.

